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EP 0550395 A1
KR 100673829 B1
KR20140055564
KR 100987700 B
US 20080222992 A1

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INT CL **E04F**
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(54) Title of the Invention: **Façade Bracket**
Abstract Title: **Cladding bracket.**

(57) A bracket 10 for mounting a cladding component to a wall comprises a wall-facing flat 12 having one or more protrusions 14A-D. The protrusions act to space apart the flat from the wall to which it is mounted and reduce the contact area of the flat with the wall to reduce thermal conductivity. The protrusions may be formed by a deformation in the flat such as a punched portion or an embossment, and may extend from the flat by a distance greater that the thickness of the flat. Each protrusion may extend the same distance from the flat. The bracket may comprise an insulating material on the flat, such as an insulating pad 20 fixed to the bracket by adhesive. The insulating material may have a thickness no more than the extension of protrusions from the flat. The insulating pad may include one or more holes 26A-B for fixtures and/or for receiving the protrusions.

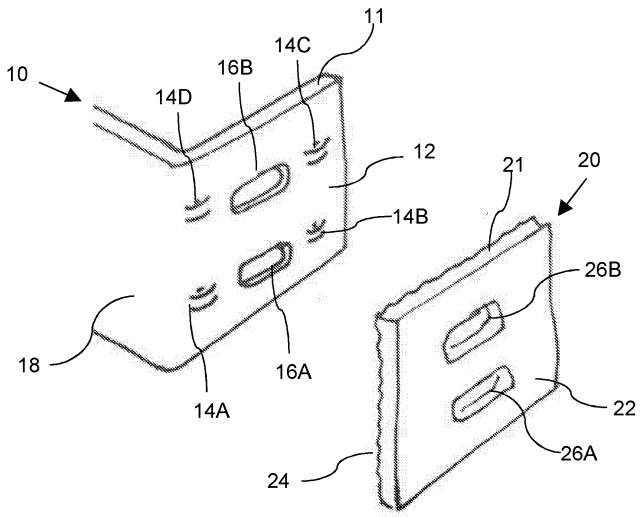

Fig. 2

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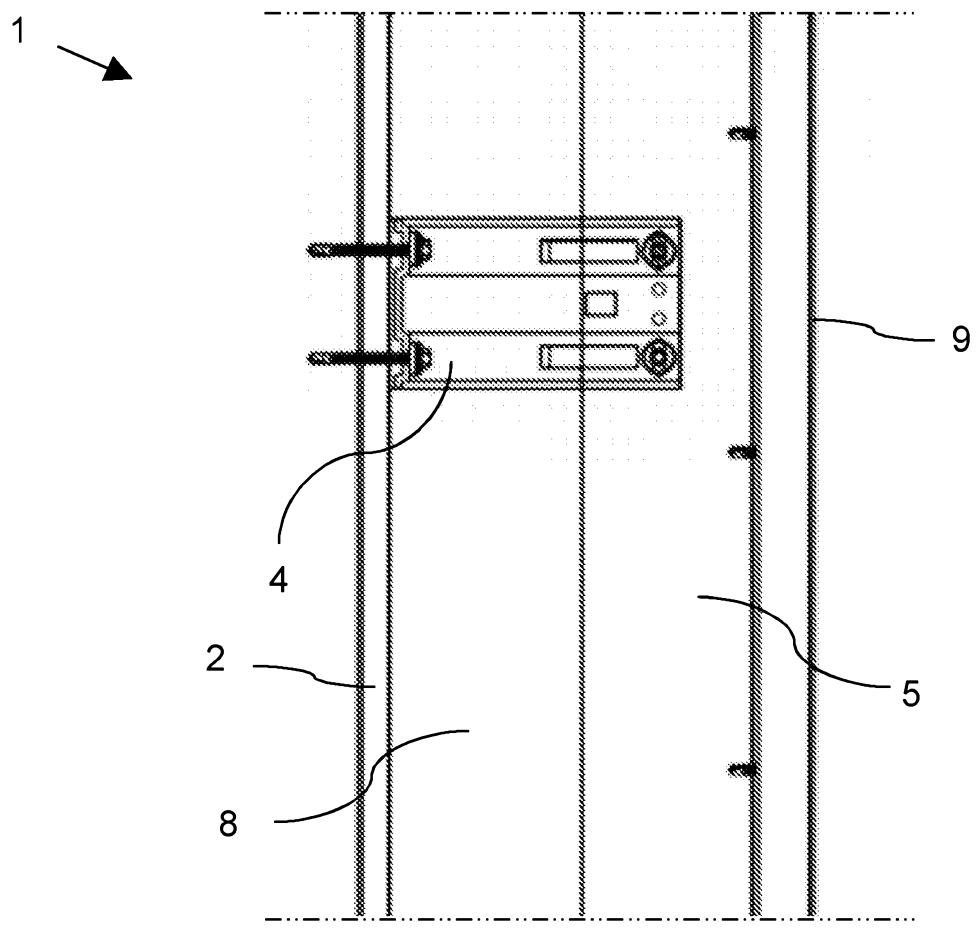

Fig. 1

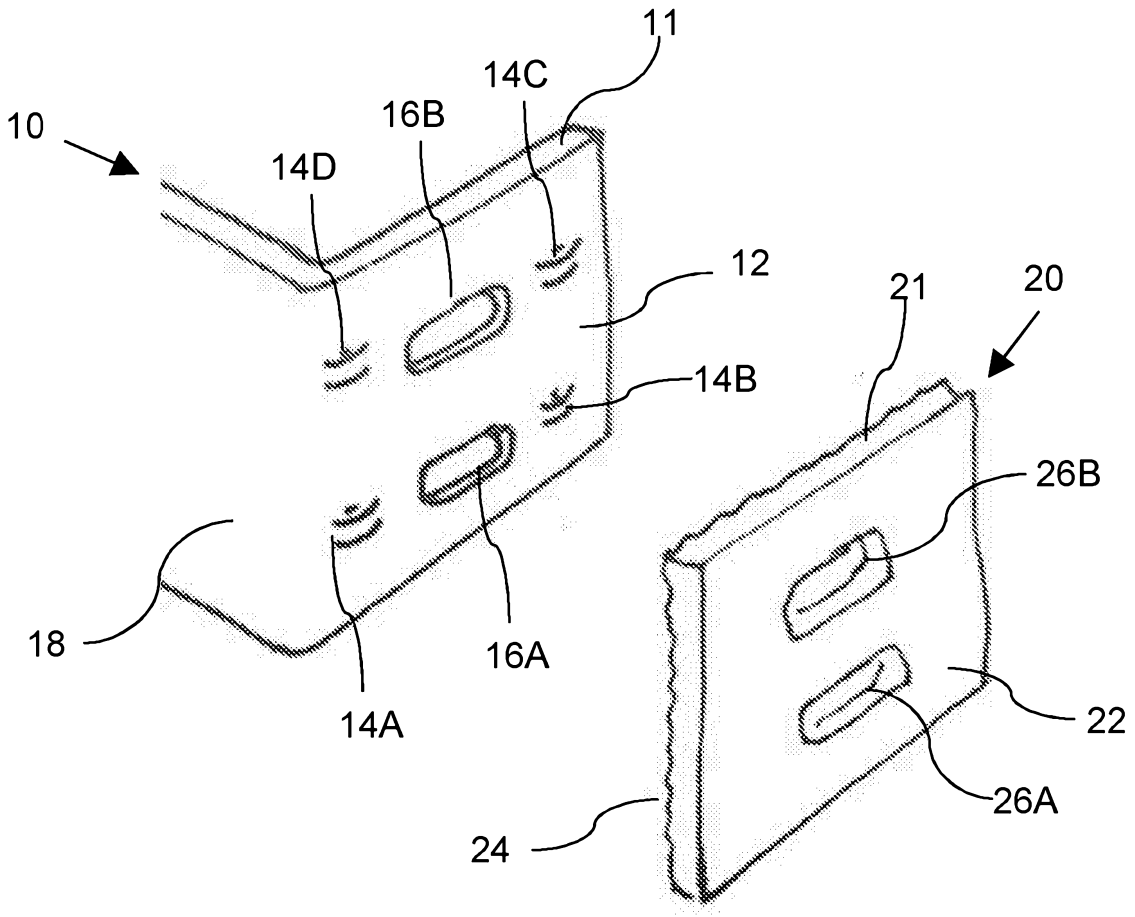

Fig. 2

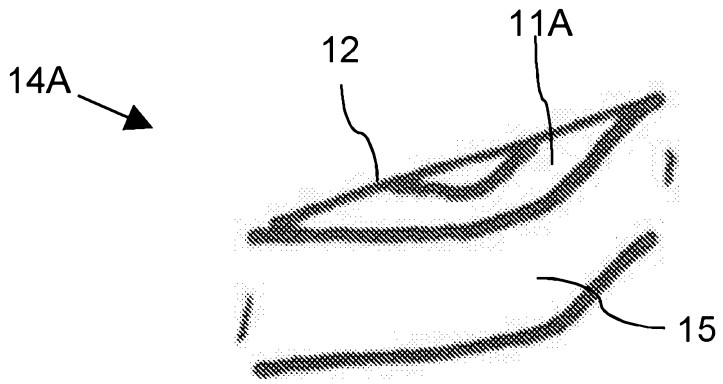

Fig. 3

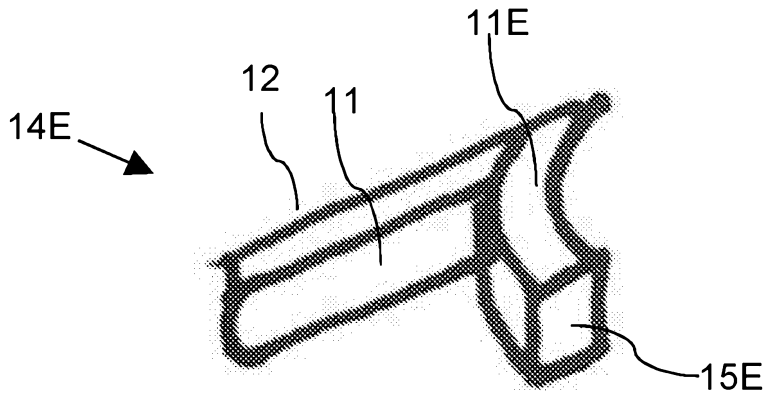

Fig. 4

Façade Bracket

Field of the Invention

This invention relates to brackets of the type used to fix cladding components to a wall structure. More specifically, the invention relates to a bracket reducing the thermal conductivity between the cladding and the wall.

Background

External cladding such as rain screens are mounted to a wall in the form of panels via intermediate structures, such as mounting rails and support brackets, that allow the panels to be fixed to the wall and that also provide a mechanism for aligning the panels relative to the wall, both in the plane parallel to a wall (ie vertically and horizontally along the wall) and perpendicular to (ie the spacing from) the wall.

Cladding panels may be spaced from the wall to provide a cavity for thermal insulation. The cavity may be filled with insulating material. However, the brackets that mount the cladding to the wall provide a thermal bridge.

Embodiments of the present invention seek to improve mounting options for cladding.

Summary of the Invention

In accordance with a first aspect of the invention, there is provided a bracket for mounting a cladding component directly or indirectly to a wall structure, the bracket comprising a wall-facing flat, wherein the wall-facing flat comprises one or more protrusions, each protrusion extending from the wall-facing flat to space apart the wall-facing flat from a wall structure to which it is mounted.

To provide an example of a cladding component, this may be a cladding rail onto which cladding tiles are fixed after the cladding rail has been mounted, horizontally or vertically, to a vertical wall structure. The cladding component is mounted to the wall structure via brackets. Typically, such brackets have flats angled to provide an L profile, U profile, top-hat profile or other known profile shapes. The bracket will comprise a wall-facing flat and a cladding-facing flat, wherein the wall-facing flat is

usually provided with apertures or slots for mounting the bracket to the wall structure, and wherein the cladding-facing flat is usually provided with clips, slots and apertures for fixing a cladding component to the bracket.

Brackets may be profiled, for instance extruded with grooves, and so the wall-facing flat may comprise lower and higher plane levels. The protrusions of the invention are distinguished from lower and higher plane levels in that the protrusions extend over only a portion of the full width of the wall-facing flat and over only a portion of the full height of the wall-facing flat. The protrusions can be considered spaced from the edge of the wall-facing flat. This distinguishes the protrusions from extruded profiles that would be expected to extend to at least one edge of the wall-facing flat, and over the full height or width.

The protrusions help to reduce the contact area of the bracket with the wall structure to which the bracket is mounted. Each protrusion has only a small contact area with the wall structure. The small contact area of the protrusion can be regarded as a point contact, or a short line contact, which is much smaller than a full face-to-face contact area in the region of several square centimetres that the wall-facing flat would otherwise have if it fully abutted the wall structure. If a single protrusion is provided, the contact area of the bracket is reduced to the contact points between the protrusion and the wall structure and an edge of the bracket and the wall structure.

This reduces the thermal bridge area between the bracket and the wall structure. Practically, the protrusions provide a reduced thermal conductivity between the bracket and the wall structure than would otherwise be present with a full face-to-face contact.

Conventionally, brackets comprise a wall-facing flat that provides as large a contact area as possible. The large contact area is sought in order to ensure a stable fixture, given that wall structures are intended for installations having to last several decades, or in order to allow a so-called thermal break pad to be securely fixed, or sandwiched, between the wall-facing face of the bracket and the wall structure. Furthermore, conventionally, thermal breaks may be provided by polymer pads sandwiched between the flat of the bracket and the wall structure, and so any protrusions on the wall-facing flat of the bracket would risk an instable abutment of the bracket against the polymer pad.

It is a departure from common knowledge that the wall-facing flat of the bracket is configured so as to prevent full face-to-face abutment in order to ensure a stable fixture. Underlying the present invention is the appreciation that cladding brackets are usually mounted to a wall structure, eg a vertical plane, that is much larger than the bracket flat. As such, a stable abutment of the bracket against the wall structure can be achieved by only a few contact points. This is entirely unconventional, but the provision of only a few contact points allows a defined thermal resistance space between the wall-facing flat and the wall structure to be provided.

In some embodiments, at least one protrusion is formed by a deformation of the wall-facing flat.

The one or more protrusions may be unitary with the wall-facing flat. Conveniently, the bracket is formed of sheet metal. A protrusion may be formed by a deformation in the sheet constituting the wall-facing flat. The deformation may be achieve by a sheet-forming method.

In some embodiments, at least one protrusion is formed by a punched portion or by an embossment.

Punching or embossing out of a metal sheet allows the spacer distance of the protrusion to be defined by the depth of the deformation and/or the length and/or angle of a clip. This provides a good degree of control over the spacing distance without affecting the remaining geometry of the bracket.

It will be understood that a punched portion, or a clip, may for technical reasons have to be bent at a rounded angle from the sheet constituting the wall-facing flat. Thus, the distal, or wall contacting point of such a protrusion is a portion that is bent away from the sheet. Thus, the contact point of the protrusion is spaced (in the width and height extension of the flat) from the edge of the wall-facing flat.

In some embodiments, the wall-facing flat is a side of a sheet having a sheet thickness, and at least one protrusion extends from the wall-facing flat by a distance greater than the sheet thickness.

For instance, the sheet thickness may be 3 mm and the distal contact point of each protrusion may extend more than 3 mm, or more than 4 mm, from the wall-facing flat.

In some embodiments, each protrusion extends by substantially the same distance from the wall-facing flat as the other protrusions.

This helps to ensure that the wall-facing flat of the bracket is substantially parallel to the wall structure to which the bracket is mounted.

In some embodiments, the bracket comprises an insulating material on the wall-facing flat.

The insulating material provides a material insulating layer to reduce the thermal conductivity between the bracket and the wall structure. The insulating layer can be selected to conform to specific material properties. The material properties may relate to a thermal insulation performance. The material properties may relate to stability under environmental influences. For instance, the insulating layer may be designed to last for at least 20 years under normal performance without decomposing. The material properties may relate to a fire rating.

In some embodiments, the insulating material is provided by an insulating pad. In some embodiments, the insulating pad is fixed to the bracket by an adhesive.

The insulating pad may be held loosely on the bracket buy way of a pre-inserted bolt or screw extending through the wall-facing flat and through the insulating pad. For instance, a bracket with mineral fibre pad and bolt may be provided as a loosely connected assembly in which the mineral fibre pad is retained loosely on the threads of the bolt until the bracket is fixed, with the insulating pad, to a wall structure.

In some embodiments, the insulating pad comprises or consists of a material having a density of no more than 500 kg/m^3, 400 kg/m^3, 300 kg/m^3, 200 kg/m^3, 150 kg/m^3, 100 kg/m^3, 80 kg/m^3, 60 kg/m^3, or 40 kg/m^3. In some embodiments, the insulating pad comprises or consists of mineral wool. Typical density values for mineral wool are in the region of 45 to 100 kg/m^3.

In some embodiments, the insulating pad comprises or consists of a material that has a compressive strength of no more than 100 kPa, 90 kPa, 80 kPa, 70 kPa, 60 kPa, 50 kPa, 40 kPa, 30 kPa, 20 kPa or 10 kPa.

Under loads typically expected for brackets mounted to a wall structure, the insulating pad may be compressible to less than 20%, 30%, 40%, or 50% of its original, uncompressed thickness.

The provision of protrusions on the wall-facing flat allows materials to be used for the thermal break that would otherwise be compressible. The protrusions can thus be considered a compression-preventing arrangement, by which is meant that the protrusions resist a compression of a material between the wall-facing side of the bracket and the wall structure under loads normally expected for a cladding system mounting bracket.

For materials such as mineral wool, the thermal insulating behaviour correlates with the layer thickness. An arrangement that avoids compression of the insulating pad helps to maintain a better thermal break performance.

To provide an illustrative value, a thermal resistance value R of 0.2 $m^2 \times K/W$ or greater is typically considered to provide a thermal break. For a nylon pad, this would require a thickness of about 40 mm of the insulating pad. Rockwool or mineral wool will achieve a thermal resistance value of 0.2 $m^2 \times K/W$ or greater with a pad thickness of about 5-10 mm.

To put this into context, even if the thermal resistance value is lower, eg provided by a rockwool thickness of eg 2-3 mm, this is still better than the corresponding thermal resistance of a nylon pad of the same thickness. However, if a 2-3 mm rockwool pad is compressed, this correspondingly affects the thermal resistance properties. The protrusions allow a defined space to be maintained and therefore help to ensure a defined thermal resistance value even when a compressible insulating material is used. Furthermore, the protrusions maintain stable abutment points between the bracket and the wall independently of the stability of the insulating material, even if the insulating material may partially decompose over the course of decades.

In some embodiments, the insulating material has a thickness of no more than the extension of protrusions from the wall-facing flat.

This avoids compressive forces acting on the insulating material in the space between the wall-facing flat and the wall structure.

In some embodiments, the insulating pad comprises one or more holes for fixtures and/or for receiving the protrusions.

This helps to fix the insulating pad between the bracket and the wall structure to which the bracket is mounted. The holes through the insulating pad avoid a compression of the insulating pad.

In some embodiments, the insulating pad has an outer silhouette substantially corresponding to the circumference of the wall-facing flat.

For instance, the insulating pad may have a height and width substantially corresponding to the height and width of the wall-facing flat.

In some embodiments, the bracket is made from steel or a steel alloy. The properties may be that of or similar to stainless steel 316, as known in the trade. The bracket may be provided with a mill finish.

In some embodiments, the bracket is made from aluminium or an aluminium alloy. The properties may be according to EN AW-6063T6 and/or BS EN 755-2:1997, as known in the trade. The bracket may be provided with a mill finish. The bracket may be provided with an anodised finish.

One or more brackets of the first aspect may be comprised in sub-frame assembly of a building structure. The sub-frame may be used to support rain screen cladding.

The brackets may be rail-support brackets, such as so-called ‘helping hand’ brackets known in the trade.

Description of the Figures

Exemplary embodiments of the invention will now be described with reference to the Figures, in which:

Figure 1 shows a side view of a part of a façade system;
Figure 2 shows an exploded view illustrating a partial isometric view of a bracket and an isometric view of an insulating pad according to an embodiment;
Figure 3 shows a partial isometric view of a protrusion arrangement according to an embodiment, and
Figure 4 shows a partial isometric view of another protrusion arrangement according to an embodiment.

Description

Figure 1 shows a side view illustrating a vertical rail bracket 4 in the context of a sub frame 1 for a cladding system such as rain screen cladding. In the reading orientation of Figure 1, the interior wall side is to the left and the exterior wall side is to the right. A wall structure 2 is provided with a series of brackets 4 (only one bracket 4 shown in Figure 1). The bracket 4 holds a vertical rail 5 (in Figure 1: in vertical orientation) spaced apart from the wall structure 2. The vertical rail 5 constitutes a cladding system component. It will be understood that a series of laterally spaced apart vertical rails 5 is mounted to the wall structure 2, each vertical rail mounted via a series of multiple brackets 4. The plurality of vertical rails 5 serves as support for a cladding system 9. The cladding system 9 is only schematically indicated in Figure 1 and could be comprised of a series of panels fixed to the series of rails. Between the wall structure 2 and the series of vertical rails 5 there is a cavity 8 that may be filled with insulating material.

As illustrated in Figure 1, the wall-facing face of the bracket 4 is in full face-to-face abutment with the wall structure 2. As brackets are increasingly made from steel to comply with fire rating requirements, each bracket provides a thermal bridge between the exterior side and the wall structure 2, reducing the effectiveness of the insulating cavity 8. It will be understood that a wall structure comprises a great number of brackets each providing a thermal bridge.

Figure 2 shows an isometric exploded view of a part of a bracket 10 and an insulating pad 20. The bracket 10 is formed of a sheet having a sheet thickness 11 and is shaped to an L profile comprising two flats, which include a wall-facing flat 12 and a cladding-facing flat 18. The cladding-facing flat 18 is indicated only in part and it is understood that a cladding component is intended to be mounted to the cladding-facing flat 18. The wall-facing flat 12 is provided with a plurality of elongate slots 16A, 16B providing a sliding fixture allowing the bracket 10 to be mounted to a wall structure (such as wall structure 2 in Figure 1). The wall-facing flat 12 is provided with a plurality (here: 4) of deformations 14A, 14B, 14C, 14D. Each deformation 14A, 14B, 14C, 14D provides a protrusion of the invention. One deformation 14A is described in more detail in Figure 3.

Each deformation 14A, 14B, 14C, 14D protrudes away from the wall-facing flat 12 in the direction in which the bracket 10 is intended to be mounted to a wall structure. Thereby, the each deformation provides a contact point with a wall structure. The contact points prevent a direct face-to-face abutment of the wall-facing flat 12 with a wall structure. The deformations define the thickness of a space between the wall structure 2 and the wall-facing flat 12. The space may constitute a cavity or may be used to accommodate insulating material.

The insulating pad 20 has a pad thickness 21 and comprises a wall-facing surface 22 and a bracket-facing surface 24. The insulating pad 20 corresponds in width and height to the wall-facing flat 12, and as such the outer silhouette (here: a rectangle) substantially corresponds to the circumference of the wall-facing flat. The insulating pad 20 comprises a plurality of holes 26A, 26B corresponding in position and shape to the elongate slots 16A, 16B, to avoid blocking the elongate slots 16A, 16B when the insulating pad 20 is sandwiched between the bracket 10 and a wall structure.

An adhesive may be provided between the wall-facing flat 12 and the bracket-facing surface 24 to ensure a secure positioning of the insulating pad 20 on the bracket 10. This facilitates the installation of the bracket 10 onto the wall structure. The insulating pad 20 may be self-adhesive. The adhesive may be provided on the bracket-facing surface 24.

The insulating pad 20 is compressible. When the wall-facing flat 12 is pressed against a wall structure, the deformations 14A, 14B, 14C, 14D will locally compress and/or pierce through the insulating pad 20 until the deformations come into abutment with the wall structure. The contact points between the deformations and the wall structure are much smaller than the area of the wall-facing flat 12. However, the improved thermal insulation properties of a cavity or of a low density insulating pad are greatly improved relative to a rigid polymer pad such as a nylon pad.

Figure 3 shows a larger view of a deformation 14A, which corresponds to the deformation 14B, 14C and 14D. The deformation 14A is stamp-embossed into the sheet constituting the wall-facing flat 12. It is understood that the deformation 14A protrudes in the wall-facing direction from the wall-facing flat 12. The deformation 14A has a thickness 11A corresponding to the sheet thickness 11 (Figure 2). By way of the manufacturing method, the deformation is bent at an obtuse angle from the wall facing flat 12. The deformation has an apex 15 that constitutes a distal protrusion end relative to the wall-facing flat and that provides a contact point with a wall structure and thereby prevents a full face-to-face abutment of the wall-facing flat with a wall structure. The apex 15 is spaced further from the wall-facing flat 12 than the sheet thickness 11. The deformation 14A is spaced from the edge of the wall-facing flat 12 (see Figure 2). Likewise, the apex 15 is therefore spaced from the edge of the wall-facing flat 12.

Figure 4 shows a variant of a stamped and bent deformation 14E constituting a protrusion. Each of the Figure 2 deformations 14A-14D may be constituted by a deformation 14E. It is understood that the deformation 14E protrudes in the wall-facing direction from the wall-facing flat 12. The deformation 14E has a thickness 11E corresponding to the sheet thickness 11 (Figure 2). The end 15E of the deformation 14E constitutes a distal protrusion end relative to the wall-facing flat and provides a contact point with a wall structure and thereby prevents a full face-to-face abutment of the wall-facing flat 12 with a wall structure. The end 15E is spaced further from the wall-facing flat 12 than the sheet thickness 11. The deformation 14E is spaced from the edge of the wall-facing flat 12 (see Figure 2). Likewise, the end 15E is therefore spaced from the edge of the wall-facing flat 12.

As shown in Figure 2, the insulating pad 20 comprises no holes corresponding to the locations of the deformations 14A to 14D. The insulating pad 20 may be provided with

holes through which the deformations may protrude to come into direct contact with the underlying wall structure. Alternatively, it is acceptable for the insulating pad 20 to be compressed and/or pierced locally by the deformations.

The protrusions provide a spacer that is integral with the bracket. The integral arrangement facilitates the installation of a bracket with thermal break cavity or with a low-density thermal break pad. It will be understood that Figures 3 and 4 are illustrative examples and that other deformations may be provided, for instance triangular stamped clips (one side of the triangle remaining connected to the sheet) or elongate wings with a multi-point or line contact, or other suitable shapes.

The spacer is less compressible than the insulating pad. As such, the protrusions can be considered a compression-preventing arrangement. In particular, under normal loads applied to a bracket when mounted to a wall structure, the spacer will not collapse whereas the insulating pad may be of a material that would in the absence of a spacer be compressed upon installation.

The provision of a compression-preventing arrangement increases the options for the choice of an insulating material. In particular, otherwise compressible material, such as mineral fibre, mineral wool, or rockwool, may be used. This allows material to be selected for its fire resistant properties. The insulating material may have high fire resistance. The insulating material may have low combustibility, or practically no combustibility. The material may be selected for its stability properties, eg this may be material resisting decomposition at defined environmental conditions for a pre-defined period of time, for instance resisting decomposition in warm humid climate for decades.

This is an advantage over materials such as nylon that are chosen for their low compressibility. Nylon pads are established because they provide good stability, but nylon pads will break down above 100 degrees Celsius. In contrast, material such as mineral wool has limited combustibility.

The invention is described with reference to flat bracket surfaces but may be used on profiled brackets.

CLAIMS:

1. A bracket for mounting a cladding component directly or indirectly to a wall structure, the bracket comprising a wall-facing flat, wherein the wall-facing flat comprises one or more protrusions, each protrusion extending from the wall-facing flat to space apart the wall-facing flat from a wall structure to which it is mounted.

2. The bracket according to claim 1, wherein at least one protrusion is formed by a deformation of the wall-facing flat.

3. The bracket according to claim 2, wherein at least one protrusion is formed by a punched portion or by an embossment.

4. The bracket according to any one of the preceding claims, wherein the wall-facing flat is a side of a sheet having a sheet thickness, and at least one protrusion extends from the wall-facing flat by a distance greater than the sheet thickness.

5. The bracket according to any one of the preceding claims, wherein each protrusion extends by substantially the same distance from the wall-facing flat as the other protrusions.

6. The bracket according to any one of the preceding claims, wherein the bracket comprises an insulating material on the wall-facing flat.

7. The bracket according to claim 6, wherein the insulating material is provided by an insulating pad, wherein preferably the insulating pad is fixed to the bracket by an adhesive.

8. The bracket according to claim 7, wherein the insulating pad comprises or consists of a material having a density of no more than 500 kg/m^3, 400 kg/m^3, 300 kg/m^3, 200 kg/m^3, 150 kg/m^3, 100 kg/m^3, 80 kg/m^3, 60 kg/m^3, or 40 kg/m^3, such as mineral wool.

9. The bracket according to claim 7 or 8, wherein the insulating pad comprises or consists of a material that has a compressive strength of no more than 100 kPa, 90 kPa, 80 kPa, 70 kPa, 60 kPa, 50 kPa, 40 kPa, 30 kPa, 20 kPa or 10 kPa.

10. The bracket according to any one of claims 6 to 9, wherein the insulating material has a thickness of no more than the extension of protrusions from the wall-facing flat.

11. The bracket according to any one of claims 7 to 10, wherein the insulating pad comprises one or more holes for fixtures and/or for receiving the protrusions.

12. The bracket according to any one of claims 7 to 12, wherein the insulating pad has an outer silhouette substantially corresponding to the circumference of the wall-facing flat.

13. The bracket according to any one of the preceding claims, wherein the bracket is made from steel or a steel alloy.

14. The bracket according to any one of claims 1 to 12, wherein the bracket is made from aluminium or an aluminium alloy.

15. The bracket according to any one of the preceding claims, comprised in a sub-frame assembly of a building structure.

Intellectual Property Office

Application No:	GB1714469.2	**Examiner:**	Mr William Crowe
Claims searched:	1-15	**Date of search:**	22 February 2019

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1, 2, 4-10 and 13-15	KR100987700 B (KWANG STEEL CO) See Figures and Abstract, noting fixing bracket comprising a flat portion 11 having protrusions 13, 14.
X	1, 5-10 and 13-15	KR100673829 B1 (CHO) See Figures and Abstract, noting fixing structure comprising an apparatus 10 having legs 12.
X	1, 2, 4-10 and 13-15	KR20140055564 A (CHO) See Figures and Abstract, noting bracket comprising a flat portion 11 having extensions 100.
X	1, 2, 4-10 and 13-15	US2008/222992 A1 (NICHIHA) See whole document, noting external wall bracket comprising a fixture 7 having a flat portion 71 and extensions 72-74.
X	1, 5 and 13-15	EP0550395 A1 (JANSSON) See Figures 5 and 6 in particular, noting projections extending from flat plate 2.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

E04F

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI, Patent Fulltext

International Classification:

Subclass	Subgroup	Valid From
E04F	0013/08	01/01/2006