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(54) BRACKET FOR VENTILATED FACADE

(57) The present invention provides a bracket for ventilated façade with improved mechanical strength characteristics suitable for use in structures for ventilated façade, but at the same time it has a significantly lower thermal conductivity, which ensures a better thermal performance of the building.

The transverse cross-sectional shape of the provided bracket resembles a rectangle with one partially removed border, its middle parts, i.e. the shape resembles the "[_]" shape. Such transverse cross-sectional shape provides better mechanical strength characteristics without increasing the transverse cross-sectional area.

The provided bracket is formed using composite materials, polymeric resins, which are reinforced with fibres; in the present invention, fibres are made using basalt. Such material of the structure of the bracket ensures low (compared to the normal metal) thermal conductivity.

Reinforcing fibres of different orientation are used to further increase mechanical strength. In the present invention, longitudinal fibres are used, and then they are coated with a mat or fabric layer, if needed, it is further coated with a veil.

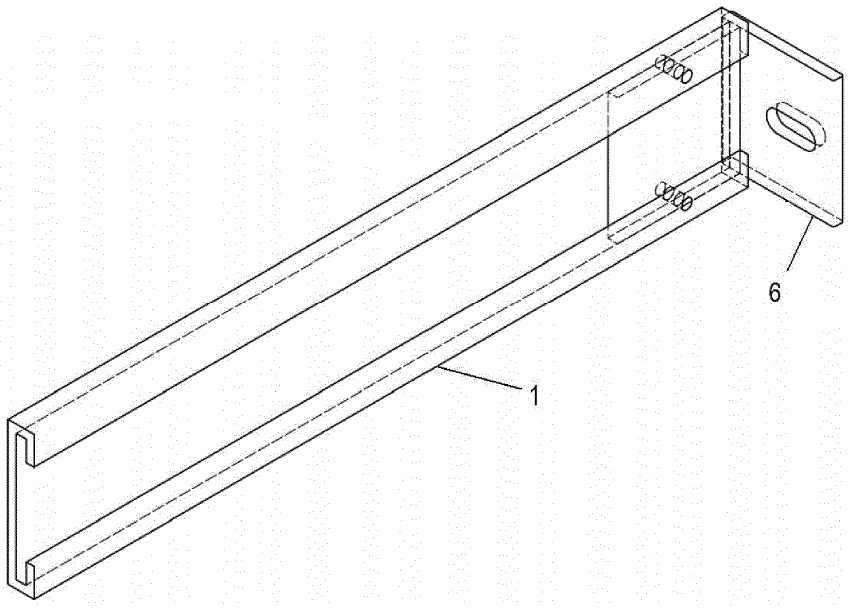

FIG. 5

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Description

FIELD OF THE INVENTION

[0001] The invention relates to the field of construction of buildings, and in particular, brackets for ventilated façade and structures thereof.

DESCRIPTION OF THE RELATED ART

[0002] The present invention provides a new bracket for ventilated façade with sufficient and higher mechanical strength to retain fagade/finishing panels, while having very low thermal conductivity. The bracket is made of a polymeric material by embedding a reinforcing fibre made of basalt. The transverse cross-sectional shape of the bracket resembles a rectangle with a removed middle part of one side, i.e. the shape resembles the "[_]" shape. Also, when forming the bracket, different layers are formed from the reinforcing fibre of different orientation which provides additional mechanical strength. Used polymeric materials have significantly lower thermal conductivity than thermal conductivity of a currently used metal.

[0003] Document GB2398580A (published on 25 August 2004) provides a structure of a retaining element used in construction of buildings for sufficient mechanical strength with low thermal conductivity. The cited document provides the retaining element having a junction made of discontinuous material; the structure comprises two separate mechanically strong parts separated by a thermal insulation layer. Thereby the retaining element of sufficiently low thermal conductivity is formed, but it is clear from the present invention to the skilled person that such retaining element does not exhibit high mechanical strength. Also, the manufacture and/or installation of such retaining element is quite complicated.

[0004] Document LT 6136 B (published on 25 March 2015) provides a structural element of buildings, a bracket for ventilated fagade, which is made of fibre glass composite, one cross-section of which is U-shaped. The cited document does not mention other materials that have higher mechanical strength, lower thermal conductivity. The cited document does not provide such transverse cross-sectional shapes that give higher strength. The cited document does not provide a possibility to direct the reinforcing fibres of the bracket in various directions.

[0005] The above examples of the related art have the following deficiencies:

- does not provide materials that are more suitable for brackets (mechanically strong with low thermal conductivity),
- the transverse cross-sectional shape does not ensure the highest strength,
- reinforcing fibres are oriented in one direction along the bracket, therefore all means for increasing strength are not used,
- the bracket is made of the discontinuous material, constructed of separate elements separated by a thermal insulation insert, which does not ensure sufficient mechanical strength.

[0006] This invention provides a new technical solution that does not have the above deficiencies.

SUMMARY OF THE INVENTION

[0007] The present invention provides a bracket for ventilated façade with improved mechanical strength characteristics suitable for use in structures for ventilated fagade, but at the same time having significantly lower thermal conductivity, which ensures better thermal performance of the building.

[0008] The transverse cross-sectional shape of the provided bracket resembles a rectangle with one partially removed border, its middle part, i.e. the shape resembles the "[_]" shape. Such transverse cross-sectional shape provides better mechanical strength characteristics without increasing the transverse cross-sectional area.

[0009] The provided bracket is formed using composite materials, polymeric resins, which are reinforced with fibres; in the present invention fibres are made using basalt. Such material of the structure of the bracket ensures low (compared to the normal metal) thermal conductivity.

[0010] Reinforcing fibres of different orientation are used to further increase mechanical strength. In the present invention longitudinal fibres are used, then they are coated with a mat or fabric layer, if needed, it is further coated with a veil..

BRIEF DESCRIPTION OF THE DRAWINGS

[0011]

Fig. 1 depicts a bracket with a transverse cross-section that resembles a rectangle with a partially removed middle part of the border, i.e. a shape resembling the "[_]" shape.

Fig. 2 depicts a bracket with a transverse cross-section that resembles a rectangle with the entirely removed border, i.e. a shape resembling the "[" shape.

Fig. 3 depicts a bracket with a transverse cross-section that resembles an elongated rectangle.

Fig. 4 depicts angular-shaped fastening elements adapted to different transverse cross-sections of the bracket.

Fig. 5 provides an overall view when a bracket for ventilated façade is used with an angular-shaped fastening element.

Fig. 6 depicts a temporary fastening spring attached to the bracket, which helps to attach a vertical structural element to the bracket.

[0012] The presented figures are more illustrative, scale, proportions and other aspects do not necessarily

correspond to a real technical solution.

THE PREFERRED EMBODIMENTS

[0013] This invention provides a structure of a bracket for ventilated façade (1), (2), (7) (Fig. 1, Fig. 2, Fig. 3). The bracket (1), (2), (7) is attached at one end (it can be attached with additional fastening means) to the outside of outer enclosures of buildings or other structural elements; finishing, façade panels or other structural elements of ventilated façade are attached to the other end of the bracket (1), (2), (7) (it can be attached with additional fastening means). Thermal insulation materials, ventilation spaces, other structural elements are installed between the outer surface of the enclosure and the finishing/fagade panels. Brackets (1), (2), (7) must be sufficiently mechanically strong to retain façade panels. On the other hand, the bracket (1), (2), (7) must have the lowest thermal conductivity, because when it penetrates through the insulating layer, one end rests on façade panels that experience outside temperature fluctuations, while the other end rests on enclosures of the building, which must be protected from outside temperature fluctuations. In other words, the bracket (1), (2), (7) must be as thermally conductive as possible in order to minimize the thermal energy effect transferred from façade panels to enclosures of the building.

[0014] The present invention provides the structure of the bracket for ventilated façade (1), (2), (7), characterized by a new cross-sectional shape of the bracket (1), (2), (7), new materials for manufacturing the bracket (1), (2), (7), new uses of these materials. The bracket of said structure (1), (2), (7) is sufficiently mechanically strong, and at the same time it is characterized by low thermal conductivity.

[0015] The transverse cross-sectional shape of the bracket (1) (Fig. 1) provided by the present invention resembles a hollow quadrangle (it may be a rectangle, a square), the middle part of one border of which is removed, i.e. the shape resembles the shape of the square bracket "[" only additionally, at each end of short borders there is, connects the part of the border that forms a right angle with each of these short borders and is directed towards the other opposite short border. The described shape resembles the "[_]" shape. Short ending borders provide the entire structure of the bracket (1) with additional mechanical strength when the bracket is exposed to bending and bending force is applied to the end of the bracket (1) to which façade panels are attached and said applied bending force is parallel to (or close to parallel) a plane, which forms said short ending transverse cross-sectional border.

[0016] Pairs of borders of opposite sides which determine the transverse cross-sectional shape may have different lengths, i.e. the cross-sectional shape can be almost flat, i.e. one continuous border is several times longer than other borders with which said longer border connects.

[0017] Another transverse cross-sectional shape of the bracket (2) provided by the present invention resembles a shape of the square bracket "[", i.e. short borders are attached to different ends of one border, which usually form a right angle with said long border.

[0018] Another transverse cross-sectional shape of the bracket (2) provided by the present invention resembles an elongated rectangle (when a length of one border is at least several times larger than the size of the other connecting border which forms an angle). Angles of said rectangle can be rounded up.

[0019] The structure of the bracket for ventilated façade (1), (2), (7) provided by the present invention is new in that reinforced composite materials used for manufacturing the bracket (1), (2), (7), which, during manufacture, depending on the position in the cross-section of the bracket (1), (2), (7), are formed with reinforcing fibres oriented in different directions.

[0020] Composite materials, into which a reinforcing fibre is embedded, are used for manufacturing the bracket (1), (2). In the present invention composite materials comprise various polymeric materials (thermosetting or thermoplastic) such as polyester resin, vinyl ester resin, epoxy resin and/or the other. The reinforcing fibre is filled with a composite material called a matrix. The matrix combines reinforcing fibres into an integral structural material. The matrix comprises the base material and additional additives that can provide the base material with additional material characteristics such as: the possibility of more accurately controlling the manufacture process, changing the colour of the matrix, forming the desired texture of the surface of the product, changing the resistance of the product to various environmental factors (for example, UV radiation), reducing the cost of raw materials and/or other.

[0021] Reinforcing fibres are fibrous materials that strengthen, bind the polymer matrix, give the polymer matrix required mechanical strength characteristics. Reinforcing fibres can be of two types: special fibres (basalt, aramid, carbon and/or other) and natural fibres (hemp, sisal, jute, linen, cotton, bamboo, kenaf, fibrous banana, agava and/or other).

[0022] In the present invention basalt fibre, which is more resistant to the aggressive chemical environment (acids, alkalis, salts, etc.), is used, strength is about 25% higher than of the fibre glass of the type E, the elasticity module is about 15% higher than of the fibre glass of the type E. Due to above characteristics, the bracket (1), (2), (7) of a smaller cross-section area can be manufactured, but it can maintain the same mechanical characteristics as brackets made of other materials, while reducing the transverse cross-sectional area the thermal energy transfer coefficient is reduced.

[0023] Mechanical strength characteristics of the reinforced composite product, bracket (1), (2), (7) depend to a large extent on the orientation of the reinforcing fibre, the direction of the fibre threads, compared to the geometric shape of the bracket. If the bracket (1), (2), (7) is

attached to enclosures of the building at one end and façade panels are attached to the other end, the force applied to the end to which panels are attached will cause stresses along the shape of the bracket (1), (2), (7). Therefore, it is worth to orient reinforcing fibres along the bracket (1), (2), (7), thereby achieving maximum mechanical strength. On the other hand, the bracket (1), (2), (7) may also have stresses of other directions. Therefore, in the present invention when manufacturing the bracket (1), (2), (7), depending on its cross-section, reinforcing fibres oriented in various directions is used. The fibres are of different types too: integral, longitudinal fibre (when all the fibres are oriented parallel to each other), mat (non-woven fibres oriented in various directions), fabric (fabric of continuous fibres oriented in various directions), veil (non-woven product of glass or polyester threads which is often of low thickness (about 40 g/m^2).

[0024] In the present invention the core of brackets (1), (2), (7) is reinforced with longitudinal fibres (3), and then the outer surface of the product is further reinforced with a mat and/or fabric layer (4).

[0025] In this case, the outer mat or fabric layer (4) takes over not only transverse stresses in the case of bending, but also internal stresses resulting from the shrinkage of the polymer matrix during polymerization.

[0026] A surface veil (5) is used to form a thicker layer of polymer on the surface of the product. Thereby not only the aesthetically better looking surface is obtained but also fibres contained inside the product are more protected from aggressive environmental factors.

[0027] In the present invention brackets (1), (2), (7) manufactured are of an elongated shape, without any longitudinal shape/direction changes. If the angle is necessary for attaching the bracket or to the bracket, holes are formed in the bracket (1), (2), (7). Holes are used to attach the angular-shaped profile (6) to the bracket (1), (2), (7) (Fig. 4, Fig. 5), which creates conditions necessary for the fastening position.

[0028] In the present invention a specific-shaped spring (8) is attached to the end of the bracket (1), (2), (7), to other than the bracket is attached to enclosures of the building. The aforementioned spring (8) makes it more convenient to attach a vertical structural element for installation of façade panels.

[0029] In order to illustrate and describe the invention, the description of the preferred embodiments is presented above. This is not a detailed or restrictive description to determine the exact form or embodiment. The above description should be viewed more than the illustration, not as a restriction. It is obvious that specialists in this field can have many modifications and variations. The embodiment is chosen and described in order to best understand the principles of the present invention and their best practical application for the various embodiments with different modifications suitable for a specific use or implementation adaptation. It is intended that the scope of the invention is defined by the definition added to it and its equivalents, in which all of these definitions have meaning within the broadest limits, unless otherwise stated.

[0030] In the embodiments described by those skilled in the art, modifications may be made without deviating from the scope of this invention as defined in the following claims.

Claims

1. A structure of a bracket for ventilated façade having an elongated shape where metal or fibre glass composite is used for manufacturing the bracket, **characterized in that** a transverse cross-sectional shape of the bracket (1) resembles a hollow rectangle, the middle part of one border of which is removed, i.e. the transverse cross-sectional shape resembles the "[_]" shape.

2. The structure of the bracket for ventilated façade having the elongated shape according to claim 1, **characterized in that** the transverse cross-sectional shape of the bracket (2) resembles a rectangular shape without one border, i.e. the transverse cross-sectional shape resembles the "[" shape.

3. The structure of the bracket for ventilated façade having the elongated shape according to claim 1, **characterized in that** the transverse cross-sectional shape of the bracket (7) resembles an elongated rectangular shape.

4. The structure of the bracket for ventilated façade having the elongated shape according to the preceding claims, **characterized in that** polymeric materials with additives, with embedded reinforcing fibres made of basalt are used for manufacturing the bracket (1), (2), (7).

5. The structure of the bracket for ventilated façade having the elongated shape according to the preceding claims, **characterized in that** polymeric materials with additives, with embedded reinforcing fibres made of natural fibrous materials are used for manufacturing the bracket (1), (2), (7).

6. The structure of the bracket for ventilated façade having the elongated shape according to the preceding claims, **characterized in that** when forming the bracket (1), (2), (7), its core is formed using longitudinal fibres (3), then the outer surface of the product is further reinforced with a mat layer (4).

7. The structure of the bracket for ventilated façade having the elongated shape according to the preceding claims, **characterized in that** when forming the bracket (1), (2), (7), its core is formed using longitudinal fibres (3), then the outer surface of the product

is further reinforced with a fabric layer (4).

8. The structure of the bracket for ventilated façade having the elongated shape according to 6-7 claims, **characterized in that** a veil layer (5) is formed on said mat or fabric layer (4).

9. The structure of the bracket for ventilated façade having the elongated shape according to the preceding claims, **characterized in that** an angular-shaped profile (6) is used for attaching the bracket (1), (2), (7).

10. The structure of the bracket for ventilated façade having the elongated shape according to the preceding claims, **characterized in that** a spring (8) fastened to the profile is used to attach a vertical structural profile to the bracket (1), (2), (7).

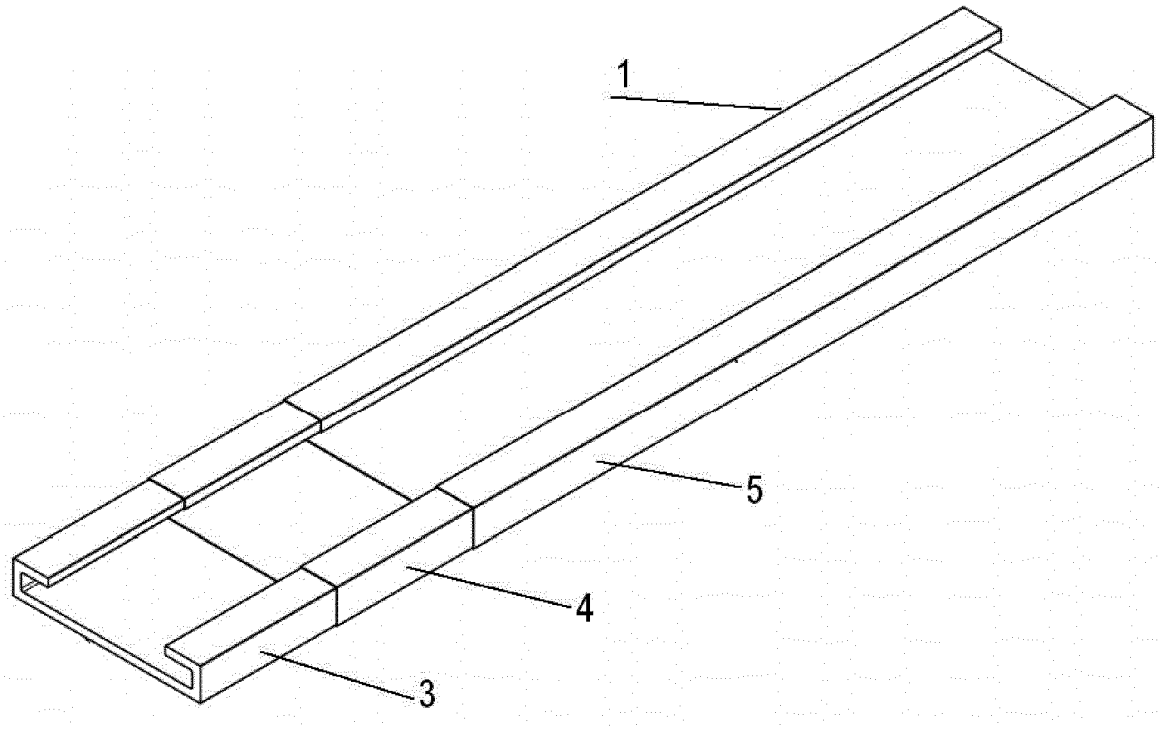

FIG. 1

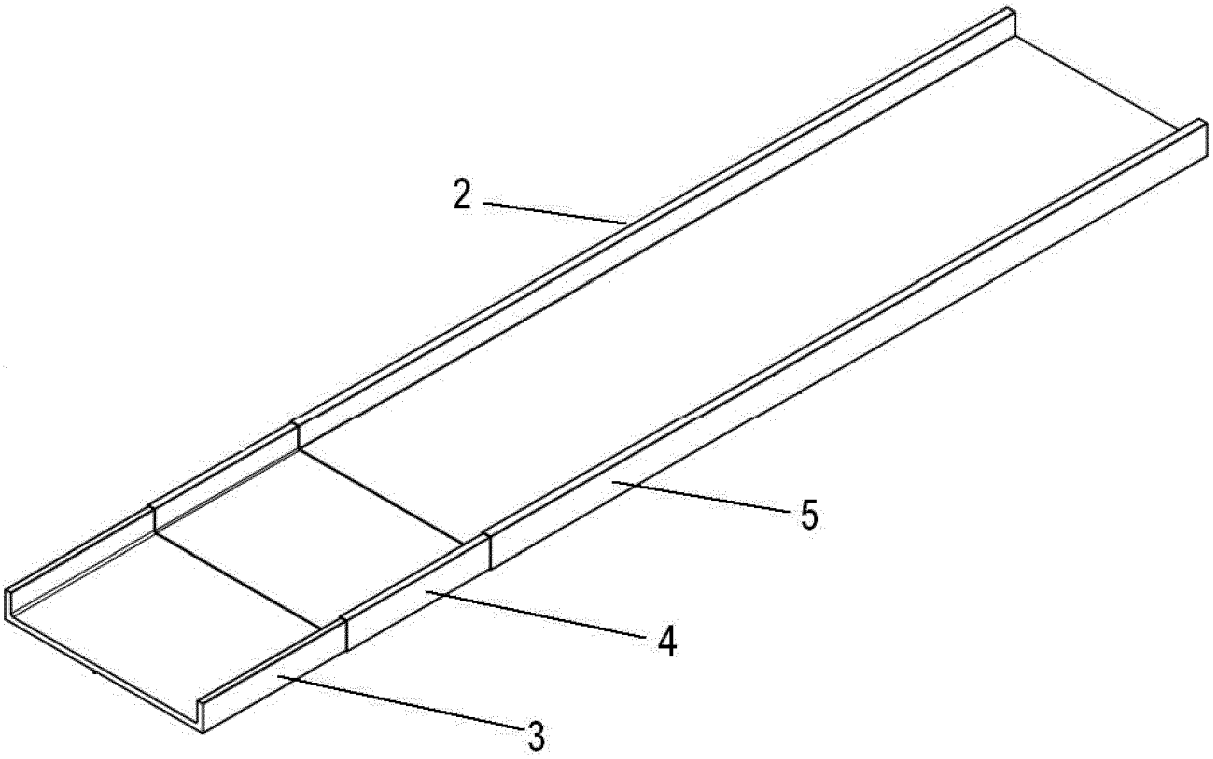

FIG. 2

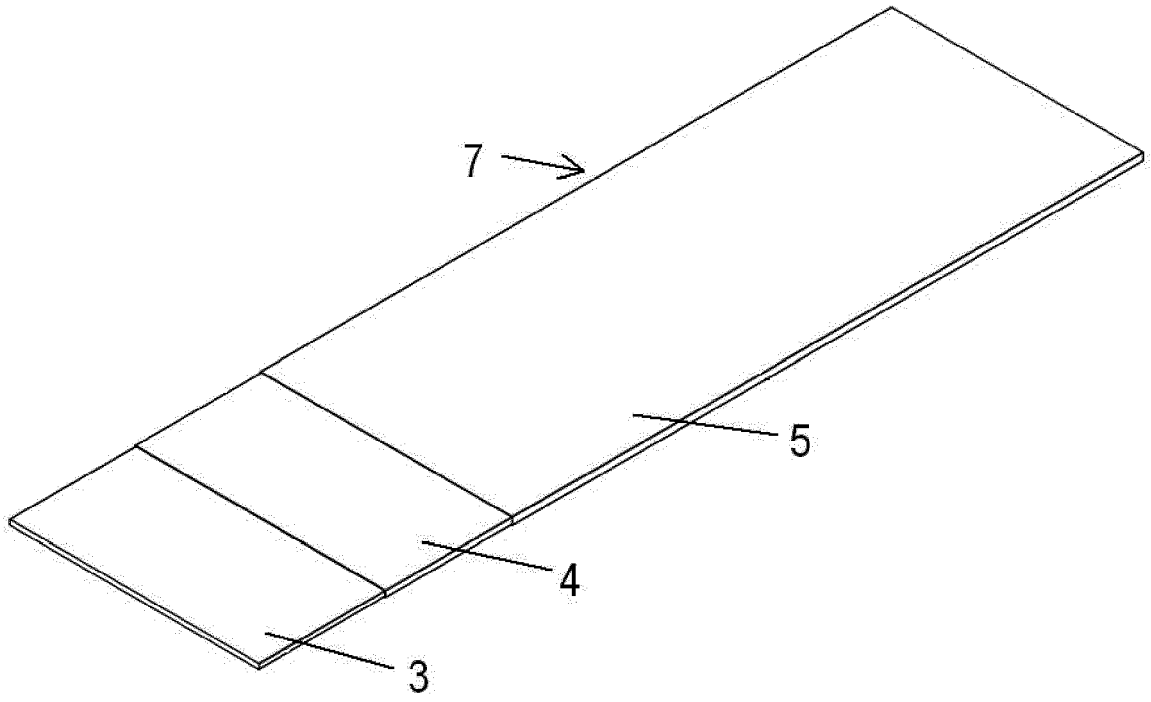

FIG. 3.

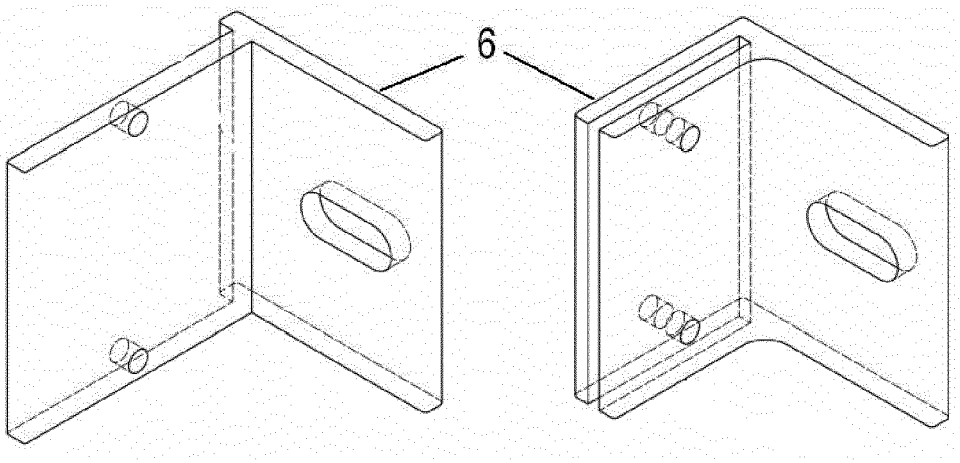

FIG. 4

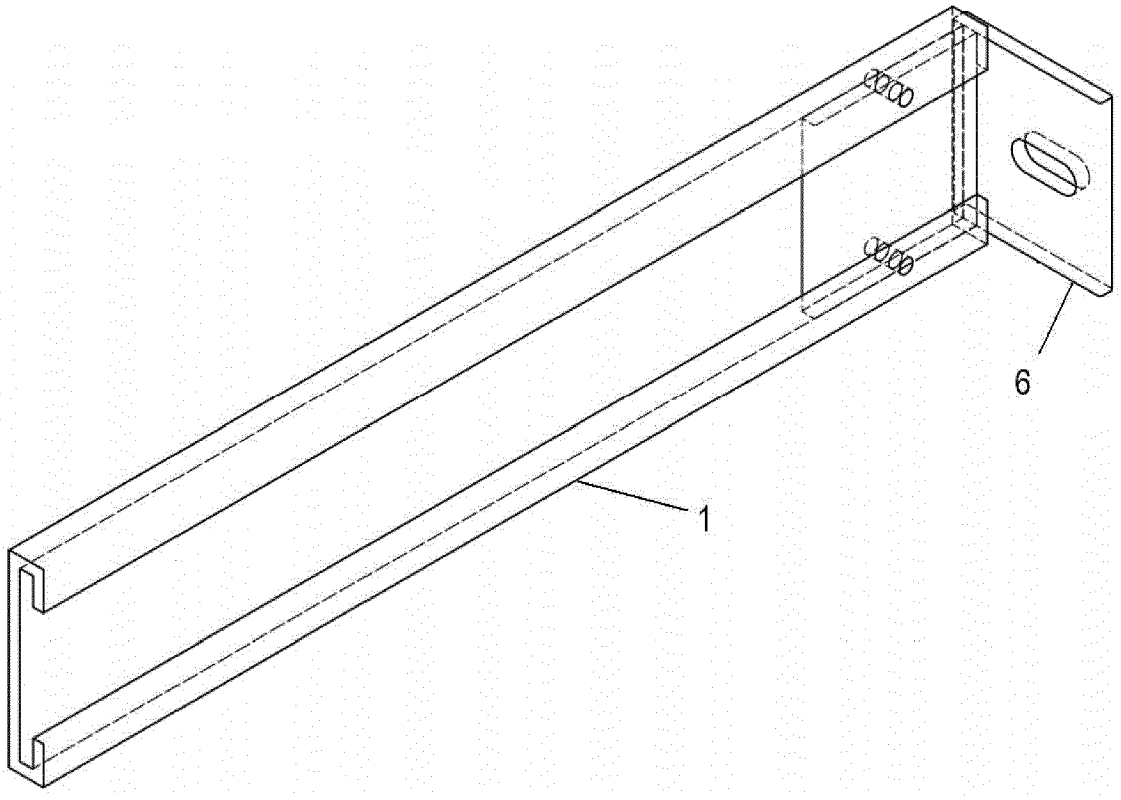

FIG. 5

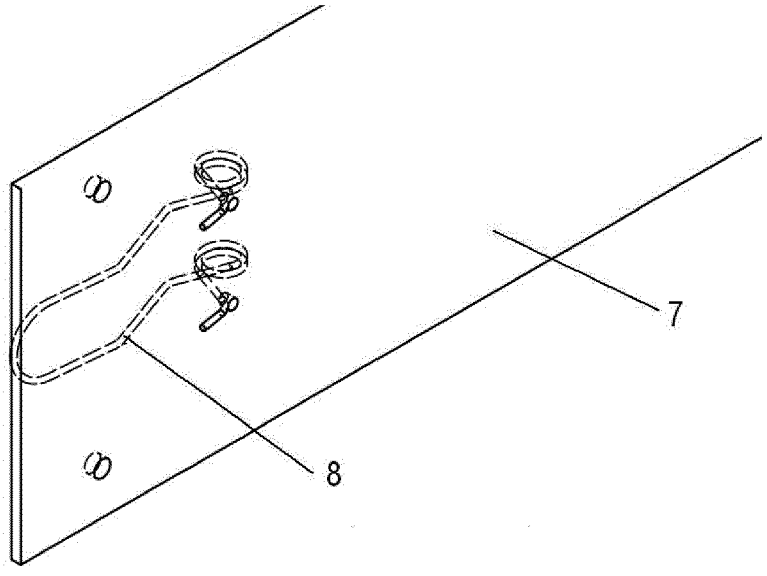

FIG. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 18 20 5887

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	WO 2016/207648 A1 (SIG PLC [GB]) 29 December 2016 (2016-12-29)	1-5,9	INV. E04F13/08
A	* page 1, paragraph 15 - page 2, paragraph 25; claims 1-18; figures 1-3 *	10	
X,D	WO 2014/188284 A1 (UAB FIBROLT [LT]) 27 November 2014 (2014-11-27)	1-5	
A	* abstract; figure 1 *	6-10	
A	US 2017/342723 A1 (KRAUSE G MATT [US]) 30 November 2017 (2017-11-30) * the whole document *	1-10	
A	WO 2014/124469 A1 (KRAUSE A2P LLC [US]) 14 August 2014 (2014-08-14) * the whole document *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC) E04F E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	15 March 2019	Friedrich, Albert

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

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

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