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(54) **SYSTEM FOR FIXING THIN CLADDING PANELS**

(57) The system for fixing of thin cladding panels, according to the invention, is applicable in the field of construction, during the building of façade constructions, for example by the use of ceramic cladding panels with a thickness of at least 6 mm. The system includes a cladding panel (1), connected by fasteners to a support profile (2), which is fastened to a façade subconstruction. On the side of the cladding panel (1), facing the facade sub-

construction, rectilinearly undercut slots (3) are locally provided, which are inclined at between 35° and 55°, in opposite directions to each other, relative to the surface of the cladding panel (1), on the side where the slots (3) are made, into which holding parts (5) of fixing details (4) are inserted, connected in their other end by fastening parts (6) to the support profile (2).

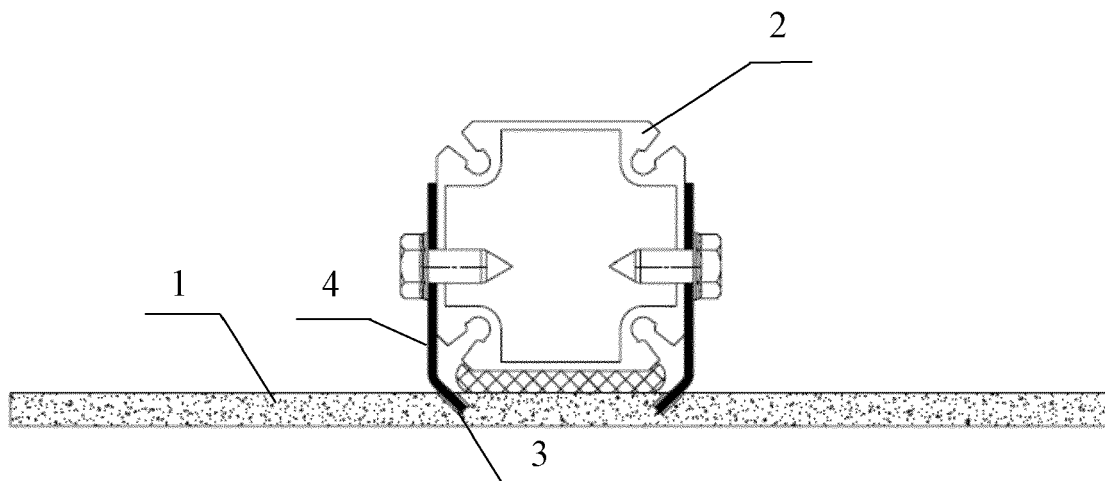


Figure 1

## Description

### TECHNICAL FIELD

**[0001]** The system for fixing of thin cladding panels, according to the invention, is applicable in the field of construction, during the building of façade constructions, for example by using ceramic cladding panels.

### STATE OF THE ART

**[0002]** In the state of the art, there are a few known systems for fixing of thin cladding panels, where the following processes are carried out:

1. Sticking of a thin cladding panel to a thicker auxiliary panel, made of different materials to the ones used for the thin cladding panel, and mechanical fastening of the auxiliary panel to support profiles, which are fastened to a façade subconstruction with common fasteners from the state of the art. A disadvantage of this system is that the sticking of the thin panel does not guarantee high reliability of the connection and the thin panel can fall off. An additional disadvantage is the need for an additional auxiliary panel, which hinders and slows down the installation of the thin panel, and increases the expenses for the system.

2. Fastening by the "undercut hole" method, where a recess hole is formed in the cladding panel, which is undercut laterally at its bottom along its entire diameter. Afterwards, a wall dowel is inserted into the hole and a support profile is fixed to the panel by inserting a screw through the support profile in the installed wall dowel. That solution is only suitable for panels with a minimum thickness of 8 mm and requires precise positioning during the drilling of the holes.

3. Inclined undercut of the panel along its entire length, thus forming two opposing inclined grooves. The grooves receive fasteners with two inclined fins, which fix load-bearing panels. A disadvantage of this system is that because the two grooves are along the entire length of the panel, they mechanically loosen its construction. Also, if the two grooves are close to each other, there is a risk of the detail breaking loose.

### SUMMARY OF THE INVENTION

**[0003]** A task of the invention is to create a system for fixing of thin cladding panels with a thickness of at least 6 mm, with the system being reliable, with a low cost and easy to install.

**[0004]** This task is performed by creating a system for fixing of thin cladding panels, which includes a cladding

panel, connected by fasteners to a support profile, configured for fastening to a façade subconstruction. On the side of the cladding panel, facing the façade subconstruction, at least two rectilinearly undercut parallel to each other slots are locally provided, that are tilted in opposite directions to each other and at an angle between 35° and 55° relative to the surface of the cladding panel, from the side on which the slots are made. The holes of the slots are located at a distance from each other equal to the width of the support profile. The fasteners are at least two fixing details, comprised of a holding part for a cladding panel, at least partially corresponding in shape and dimensions to the slots of the cladding panel and a fastening part for fastening to the support profile. The fixing details are installed on two opposite sides of the support profile, so that their holding parts are located convergently to each other and at an angle relative to the surface of the cladding panel, corresponding to the incline of the slots, wherein each holding part is inserted with its disengaged end in its respective slot on the cladding panel.

**[0005]** In a preferred embodiment of the invention, the fastening part of each fixing detail has at least one formed hole for fastening by fixing elements to the support profile.

**[0006]** In a preferred embodiment of the invention, the fixing detail is a bent monolithic detail, so that the holding part is positioned at an angle relative to the fastening part, that angle corresponding to the incline of the slots relative to the surface of the cladding panel.

**[0007]** It is preferable for the fixing detail to be a monolithic plate.

**[0008]** In a preferred embodiment of the invention, a detail of elastic material is positioned between the support profile and the cladding panel, which detail serves for thermal insulation and compensating deformations in the panel.

**[0009]** In an embodiment of the invention, the disengaged end of the holding part of the fixing detail is rounded.

**[0010]** It is possible for every slot to be moved aside from an opposing parallel slot, along the length of the slot, at a distance greater than the length of the slot, wherein the opposing fixing details are installed on both sides of the support profile with the same imposition as their respective slots.

**[0011]** It is preferable for the fixing details to be made as flat details, i.e. being plates.

**[0012]** In a preferred embodiment of the invention, the cladding panel has a thickness of at least 6 mm, while the slots are tilted at an angle of 45° relative to the surface of the cladding panel, wherein the holding part of each fixing detail, installed to a support profile, is also positioned at an angle of 45° relative to the surface of the cladding panel.

**[0013]** Advantages of the proposed system for fixing of thin cladding panels are that:

- it gives an opportunity for firm fastening of panels with a minimum thickness of 6 mm, compared to ex-

isting systems, which are limited to a minimum of 8 mm;

- it does not require great precision of the fastening positions like the "undercut hole" method, which makes the installation of the system easier;
- it does not require the presence of additional panels, which reduces the cost value of the system.

## BRIEF DESCRIPTION OF THE FIGURES

**[0014]** Further into the description, the system for fixing of thin cladding panels, object of the invention, is clarified with preferred embodiments, listed as examples that are non-limiting to the scope of the invention, with reference to the attached figures, where:

Figure 1 is a transverse section of the system for fixing of thin cladding panels, according to a preferred embodiment of the invention.

Figure 2 is a detailed view of a slot formed into the cladding panel, with a fixing detail inserted into it, according to a preferred embodiment of the invention.

Figure 3 is an axonometric view of the fixing detail, according to a preferred embodiment of the invention.

Figure 4 is an axonometric view of a cladding panel with slitted slots, according to a preferred embodiment of the invention.

Figure 5 is a plan view of a cladding panel with slitted slots, according to an embodiment of the invention.

Figure 6 is a plan view of a cladding panel with slitted slots, according to a different embodiment of the invention.

Figure 7 is a profile view of a support profile, installed to a cladding panel by fixing details, according to a preferred embodiment of the invention.

## EXEMPLARY EMBODIMENT OF THE INVENTION

**[0015]** The system for fixing of thin cladding panels, according to the invention, includes a cladding panel 1, connected with fasteners to a support profile 2, which is fastened to a façade subconstruction. The cladding panels 1 are preferably ceramic cladding panels, but alternatively, other types of panels can be used, for example panels from technical stone or another type of stone. The support profile 2 is an element that is linear or closed along the loop of the cladding panel 1 and is preferably made of aluminum. On the side of the cladding panel 1,

facing towards the façade subconstruction, is where linearly undercut slots 3 are provided, which are tilted in opposing directions to each other. The incline of the slots 3 relative to the surface of the cladding panel 1, on the side of which the slots 3 are made, is between 35° and 55°, (fig. 1, 2 and 4). For example, the incline of the slots 3 can be 40°, 45°, 50°.

**[0016]** Because they are undercut locally, i.e. in certain areas along the surface of the panel 1 and not the entire length, the slots 3 ensure a strong and reliable grip without decreasing the strength of the cladding panel 1.

**[0017]** The holes of the slots 3 are at a distance from each other equal to the width of the support profile 2 (fig. 4).

**[0018]** In a preferred embodiment, shown in figures 5 and 6, each slot 3 of each pair of slots is moved aside from its opposing parallel slot 3 along the length of the slot 3, at a distance greater than the length of the slot 3, so that a stronger base for gripping is formed and falling off of the material between them is prevented. Despite that, other embodiments are possible, where the slots 3 are not moved aside relative to their opposing slots 3, or are moved to a smaller degree relative to the length of the slot 3. The choice for the displacement is made on the basis of the used panels 1. For example, for smaller panels 1 with a width around 30 or 40 mm, it is sufficient to use one pair of slots 3, which are positioned opposite to one another without displacement for greater strength. Alternatively, it is possible to also use a pair of slots 3, which are displaced relative to each other. For bigger panels 1, where a pair of slots 3 does not ensure the necessary strong fixing of the panel 1, it is possible to use a greater number of slots 3. It is possible to use several pairs of slots 3, where in each pair of slots 3, each slot 3 is moved aside from its opposing parallel slot 3, along the length of the slot 3, at a distance greater than the length of the slot 3, thus forming a zigzag model of the slots 3. It is also possible to use an odd number of slots 3, for example three slots 3, respectively one of the three slots 3 is located on the opposite side of the other two slots 3, which are moved aside relative to the first slot 3, along the length of the slot 3, at a distance greater than the length of the slot 3. Respectively, the opposing fasteners are also installed on both sides of the support profiles 2 with an imposition from each other, which corresponds to the imposition of their respective slots 3.

**[0019]** The fasteners are fixing details 4, comprised of a holding part 5 for a cladding panel 1, corresponding at least partly to the shape and dimensions of the slots 3 of the cladding panel 1, and a fastening part 6 for fastening to the support profile 2 (fig. 3). The holding part 5 of the fixing details 4 can correspond entirely or partially to the shape and dimensions of the slots 3 of the cladding panel 1, as long as it secures a strong grip between the panel 1 and the support profile 2, namely it is necessary to insert enough of the holding part 5 into the slots 3, which would secure a strong connection.

**[0020]** The fastening part 6 of the fixing detail 4 can be

made as a straight plate, or alternatively as a bracket or as another type of fastener, known from the state of the art.

**[0021]** The fixing details 4 can be plates or a different type of detail, suitable for fixing of the profile 2 to the panel 1, like bent wire, for example.

**[0022]** It is possible to use two, three, four or more fixing details 4, positioned on opposite sides to each other, and/or at an angle relative to each other, and/or next to each other, depending on the size and shape of the support profile 2, the panel 1 and the preferences of the user. For example, in the case of large panels 1, for instance with dimensions 2x1,5 m, a frame of aluminum profiles can be made, which is fastened to the panel 1 with fixing details 4, located on each arm of the frame. In the case of rectangular panels, it is preferable for the fixing details 4 to be in pairs, but alternatively they can be an odd number. While in other configurations, the number of the fixing details 4 can be an even or an odd number, depending on the aforementioned criteria.

**[0023]** It is possible for the system to be achieved with two profiles 2 at a distance from each other, wherein at each profile 2 one of the fixing details 4 is mounted. The two profiles 2 can be parallel to each other and each profile 2 is fixed with a minimum of a pair of fixing details 4. This embodiment is particularly suitable for narrow and long panels, for instance with a width of 50 mm and a length of 500 mm. Thus the panel 1 is connected from above to a profile 2 with a pair of fixing details 4 and from below to another profile 2 with a pair of fixing details 4.

**[0024]** The fixing details 4 are attached to the support profile 2, so that their holding parts 5 are positioned convergently to each other and at an angle relative to the surface of the cladding panel 1, corresponding to the incline of the slots 3 and every holding part 5 is inserted with its disengaged end into its respective slot 3 on the cladding panel 1 (fig. 1).

**[0025]** On the fastening part 6 of each fixing detail 4 there can be one or more, for instance two or three, formed holes 7 for fixing with fasteners to the support profile 2. (fig. 3). The fasteners can be a bolt, a rivet, a screw, a bracket or another type of fastener, known in the state of the art.

**[0026]** The fixing detail 4 can be a straight detail, the holding part 5 of which is mounted at an angle in its respective slot 3 of the cladding panel 1, while its fastening part 6 is fastened to a support profile 2, for instance to a trapeziumshaped support profile. Alternatively, it is possible for the fixing detail 4 to be a bent monolithic detail, so that the holding part 5 can be positioned at an angle relative to the fastening part 6. In this embodiment, when the support profile 2 has a rectangular section, the angle in question, at which the fixing detail 4 is bent, corresponds to the incline of the slots 3 relative to the surface of the cladding panel 1 (fig. 3).

**[0027]** The fixing detail 4 is made of metal, for example stainless steel.

**[0028]** The disengaged end of the holding part 5 of the

fixing detail 4 can be rectangular, skewed or rounded, like it is shown in fig. 3.

**[0029]** The angle of the incline of the formed slots 3 in the panel 1 has to correspond to the angle, at which the holding part 5 of each fixing detail 4 is positioned, relative to the surface of the cladding panel 1. For example, for slots 3 with an incline of 45° relative to the surface of the cladding panel 1, the holding part 5 of each fixing detail 4 also has to be positioned at an angle of 45° relative to the surface of the cladding panel 1.

**[0030]** Between the support profile 2 and the cladding panel 1 a detail 8 made of elastic material can be positioned, with which any deformations on the surface of the panel 1 can be compensated and also to ensure thermal insulation between the panel 1 and the support profile 2 (fig. 1). For example, such a detail 8 of elastic material can be a detail made of rubber or flexible plastic.

**[0031]** The system for fixing of thin cladding panels, according to the invention, can be used for cladding panels 1 with a thickness of at least 6 mm, for example 7 mm or 8mm.

**[0032]** Method for fixing of thin cladding panels, according to the preferred embodiment of the invention:

- In the back of a cladding panel 1 is where several pairs of opposing, tilted towards each other slots 3 are slitted, in a halfmoon shape. The distance between the opposing slots 3 is equal to the width of the support panel 2, to which the cladding panel 1 has to be fastened. In each pair of slots 3, each slot 3 is moved aside from its opposing counterpart along the length of the slot 3 at a distance greater than the length of the slot 3;
- In the space between the opposing slots 3 is where a support profile 2 is placed, under which a strip 8 of elastic material is positioned. Into one of the slots 3, a slanting holding part 5 of a fixing detail 4 is inserted, which is rounded in the shape of a halfmoon. The fastening part 6 of the fixing detail 4 is mechanically fastened to the support profile 2. In the opposing slot 3, a slanting holding part 5 of the second fixing detail 4 is inserted and is fastened to the support profile 2. The operations are repeated for each pair of opposing slots 3.

**[0033]** Thus, a support frame or several parallel support profiles 2 are fixed to the cladding panel 1. Thus prepared, the cladding panel 1 is installed to a subconstruction of a cladding system.

**[0034]** The reference numbers of the technical features are included in the claims only in order to increase the intelligibility of the claims and, therefore, these reference numbers have no limiting effect regarding the interpretation of the elements, signified with these reference numbers.

## Claims

1. System for fixing of thin cladding panels, including a cladding panel (1), connected by fasteners to a support profile (2), configured for fixing to a façade sub-construction, **characterized in that** on the side of the cladding panel (1) facing the façade sub-construction, at least two parallel to each other, rectilinearly undercut slots (3) are locally provided, which are tilted in opposite directions to each other and at an angle between 35° and 55° relative to the surface of the cladding panel (1), on the side where the slots are made, wherein the holes of the slots (3) are at a distance from each other equal to the width of the support profile (2), wherein the fasteners are at least two fixing details (4), comprised of a holding part (5) for a cladding panel (1), corresponding at least partially in shape and size to the slots (3) on the cladding panel (1), and a fastening part (6) for fixing to the support profile (2), wherein the fixing details (4) are mounted to two opposite sides of the support profile (2) so that their holding parts (5) are positioned convergently to each other and at an angle relative to the surface of the cladding panel (1), corresponding to the incline of the slots (3), wherein each holding part (5) is inserted with its disengaged end into its respective slot (3) on the cladding panel (1). 5 10 15 20 25
2. System for fixing of thin cladding panels, according to claim 1, **characterized in that** the fastening part (6) of each fixing detail (4) has at least one hole (7) formed into it for fixing by fasteners to the support profile (2). 30
3. System for fixing of thin cladding panels, according to claims 1 or 2, **characterized in that** the fixing detail (4) is a bent monolithic detail, so that the holding part (5) is positioned at an angle relative to the fastening part (6), said angle corresponding to the incline of the slots (3) relative to the surface of the cladding panel (1). 35 40
4. System for fixing of thin cladding panels, according to claim 3, **characterized in that** the fixing detail (4) is a monolithic plate. 45
5. System for fixing of thin cladding panels, according to any of the previous claims, **characterized in that** between the support profile (2) and the cladding panel (1) is where a detail (8) of elastic material is positioned. 50
6. System for fixing of thin cladding panels, according to any of the previous claims, **characterized in that** the disengaged end of the holding part (5) of the fixing detail (4) is rounded. 55
7. System for fixing of thin cladding panels, according to any of the previous claims, **characterized in that** each slot (3) is moved aside from a parallel opposite slot (3), along the length of the slot (3), at a distance greater than the length of the slot (3), wherein the opposite fixing details (4) are mounted on both sides of the support panel (2) with the same imposition as their respective slots (3).
8. System for fixing of thin cladding panels, according to any of the previous claims, **characterized in that** the cladding panel (1) has a thickness of at least 6 mm, and the slots (3) are inclined at an angle of 45° relative to the surface of the cladding panel (1), wherein the holding part (5) of each fixing detail (4), mounted to a support profile (2), is also positioned at an angle of 45° relative to the surface of the cladding panel (1).

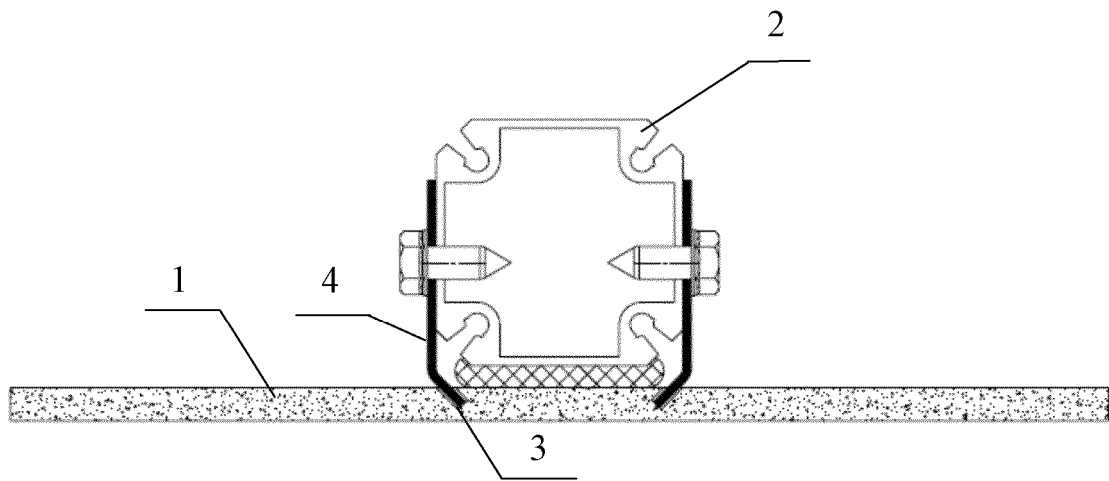


Figure 1

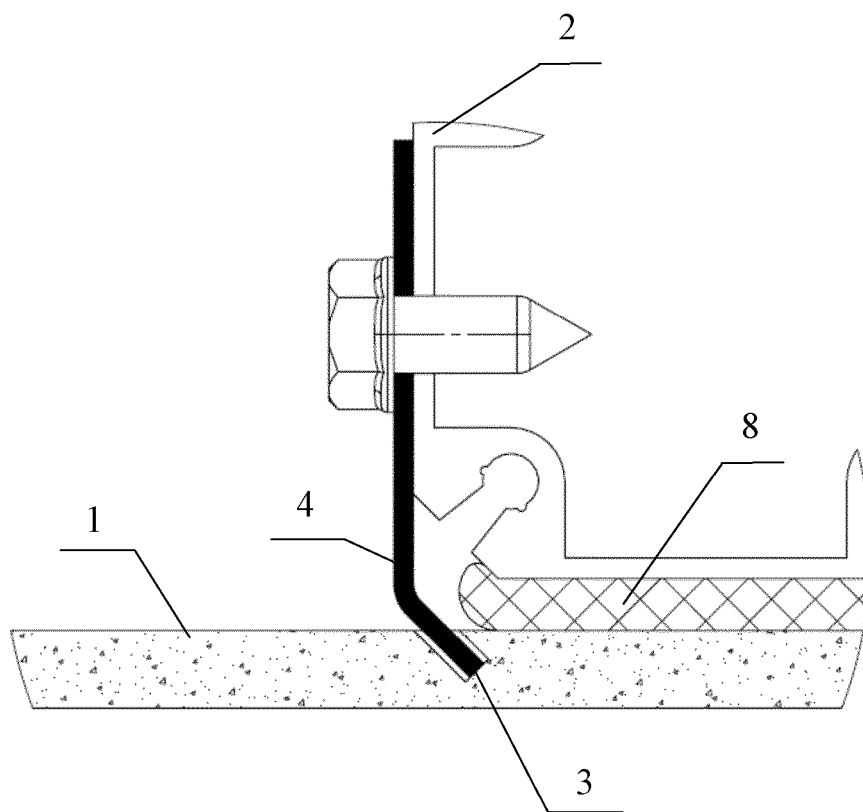


Figure 2

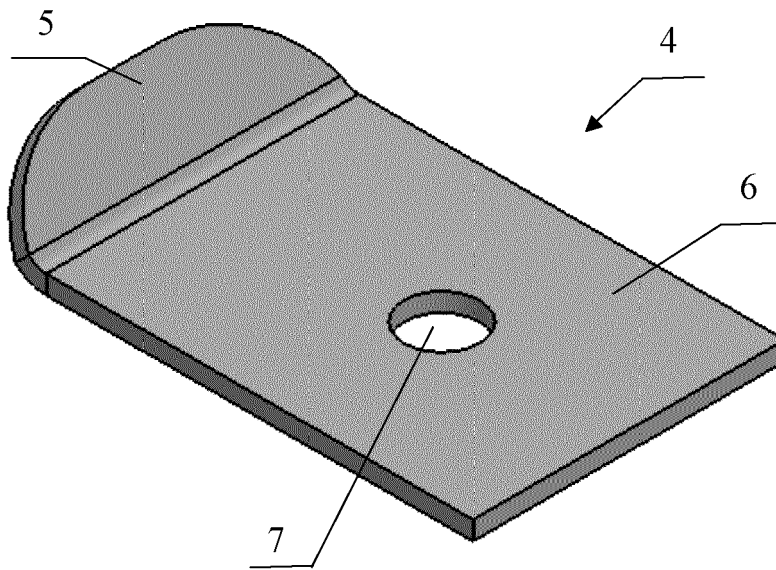


Figure 3

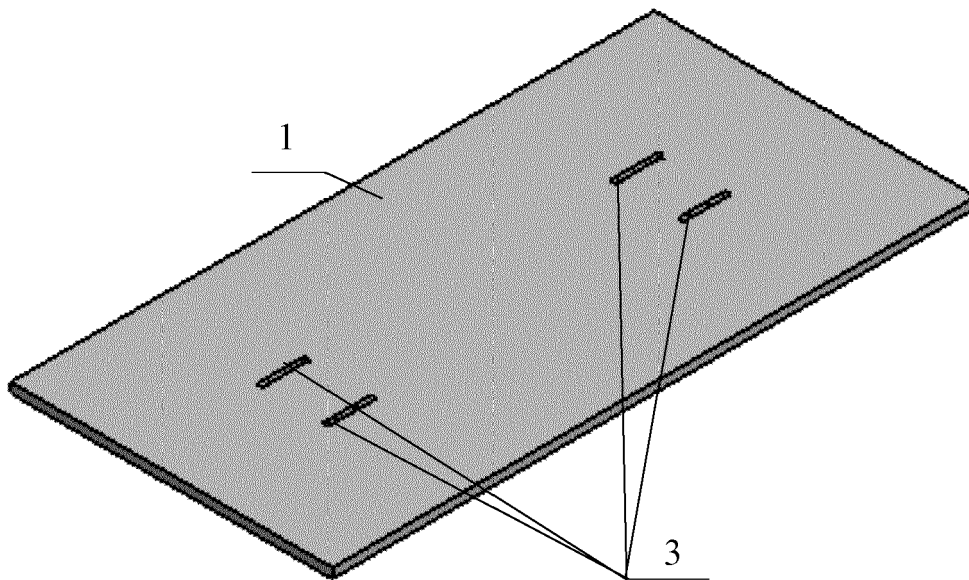


Figure 4

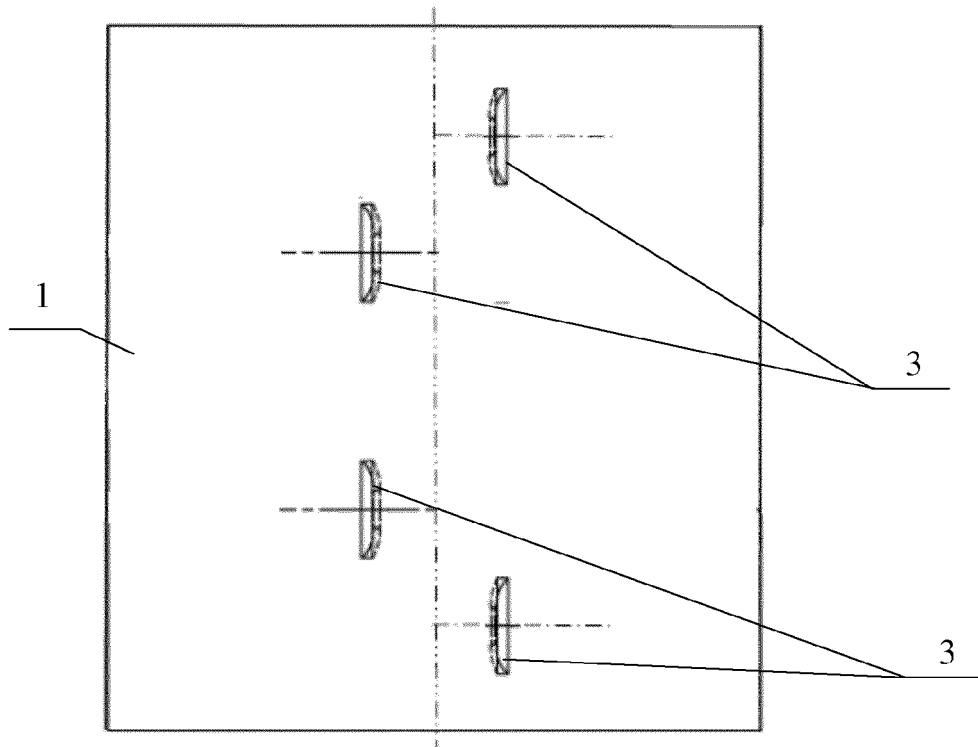


Figure 5

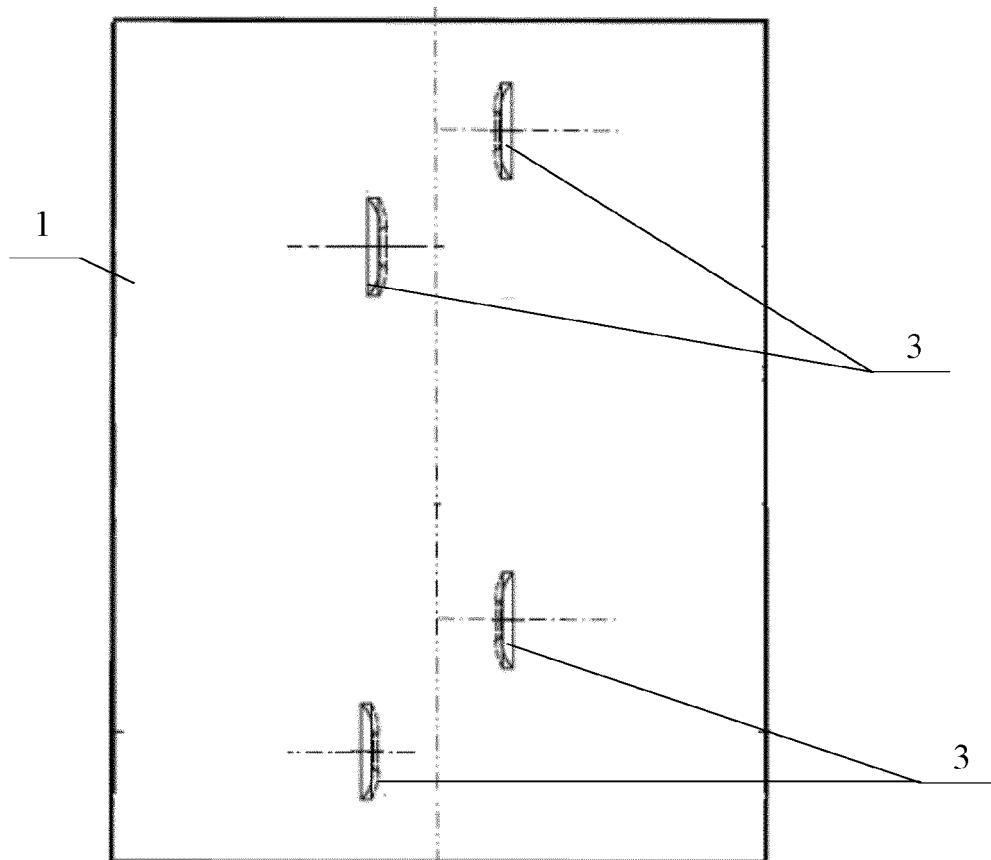


Figure 6



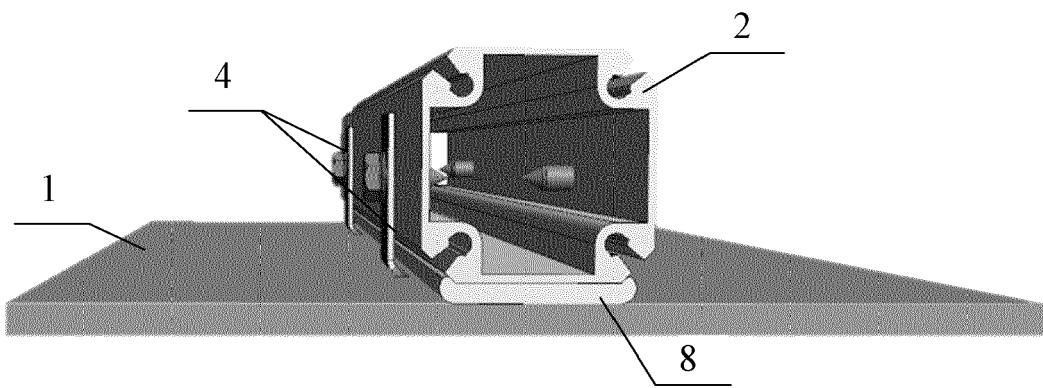


Figure 7



## EUROPEAN SEARCH REPORT

Application Number

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EPO FORM 1503 03.82 (P04C01)

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 1 764 456 A2 (DALLERA FRANCO [IT]) 21 March 2007 (2007-03-21)	1-4, 6, 8	INV. E04F13/08
Y	* figures 1-4 *	5	E04F13/14
A	-----	7	
Y	ES 2 257 143 A1 (WADEGAR 2001 S L [ES]) 16 July 2006 (2006-07-16) * figures 2-3 * * column 2, lines 66-67 * -----	5	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04F
The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>3 May 2022</b>	Examiner <b>Estorgues, Marlène</b>
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03-05-2022

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	<b>EP 1764456</b>	<b>A2</b>	<b>21-03-2007</b>	<b>NONE</b>
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