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

(11) EP 3 235 998 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.10.2017 Bulletin 2017/43

(51) Int Cl.:
E06B 3/984 *(2006.01)*

(21) Application number: **16179025.8**

(22) Date of filing: **12.07.2016**

(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 MD

(30) Priority: **18.04.2016 CN 201610243625**

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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) WOOD WINDOW, WOOD DOOR, AND CORNER JOINT FOR WOOD DOORS AND WINDOWS

(57) A corner joint for wood doors and windows includes a first timber and a second timber. An end surface of an end of the first timber perpendicularly abuts against a side surface of an end of the second timber. A position-fixing structure with concave and convex surfaces is formed between the abutting surfaces, abutting against each other, of the first timber and the second timber, and is configured to fix the position of the end surface of the first timber in a length direction of the second timber. After the first timber perpendicularly abuts against the second timber, the position of the first timber is fixed by the position-fixing structure, thus preventing the end surface of the first timber from moving in the length direction of the second timber. A wood window and a wood door both employing the corner joint are further provided.

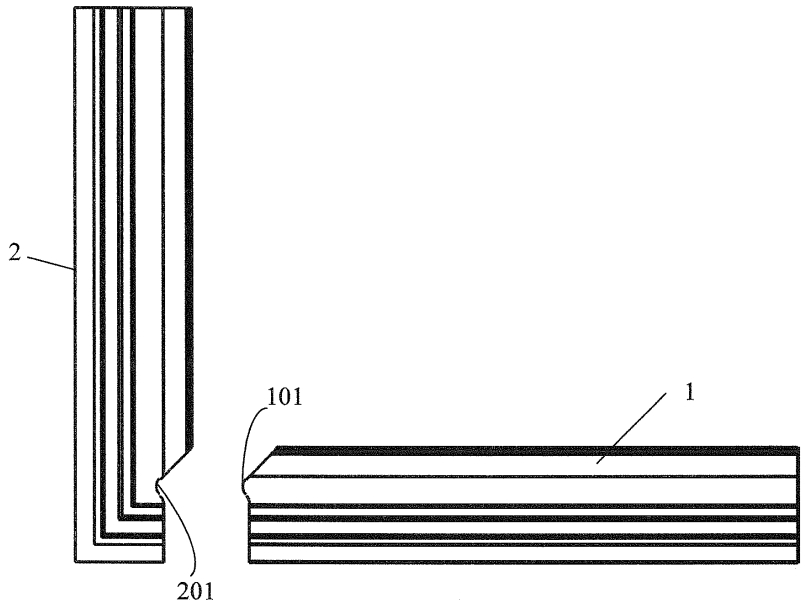

Fig. 2

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Description

FIELD

[0001] This application relates to the technical field of wood doors and windows, and particularly to a corner joint for wood doors and windows. The present application further relates to a wood window and a wood door each using the corner joint.

BACKGROUND

[0002] Wood doors and windows are mainly referred to solid wood doors and windows and aluminium-clad wood doors and windows, and they both have a long production history around the world. Presently, European aluminium-clad wood windows are mainstream products, and are optimal among various kinds of doors and windows of different materials in aspects such as heat preservation, sound insulation, environmental protection, residential comfort, and etc. However, the European aluminium-clad wood windows has a complicated production process, and thus many parts require quality assurance, among which, the corner joint for doors and windows is a key factor influencing the qualities of wood doors and windows.

[0003] At present, there are mainly three kinds of corner joints in the market, including a tongue and groove joint, a bolt joint, and a 45-degree dovetail joint. In the tongue and groove joint, the mating members are coated with glue and then are pressed by a press machine, and since the tongue and groove joint is a rigid connection, internal stress generated due to swelling and shrinkage of wood in response to climate changes is hard to eliminate, and thus the corner of the wood door or window is apt to crack over a period time. Further, this production process can only perform paint spraying, sanding and fastener installation after a door frame or a window frame is assembled, while the assembled door frame or window frame is large and heavy, therefore, the operation is difficult to perform, the working procedure is complicated, more requirements are imposed on the apparatus and the production cycle is long. The bolt joint can produce each mating member individually with a single timber, and perform paint spraying and sanding on the produced mating member and then assembles these mating members, thus the process is simple. However, there are still deficiencies in the bolt joint. The bolt joint has two connection manners, including a splice joint having complementarily configured ends and a flat-head dowel joint. In the splice joint having complementarily configured ends, two perpendicularly abutted timbers are spliced together at their mating ends, an outer profile of each mating end has multiple stepped shapes, and then the two timbers are fixed by a bolt, and an over positioning is caused due to too many contacting surfaces, and under the action of swelling and shrinkage of the timbers, a slit is apt to form at the junction of the complementarily configured ends. In the flat-head dowel joint, two perpendicularly abutted timbers are positioned at the junction thereof by a planar surface and a dowel perpendicular to the planar surface and are fixed by a bolt. Although the two timbers positioned by the dowel may be prevented from moving in the abutting plane even after undergoing many times of swelling and shrinkage, a slit may still form at the corner junction, where inclined surfaces are spliced, due to swelling and shrinkage of the timbers, and thus water seepage, dust accumulation and even fungi growth may be caused accordingly. Further, the load-bearing capacity is low since the weight of the door or the window is also born by the dowel.

[0004] In conclusion, a technical issue to be addressed by the person skilled in the art is to make the connection structure for wood doors and windows have a simple structure, being convenient to manufacture, have a high structural strength and a good weatherability.

SUMMARY

[0005] In view of this, an object of the present application is to provide a corner joint for wood doors and windows, which simplifies the connection structure of the wood doors and windows, is convenient to install and manufacture, and also ensures the structural strength of the wood doors and windows, and improves the connection quality of at the corner of the wood doors and windows.

[0006] Another object of the present application is to provide a wood window and a wood door both employing the above corner joint, to facilitate installing and manufacturing and improve the quality of the wood window and the wood door.

[0007] In order to achieve the above objects, the following technical solutions are provided according to the present application.

[0008] A corner joint for wood doors and windows includes a first timber and a second timber, an end surface of an end of the first timber perpendicularly abuts against a side surface of an end of the second timber, and a position-fixing structure with concave and convex surfaces is formed between abutting surfaces, abutting against each other, of the first timber and the second timber, and is configured to fix a position of the first timber in a length direction of the second timber.

[0009] Preferably, in the corner joint, the position-fixing structure with concave and convex surfaces includes one pair of or a plurality of pairs of projections and concave recesses matching with each other;

each of the projections is arranged on the end surface of the end of the first timber for abutting the second timber, each of the concave recesses is arranged on the side surface of the end of the second timber for abutting the first timber; or, each of the projections is arranged on the side surface of the end of the second timber for abutting the first timber, and each of the concave recesses is arranged on the end surface of the end of the first timber

for abutting the second timber; and
an axis of the concave recess is perpendicular to a plane defined by the first timber and the second timber.

[0010] Preferably, in the corner joint, the concave recess is a curved concave recess.

[0011] Preferably, in the corner joint, the concave recess is a circular arc-shaped curved concave recess.

[0012] Preferably, in the corner joint, a profile of a cross section of the concave recess, taken in a direction perpendicular to the axis of the concave recess, is in a V shape, a rectangular shape or a trapezoid shape.

[0013] Preferably, in the corner joint, the concave recess and the projection are both processed by a numerical control machine.

[0014] Preferably, in the corner joint, the end surface of the end of the first timber for abutting the second timber and the side surface of the end of the second timber for abutting the first timber are fixed by gluing or by a tension bolt.

[0015] A wood door is further provided according to the present application, which includes a door frame and a door panel, and a corner joint of the door frame is the corner joint according to any one of the above solutions.

[0016] A wood window is further provided according to the present application, which includes a window frame and a window sash, and a corner joint of the window frame is the corner joint according to any one of the above solutions.

[0017] Preferably, in the wood window, a corner joint of the window sash is the corner joint according to any one of the above solutions.

[0018] Compared with the conventional technology, the present application has the following advantages.

[0019] In the corner joint of wood doors and windows according to the present application, the end surface of the end of the first timber abuts against the side surface of the end of the second timber. The position-fixing structure with concave and convex surfaces is formed between the abutting surfaces, abutting against each other, of the first timber and the second timber, and is configured to fix the position of the end surface of the first timber in the length direction of the second timber. The corner joint has a simple structure. After the first timber perpendicularly abuts against the second timber, the position of the first timber is fixed by the position-fixing structure with concave and convex surfaces, thus preventing the end surface of the first timber from moving in the length direction of the second timber. The load-bearing capacity of the position-fixing structure with concave and convex surfaces is enhanced, thus, the connection strength of the corner joint is increased. Furthermore, the engagement of the position-fixing structure with concave and convex surfaces can be ensured even in case of swelling and shrinkage, and a slit is not apt to form in the position-fixing structure, thus, the weatherability of the corner joint is increased.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] For more clearly illustrating embodiments of the present application or the technical solutions in the conventional technology, drawings referred to describe the embodiments or the conventional technology will be briefly described hereinafter. Apparently, the drawings of the present application in the following description are only some examples of the present application, and for the person skilled in the art, other drawings may be obtained based on these drawings without any creative efforts.

Figure 1 is a schematic view of a corner joint of a window sash of a wood window according to an embodiment of the present application;

Figure 2 is a front view of the corner joint of the window sash of the wood window according to the embodiment of the present application;

Figure 3 is a schematic view of a corner joint of a window frame of the wood window according to an embodiment of the present application; and

Figure 4 is a front view of the corner joint of the window frame of the wood window according to the embodiment of the present application.

Reference Numerals in Figures 1 to 4:

1	first timber,	101	projection,
2	second timber, and	201	concave recess.

DETAILED DESCRIPTION

[0021] An object of the present application is to provide a corner joint for wood doors and windows, which simplifies the connection structure of the wood doors and windows, is convenient to install and manufacture, and also ensure the structural strength of the wood doors and windows, and improves the connection quality of at the corner of the wood doors and windows.

[0022] A wood window and a wood door both employing the corner joint are further provided according to the present application, which are convenient to install and manufacture and have improved quality.

[0023] The technical solutions in the embodiments of the present application will be described clearly and completely hereinafter in conjunction with the drawings in the embodiments of the present application. Apparently, the described embodiments are only a part of the embodiments of the present application, rather than all embodiments. Based on the embodiments in the present application, all of other embodiments, made by the person skilled in the art without any creative efforts, fall into the scope of the present application.

[0024] Referring to Figures 1 to 4, a corner joint for wood doors and windows is provided according to an embodiment of the present application, and is referred to as a corner joint hereinafter for brevity. The corner joint includes a first timber 1 and a second timber 2. An end surface of an end of the first timber 1 perpendicularly abuts against a side surface of an end of the second timber 2. A position-fixing structure with concave and convex surfaces is formed between the abutting surfaces, abutting against each other, of the first timber 1 and the second timber 2, and is configured to position the end surface of the first timber 1 in the length direction of the second timber 2.

[0025] The structure of the above corner joint is simple, and the position of the first timber 1 is fixed by the position-fixing structure with concave and convex surfaces after the first timber 1 perpendicularly abuts against the second timber 2, thereby preventing the end surface of the first timber 1 from moving in the length direction of the second timber 2. Compared with the conventional corner joint using a dowel and a flat surface for position fixing, the position-fixing structure with concave and convex surfaces has an improved load-bearing capacity, thus the connection strength of the corner joint is increased. Also, the engagement of the position-fixing structure with concave and convex surfaces can be ensured even in case of swelling and shrinkage, and a slit is not apt to form in the position-fixing structure. Therefore, the weatherability of the corner joint is increased and the connection quality of the wood doors and windows is improved.

[0026] As shown in Figures 2 and 4, a specific position-fixing structure with concave and convex surfaces is provided according to this embodiment, which includes a pair of or multiple pairs of projections 101 and concave recesses 201 matching with each other. The projection 101 is provided on the end surface of the end of the first timber 1 for abutting the second timber 2, and the concave recess 201 is provided on the side surface of the end of the second timber 2 for abutting the first timber 1, that is, a groove-shaped structure is formed by removing material at the side surface of this end of the second timber 2. The outer profile of the projection 101 matches with the outer profile of the concave recess 201, and an axis of the concave recess 201 is perpendicular to a plane defined by the first timber 1 and the second timber 2, that is, the straight line defied by the bottom of the concave recess is perpendicular to this plane, thus, the end surface of the first timber 1 is restricted from moving on the side surface of the end of the second timber 2 in the length direction of the second timber 2. Preferably, one pair of projection 101 and concave recess 201 is provided, and in this case, the structure is simple, and the less the projection 101 and the concave recess 201 are provided, the higher the structure strength of the corner joint is. Of course, two pairs, three pairs or more pairs of the projections 101 and the concave recesses 201 may also be provided. If multiple pairs are provided, the multiple pairs of the projections 101 and the concave recesses 201 are arranged in parallel with each other.

[0027] In addition to the structure shown in Figures 2 and 4, the position-fixing structure with concave and convex surfaces may also be embodied as the following structure. The projection 101 is provided at the side surface of the end of the second timber 2 for abutting the first timber 1, and the concave recess 201 is provided at the end surface of the end of the first timber 1 for abutting the second timber 2. The axis of the concave recess 201 is perpendicular to the plane defined by the first timber 1 and the second timber 2, that is, the arrangement position of the projection 101 and the concave recess 201 in the position-fixing structure in this embodiment is opposite to that of the position-fixing structure shown in Figures 2 and 4, and may achieve the position-fixing effect as well.

[0028] Further, in this embodiment, the concave recess 201 is preferably embodied as a curved concave recess. That is, the shape of the cross section of the concave recess 201 taken in a direction perpendicular to the axis of the concave recess 201 is a curve. In this case, the structural strength of the corner joint can be increased while the position-fixing effect is achieved.

[0029] Still further, the concave recess 201 is a circular arc-shaped curved concave recess. That is, the outer profile of each of the concave recess 201 and the projection 101 in the cross section perpendicular to the axis of the concave recess 201 is of a circular arc shape. The concave recess 201 and the projection 101 are rotatable with respect to each other, thus, in case of swelling and shrinkage, the concave recess 201 and the projection 101 can rotate with respect to each other to self-adaptively perform a fine position adjustment, to allow the engagement therebetween to be tighter, and to further improve the connection quality. An inclined surface and a flat surface are further provided on the side surface of the end of the second timber 2 for abutting the first timber 1 and are respectively connected to two edges of the circular arc-shaped curved concave recess. The flat surface is arranged close to the end of the second timber 2. Correspondingly, an inclined surface and a flat surface are also provided at the end surface of the end of the first timber 1 for abutting the second timber 2 and are configured to cooperate with the abutting surface of the second timber 2. The two inclined surfaces can further realize the position-fixing effect.

[0030] Of course, the concave recess 201 and the projection 101 may also be embodied as other shapes. For example, the cross section of the concave recess 201 perpendicular to the axis of the concave recess 201 may have a V-shaped profile, a rectangular profile or a trapezoid profile, which can also realize the position-fixing effect, just the structural strength of the connection structure with these shapes is not as good as the structural strength of the curved concave recess.

[0031] In order to increase the accuracy of the fit between the concave recess 201 and the projection 101, the concave recess 201 and the projection 101 according

to this embodiment are both processed by a numerical control machine.

[0032] Since the position-fixing structure with concave and convex surfaces is employed in the corner joint according to this embodiment, the end surface of the end of the first timber 1 and the side surface of the end of the second timber 2 for abutting each other may be glued and then press fit together or may be fixed by a tension bolt. With this corner joint, sanding, paint spraying and similar treatment may be performed on the timbers individually before the timbers are assembled, which facilitates the processing and manufacturing of the wood doors and windows.

[0033] A wood door is further provided according to an embodiment of the present application, and includes a door frame and a door panel installed in the door frame. A corner joint of the door frame employs the corner joint described in any one of the above embodiments. This wood door has a simple structure, a high structural strength and a good connection quality, and is convenient to install.

[0034] As shown in Figures 1 to 4, a wood window is further provided according to an embodiment of the present application, and includes a window frame, a window sash and glass. The glass is installed in the window sash, and the window sash is pivotally connected to the window frame. All corner joints of the window frame employ the corner joint described in any one of the above embodiments as shown in Figures 3 and 4. This wood window has a simple structure, a high structural strength at the corner and a good connection quality, and is convenient to install.

[0035] Further, in this embodiment, all corner joints of the window sash also employ the corner joint described in any one of the above embodiments as shown in Figures 1 and 2. This window sash has a simple structure, a good connection quality, a good weatherability and is convenient to install and improves the bearing strength of the glass.

[0036] The embodiments in the specification are described in a progressive manner. Each of the embodiments is mainly focused on describing its differences from other embodiments, and references may be made among these embodiments with respect to the same or similar portions among these embodiments.

[0037] Based on the above description of the disclosed embodiments, the person skilled in the art is capable of carrying out or using the present application. It is obvious for the person skilled in the art to make many modifications to these embodiments. The general principle defined herein may be applied to other embodiments without departing from the spirit or scope of the present application. Therefore, the present application is not limited to these embodiments illustrated herein, but should be defined by the broadest scope consistent with the principle and novel features disclosed herein.

Claims

1. A corner joint for wood doors and windows, comprising a first timber (1) and a second timber (2), wherein an end surface of an end of the first timber (1) perpendicularly abuts against a side surface of an end of the second timber (2), and a position-fixing structure with concave and convex surfaces is formed between abutting surfaces, abutting against each other, of the first timber (1) and the second timber (2), and is configured to fix a position of the first timber (1) in a length direction of the second timber (2).

2. The corner joint according to claim 1, wherein the position-fixing structure with concave and convex surfaces comprises one pair of or a plurality of pairs of projections (101) and concave recesses (201) matching with each other;
each of the projections (101) is arranged on the end surface of the end of the first timber (1) for abutting the second timber (201), each of the concave recesses (201) is arranged on the side surface of the end of the second timber (2) for abutting the first timber (101); or, each of the projections (101) is arranged on the side surface of the end of the second timber (2) for abutting the first timber (101), and each of the concave recesses (201) is arranged on the end surface of the end of the first timber (1) for abutting the second timber (201); and
an axis of the concave recess (201) is perpendicular to a plane defined by the first timber (1) and the second timber (2).

3. The corner joint according to claim 2, wherein the concave recess (201) is a curved concave recess.

4. The corner joint according to claim 3, wherein the concave recess (201) is a circular arc-shaped curved concave recess.

5. The corner joint according to claim 2, wherein a profile of a cross section of the concave recess (201), taken in a direction perpendicular to the axis of the concave recess (201), is in a V shape, a rectangular shape or a trapezoid shape.

6. The corner joint according to claim 2, wherein the concave recess (201) and the projection (101) are both processed by a numerical control machine.

7. The corner joint according to claim 1, wherein the end surface of the end of the first timber (1) for abutting the second timber (2) and the side surface of the end of the second timber (2) for abutting the first timber (1) are glued and then press fit together, or are fixed by a tension bolt.

8. A wood door, comprising a door frame and a door

panel, wherein a corner joint of the door frame is the corner joint according to any one of claims 1 to 7.

9. A wood window, comprising a window frame and a window sash, wherein a corner joint of the window frame is the corner joint according to any one of claims 1 to 7.

10. The wood window according to claim 9, wherein a corner joint of the window sash is the corner joint according to any one of claims 1 to 7.

Amended claims in accordance with Rule 137(2) EPC.

1. A corner joint for wood doors and windows, comprising a first timber (1) and a second timber (2), wherein an end surface of an end of the first timber (1) perpendicularly abuts against a side surface of an end of the second timber (2), and a position-fixing structure with concave and convex surfaces is formed between abutting surfaces, abutting against each other, of the first timber (1) and the second timber (2), and is configured to fix a position of the first timber (1) in a length direction of the second timber (2);
the position-fixing structure with concave and convex surfaces comprises one pair of or a plurality of pairs of projections (101) and concave recesses (201) matching with each other;
each of the projections (101) is arranged on the end surface of the end of the first timber (1) for abutting the second timber (2), each of the concave recesses (201) is arranged on the side surface of the end of the second timber (2) for abutting the first timber (1); or, each of the projections (101) is arranged on the side surface of the end of the second timber (2) for abutting the first timber (1), and each of the concave recesses (201) is arranged on the end surface of the end of the first timber (1) for abutting the second timber (2);
an axis of the concave recess (201) is perpendicular to a plane defined by the first timber (1) and the second timber (2); and
the concave recess (201) is an S-shaped curved concave recess and is configured to fix the first timber (1) and the second timber (2).

2. The corner joint according to claim 1, wherein the concave recess (201) is a circular arc-shaped curved concave recess.

3. The corner joint according to claim 1, wherein a profile of a cross section of the concave recess (201), taken in a direction perpendicular to the axis of the concave recess (201), is in a V shape, a rectangular shape or a trapezoid shape.

4. The corner joint according to claim 1, wherein the concave recess (201) and the projection (101) are both processed by a numerical control machine.

5. The corner joint according to claim 1, wherein the end surface of the end of the first timber (1) for abutting the second timber (2) and the side surface of the end of the second timber (2) for abutting the first timber (1) are glued and then press fit together, or are fixed by a tension bolt.

6. A wood door, comprising a door frame and a door panel, wherein a corner joint of the door frame is the corner joint according to any one of claims 1 to 5.

7. A wood window, comprising a window frame and a window sash, wherein a corner joint of the window frame is the corner joint according to any one of claims 1 to 5.

8. The wood window according to claim 7, wherein a corner joint of the window sash is the corner joint according to any one of claims 1 to 5.

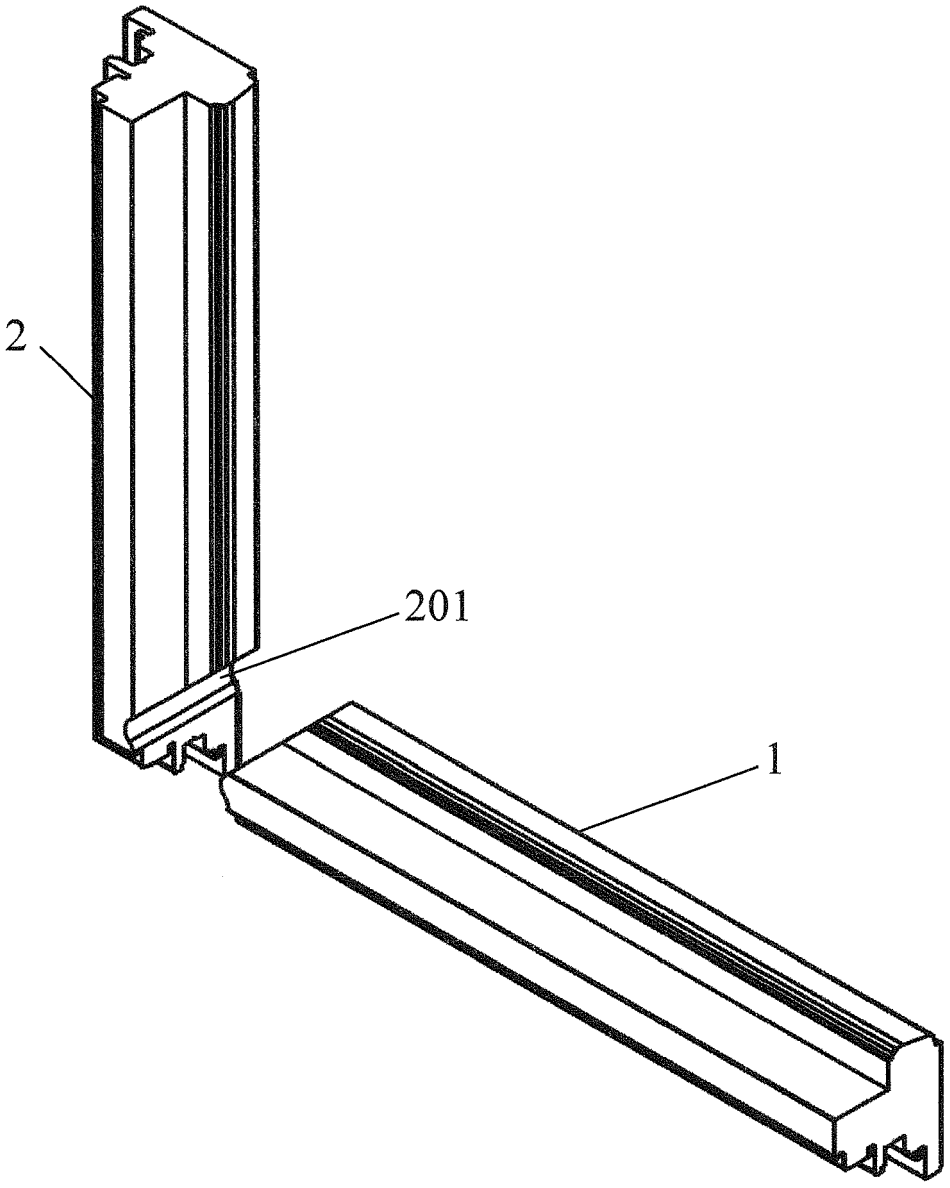

Fig. 1

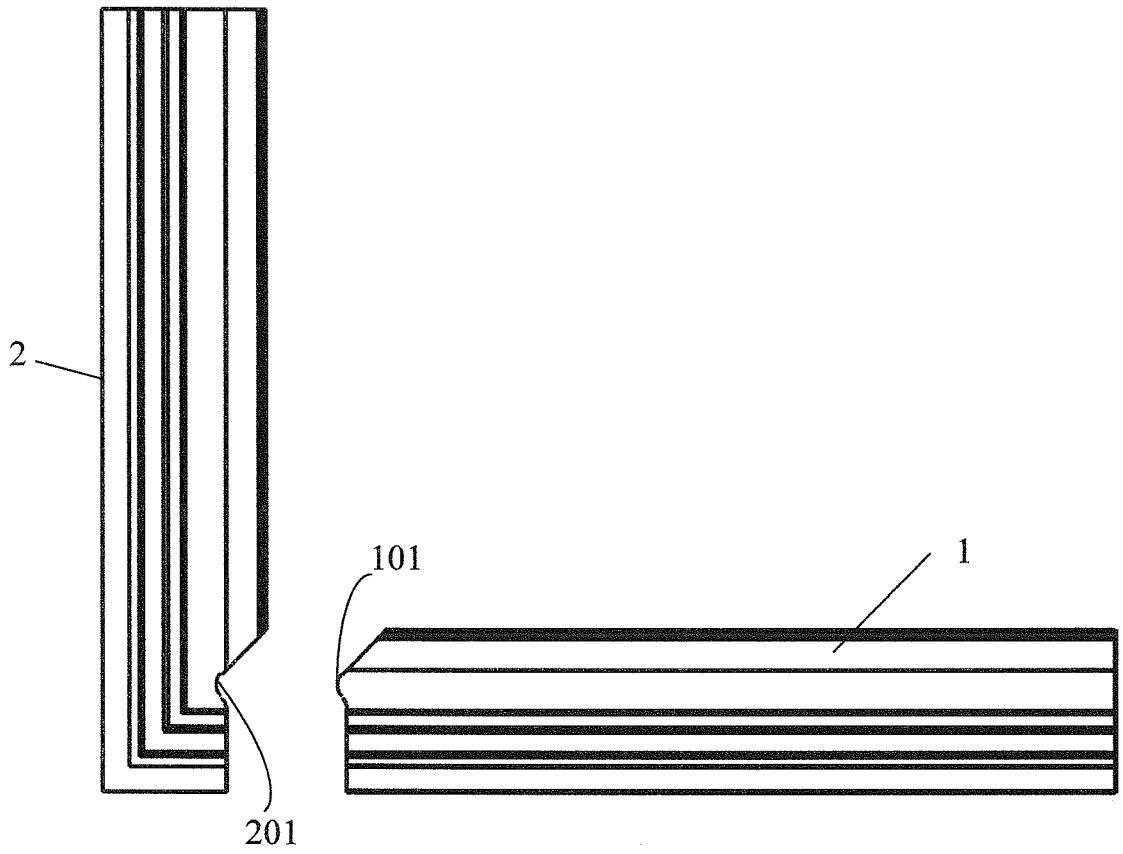

Fig. 2

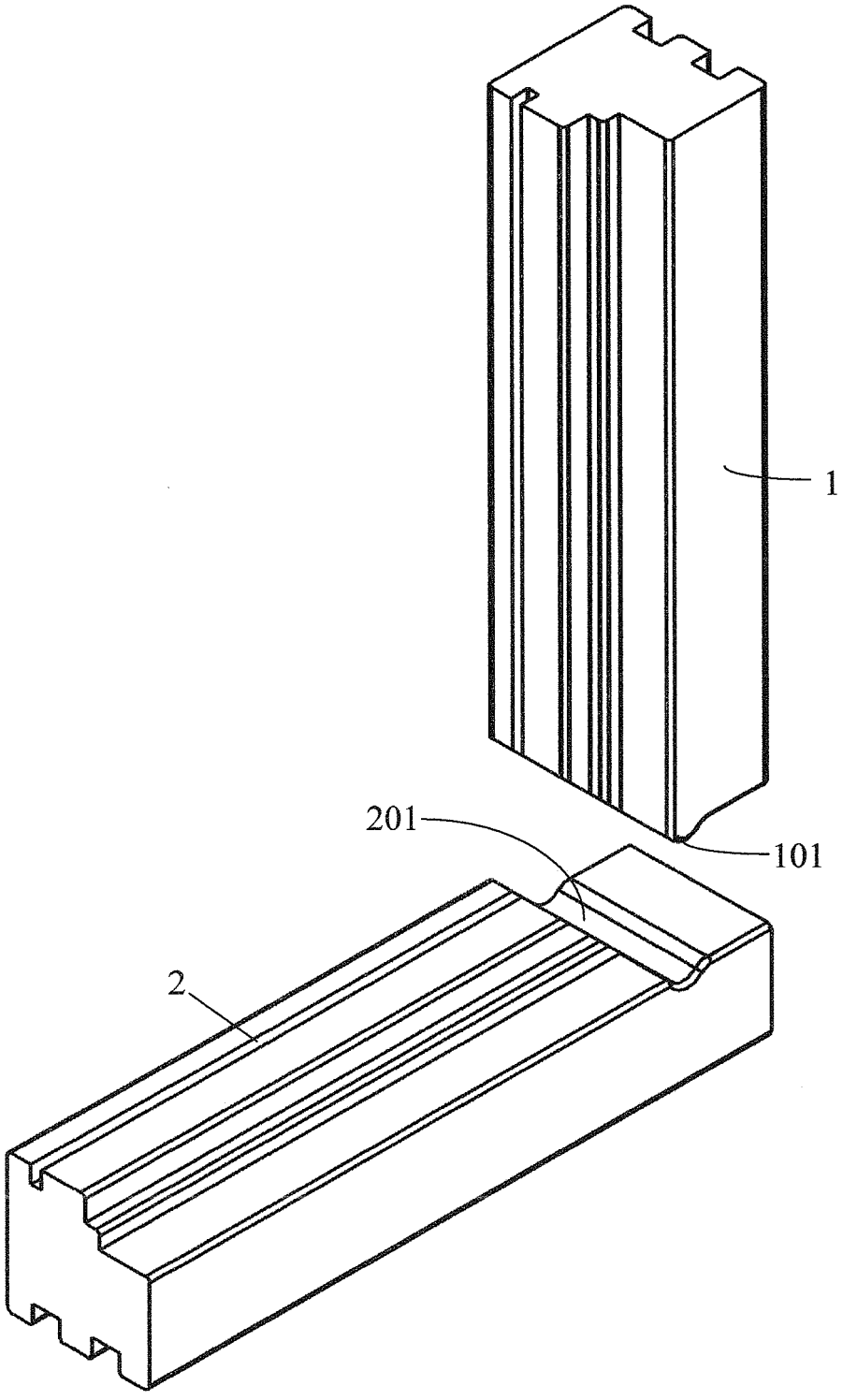

Fig. 3

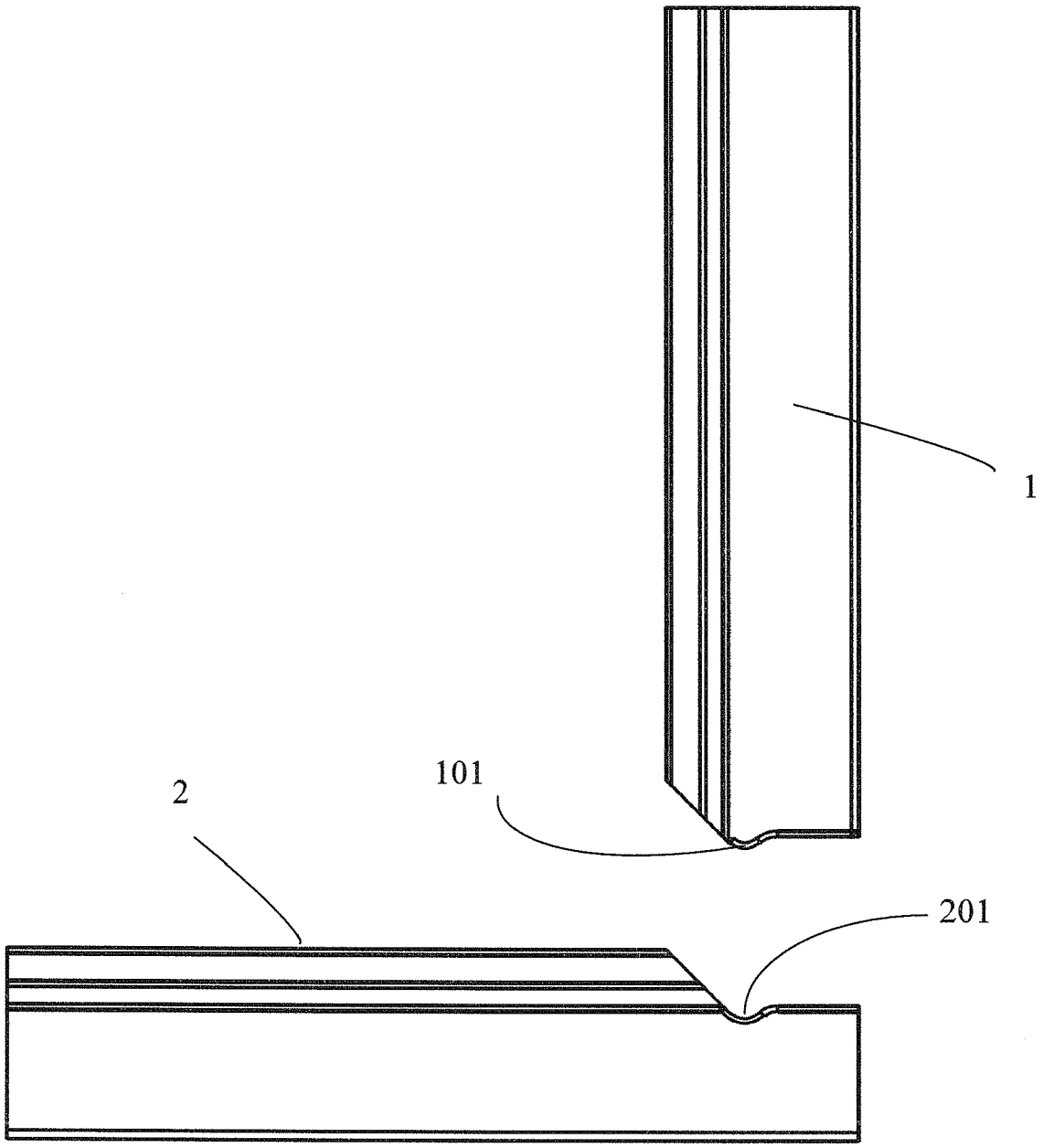

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 16 17 9025

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 0 571 321 A2 (ALBISRIEDEN FENSTER [CH]) 24 November 1993 (1993-11-24) * column 3, line 35 - line 50; figures 1-4 * -----	1-10	INV. E06B3/984

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	28 October 2016	Cobusneanu, D

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 17 9025

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
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28-10-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0571321 A2	24-11-1993	AT 185874 T	15-11-1999
		CH 685304 A5	31-05-1995
		DE 59309836 D1	25-11-1999
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