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(71) Applicant: **Rockwool International A/S**
2640 Hedehusene (DK)

(72) Inventor: **The designation of the inventor has not yet been filed**

(74) Representative: **Samuels, Lucy Alice**
Gill Jennings & Every
Broadgate House
7 Eldon Street
London EC2M 7LH (GB)

(54) Fixing method

(57) The invention provides

(g) providing a spacer device which comprises a wedge element having a cross-section which has a narrow end and a wide end and which is connected at or near the narrow end to a clip element which has a first end connected to the narrow end of the wedge element and a second, free end, whereby the wedge element and the clip element are configured so that they define a gap between the wedge element and the clip element,
(h) inserting one edge of the panel into the gap between the wedge element and the clip element, and
(i) affixing the spacer device and the panel to the surface,

wherein the wedge element or the clip element or both are formed from resilient material such that the gap into which the edge of the panel is inserted has, in the absence of external forces, a width less than the thickness of the part of the panel inserted between the wedge element and the clip element and whereby the insertion of the edge of the panel forces the size of the gap to increase, thus securing the panel between the wedge element and the clip element, and the wedge element has a first surface which contacts with the surface onto which the panel is to be affixed and a second surface which contacts the panel itself.

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Description

[0001] The invention relates to methods of fixing panels to surfaces, the constructions produced as a result of this method and devices suitable for use in methods of the invention.

[0002] It is known to provide cladding for construction surfaces such as walls and roofs, the cladding being supplied in the form of panels such as planks. It is well known to affix the panels to the wall or roof in question in an overlapping pattern so that one panel is overlapped by a second panel at one end and its other end itself overlaps a third panel. The third panel at its other end overlaps a fourth panel, and so on. This is done for various reasons, including prevention of entry of rainwater into the construction, or for aesthetic reasons.

[0003] These panels may be made of a variety of materials but one common type of panel is formed from mineral wool board. Examples are those sold commercially by a subsidiary of the present applicant under the trade name Rockpanel (RTM).

[0004] In order for the panels to overlap in the manner discussed above, each panel must be at an angle with, and not parallel to, the surface to which it is affixed. Each panel is usually affixed to the surface by means of a screw, nail or other holding means. The angle of the screw alone can be used to determine the angle to the surface at which the panel is held. However, this has the disadvantage that it is essential that the installer of the panels ensures that the angle of entry of the screw is correct. Furthermore, it is possible for the screw to penetrate too far into the construction surface and cause warping of the insulation panel.

[0005] Therefore it has been known to provide devices which are positioned between the panel and the construction surface and which maintain the appropriate angle and distance from the construction surface. Certain of such systems even encompass the top edge of a panel, holding the panel in place when it has been affixed to the construction surface. Such systems are described in product information brochures from Eternit, entitled "Planung und Ausfuhrung: Stulpdeckung mit PELICOLOR-Fassadenplatten", published March 1999.

[0006] However, these systems have the disadvantage that they serve only to maintain distance, and in some cases an appropriate angle, between the construction surface and the panel. Construction of the entire system involving application of the device for maintaining distance and angle, panel and screw is complex to affix to the construction surface, in particular in an accurate manner. Furthermore, with some systems there is still potential for over-penetration of the screw and consequent warping of the panels.

[0007] Consequently, it would be desirable to be able to provide methods whereby panels, such as mineral wool boards, can be affixed to surfaces, such as walls and roofs, in overlapping manner whilst maintaining the appropriate angle between the panel and the surface and allowing attachment to the surface of both the device and the panel itself without difficulty.

[0008] According to a first aspect of the invention we provide a method of affixing a panel to a surface comprising

(a) providing a spacer device which comprises a wedge element having a cross-section which has a narrow end and a wide end and which is connected at or near the narrow end to a clip element which has a first end connected to the narrow end of the wedge element and a second, free end, whereby the wedge element and the clip element are configured so that they define a gap between the wedge element and the clip element,
(b) inserting one edge of the panel into the gap between the wedge element and the clip element, and
(c) affixing the spacer device and the panel to the surface,

wherein the wedge element or the clip element or both are formed from resilient material such that the gap into which the edge of the panel is inserted has, in the absence of external forces, a width less than the thickness of the part of the panel inserted between the wedge element and the clip element and whereby the insertion of the edge of the panel forces the size of the gap to increase, thus securing the panel between the wedge element and the clip element, and the wedge element has a first surface which contacts the surface onto which the panel is to be affixed and a second surface which contacts the panel itself.

[0009] The method described allows panels to be affixed to surfaces at a predefined angle to the relevant surface, by means of appropriate selection of the ratio between the widths of the narrow and wide ends of the cross-section of the wedge. Furthermore, the use of resilient material to form the clip element allows insertion of the panel between the clip element and the wedge element and secure holding of the panel in that space, allowing time for affixing the spacer device and panel to the surface. This minimises the risk of the panel falling and/or affixation at an incorrect angle. The method of the invention allows affixing of a large number of overlapping panels onto a surface, each panel being associated with a spacer device in the manner described above.

[0010] The invention can be used for affixing panels to any type of surface, but preferably the surface is a construction surface such as a fascia or a soffit. More preferably it is a wall or a roof, preferably an external wall. Application of panels by the method described above can be carried out for the purpose of cladding and insulating the surface or simply for aesthetic purposes.

[0011] The surface to which the panels are affixed may be at any angle with the horizontal, but is preferably a sloping, substantially flat surface at an angle of at least 20°, preferably at least 30°, more preferably at least 45°

with the horizontal. The invention is particularly suitable for application of panels to substantially vertical surfaces at an angle of at least 80°, preferably at least 85° and often around 90° with the horizontal, such as external walls.

[0012] The panel has a thickness y which is its smallest dimension. The length and width may be in any ratio but generally preferred panels are in the form of planks having substantially larger length than width, whereby the edge inserted into the gap between the wedge element and the clip element is the long edge. Preferably such panels are affixed so that the long edge is substantially parallel with the horizontal.

[0013] A variety of sizes of panel may be used but preferably the thickness is in the range 5 to 25 mm, more preferably 6 to 15 mm. Preferably the length is in the range 100 to 6100. Preferably the width is in the range 160 to 400 mm.

[0014] The panels may be made of any suitable material, such as wood, thermoplastic or any other appropriate construction or cladding material. Preferably however they are formed from mineral wool. Examples of mineral wool panels are those sold under the name Rockpanel by a subsidiary company of the applicant. The density of such mineral wool panels is generally in the range 500 to 1500 kg/m^3, preferably 850 to 1350 kg/m^3.

[0015] The panels are affixed to the surface by means of the spacer device. This device comprises two elements, a wedge element and a clip element. The wedge element has a cross-section having a narrow end and a wide end. The two non-parallel surfaces of the wedge element are designated as an outer surface, which in the method is placed in contact with the surface to which the panel is to be affixed and an inner surface, which makes contact with the panel itself. These surfaces may be continuous or the wedge element may for instance be formed of ribs with spacers between these ribs so one or both surfaces are partially imaginary but at least the ribs make contact with the surface to which the panel is to be affixed or the panel itself, as applicable. This latter construction has the advantage of adequate strength and other physical properties but with a saving of material.

[0016] These surfaces are generally substantially planar and flat and the angle between these surfaces is determined by the angle at which the panel is required to lie in relation to the surface to which it is to be affixed. This angle is generally in the range of from 1 to 20°, preferably 2 to 10°.

[0017] At or near the narrow end of the wedge element is fixed a clip element. The wedge element and clip element can be formed from separate entities which are joined but preferably they are integral.

[0018] The clip element is formed so that the cross-section of the spacer device is such that it is of substantially U-shape. That is, the clip element is folded back so that a substantial part of it is essentially parallel with (but generally not exactly parallel, see below) the inner surface of the wedge element. The first end of the clip element is attached at or near the narrow end of the wedge element and the second end is free. The second end, or a part of the clip element close to the second end, and the inner surface of the wedge element form a gap into which the edge of the panel is inserted. The width x of this gap is, in the absence of any external forces applied to the spacer device, less than the thickness y of the panel. However, the material from which the clip element and/or the wedge element is/are formed is resilient so that the panel may nevertheless be inserted into this gap and lie along the inner surface of the wedge element so that its largest surface lies along the inner surface of the wedge element. The clip element exerts force against the panel, thus securing it within the gap. The clip element and wedge element are configured so that the panel can be held in position between these two elements simply by forces exerted on it by these elements for sufficient time that a permanent fixing means such as a screw may be applied.

[0019] Suitable materials for the wedge element and/or the clip element include synthetic polymeric materials such as polypropylene (PP), high density polyethylene (HDPE), polyvinyl chloride (PVC), acrylonitrile-butadiene-styrene copolymer (ABS) and polyamide (PA). HDPE is preferred. Metallic materials can also be used provided they have the necessary resilience. An example is aluminium and other examples include spring steel.

[0020] The clip element is generally substantially flat and straight and includes a bridging element which extends from a position at or near the narrow end of the wedge element and a substantially perpendicular holding element which is substantially parallel to the inner surface of the wedge element. Preferably the holding element and the inner surface of the wedge element are not exactly parallel, as a non-parallel configuration assists in provision of a gap which at the free end of the holding element is narrower than the thickness of the panel but allows insertion and holding of the panel nevertheless. Preferably the holding element is at an angle of from 1 to 30°, preferably 6 to 12°, with the inner surface of the wedge element. The bridging element is generally substantially perpendicular with the inner surface of the wedge element.

[0021] The free end of the holding element may be at, close to or even beyond the wide end of the wedge element. However, preferably it terminates at a point from one half to two thirds of the way between the narrow end and the wide end of the wedge element.

[0022] The holding element may have width w greater than or substantially the same as the width z of the wedge element but is preferably from 25 to 50% of the width of the wedge element. The bridging element is generally of substantially the same width as the wedge element.

[0023] The free end of the holding element may be

angled with respect to the majority of the holding element away from the inner surface of the wedge element. This angled end ensures easy one-hand positioning of the panels. This angle is preferably from 10 to 80°, more preferably from 40 to 50°.

[0024] The width z of the wedge element is generally in the range of from 35 to 65 mm. The width of the bridging element is preferably in the same range.

[0025] The width w of the clip element is preferably in the range 10 to 40 mm. The thickness (dimension perpendicular to the width w) of the clip element is preferably in the range 0.5 to 2 mm. The length of the wedge element from narrow end to wide end is preferably in the range 50 to 100 mm. The length of the bridging element is preferably in the range 5 to 20 mm. The length of the holding element is preferably in the range 30 to 70 mm. The angle in the holding element is preferably at a distance of from 5 to 20 mm from the free end of the holding element.

[0026] The method requires affixing of the spacer device and the panel to the surface. Step (b), insertion of the panel into the spacer device, can be carried out after the spacer device has been affixed to the surface, but preferably is carried out before this step so that the entire construction of spacer device with inserted panel is affixed to the surface.

[0027] Affixing can be by any suitable fixing means, for instance bolts, nails or screws. Preferably these pass through the holding element, the panel and the wedge element. Preferably also both the holding element and the wedge element are provided with pre-formed apertures through which a screw, nail, bolt or other fixing means can pass. One advantage of use of mineral wool panels is that no predrilling of apertures in the panel is required.

[0028] An advantage of the spacer device used in the invention is that the preformed apertures in the holding element and the wedge element can closely predefine the angle at which the fixing means enters the panel and the surface to which the panel is to be affixed.

[0029] The method of the invention may be used to apply two or more, preferably at least 5, more preferably at least 10, overlapping panels to a construction surface such as an external wall.

[0030] The invention also provides in a second aspect a construction which comprises a construction surface having a fixed thereto a spacer device as described above, with a panel inserted between the clip element and the wedge element wherein the outer surface of the wedge element is in contact with the construction surface and the inner surface of the wedge element in contact with the panel, the spacer device and panel being affixed to the construction surface by means of a holding means.

[0031] In a third aspect the invention also provides a spacer device suitable for affixing a mineral wool cladding panels to a construction surface comprising a wedge element having a cross-section which has a narrow end and a wide end and which is connected at or near the narrow end to a clip element which has a first end connected to the narrow end of the wedge element and second, free end, whereby the wedge element and the clip element are configured so that they define a gap between the wedge element and the clip element, and the wedge element has an outer surface and an inner surface, the inner surface facing the clip element, wherein either the wedge element or the clip element or both are formed from resilient material such that the gap between the wedge element and the clip element may be made larger by application of force.

[0032] The invention will now be illustrated with reference to the drawings.

[0033] Figure 1 is a perspective view of a spacer device for use in the method of the invention from the clip element side.

[0034] Figure 2 is a perspective view of the spacer device of Figure 1 from the opposite side.

[0035] Figure 3 is a cross-section of a spacer device for use in the method of the invention.

[0036] Figure 4 illustrates three panels which have been affixed to a surface using the method of the invention.

[0037] Figure 5 is a cross-sectional view of a panel which has been affixed to a surface using the method of the invention.

[0038] In Figure 1 the spacer device 1 comprises a wedge element 2 and a clip element 3, the clip element comprising a bridging element 4 and a holding element 5.

[0039] The device 1 is suitable for affixing a series of mineral wool boards to an external wall in an overlapping configuration.

[0040] The wedge element and clip element are integral and formed from HDPE. The inner surface 6 of the wedge element is visible and the surface with which the panel comes into contact.

[0041] The wedge element has a wide end 7 and a narrow end 8, the latter being connected with the clip element at the bridging element. The free end 9 of the clip element is provided with an angle 10 which, as will be seen from the discussion below, aids placing the spacer device on the panels. Both the holding element 5 and the wedge element 2 are provided with apertures 11 which are aligned so that a screw may pass through aperture 11a, through the panel and through aperture 11b into the external wall.

[0042] The width w of the holding element 5 is approximately one third of the width z of the wedge element.

[0043] Figure 2 shows the opposite side of the same device. It can be seen that the wedge element 2 is provided with ribs 12a and 12b. The surface of the wedge element 2 which contacts the external wall 13 is therefore not a continuous surface but is made defined by the surfaces of the ribs and the remainder is an imaginary surface.

[0044] Figure 3 shows a device 1 in cross-section. It

can be seen that wedge element 2, bridging element 4 and holding element 5 form a substantially U-shaped cross-section, with the free end 9 of the holding element being about 3/5 of the way along the wedge element 2 from its narrow end 8.

[0045] The smallest gap between the clip element and the wedge element has width x. This is less than the thickness y of the panel which is to be inserted into the gap.

[0046] Figure 4 shows a number of panels affixed to an external wall 13 with the use of spacer devices. The panel 14 is inserted between the clip element 3 and the wedge element 2 of the spacer device until its top edge comes into contact with the inner surface of the bridging element 4. Because the clip element is formed of resilient material and the gap x between the clip element and the wedge element is less than the thickness of the panel, the holding element 5 holds the spacer device securely on the panel whilst the panel and spacer device are affixed to the wall by means of screws 15 which pass through the apertures 11a and 11b. It can be seen that panel 14a is affixed to the wall 13, followed by overlapping panel 14b and further overlapping panel 14c. A more detailed view of such a construction is given in Figure 5. It can be seen that the cross-section of the wedge element, ie having a narrow end and a wide end, ensures that the angle between the panel and the external wall is maintained and ensures appropriate ventilation and wind proofing between the panels 14a and 14b.

[0047] It can be seen clearly from Figure 5 that in the method of the invention the top edge 16 of the panel 14a (shown in cross-section) is inserted into the gap of width x between the clip element and the wedge element. The panel has thickness y which is greater than x.

Claims

1. A method of affixing a panel to a surface comprising

(d) providing a spacer device which comprises a wedge element having a cross-section which has a narrow end and a wide end and which is connected at or near the narrow end to a clip element which has a first end connected to the narrow end of the wedge element and a second, free end, whereby the wedge element and the clip element are configured so that they define a gap between the wedge element and the clip element,

(e) inserting one edge of the panel into the gap between the wedge element and the clip element, and

(f) affixing the spacer device and the panel to the surface,

wherein the wedge element or the clip element or both are formed from resilient material such that the gap into which the edge of the panel is inserted has, in the absence of external forces, a width less than the thickness of the part of the panel inserted between the wedge element and the clip element and whereby the insertion of the edge of the panel forces the size of the gap to increase, thus securing the panel between the wedge element and the clip element, and the wedge element has a first surface which contacts with the surface onto which the panel is to be affixed and a second surface which contacts the panel itself.

2. A method according to claim 1 in which the wedge element or the clip element or both are formed from a synthetic polymeric material or a metallic material.

3. A method according to any preceding claim in which the panel is a mineral wool board and the surface is a construction surface, preferably an external wall or a roof.

4. A method according to any preceding claim in which the clip element is formed from a bridging element which is substantially perpendicular to the inner surface of the wedge element and a holding element which is at an angle of from 2 to 20° with the inner surface of the wedge element and the free end of the holding element is closer to the inner surface of the wedge element than the end of the holding element connected to the bridging element.

5. A method according to any preceding claim wherein the holding element is substantially straight but is provided with an angle at its free end.

6. A method according to any preceding claim wherein the holding element and wedge element are provided with preformed apertures through which holding means may pass so as to secure the device and panel to the surface.

7. A construction comprising a construction surface having affixed thereto a spacer device and a panel, the spacer device and panel having been affixed to the surface by the method of claim 1.

8. A spacer device suitable for use in affixing mineral wool cladding panels to building surfaces, comprising a wedge element having a cross-section which has a narrow end and a wide end and which is connected at or near the narrow end to a clip element which has a first end connected to the narrow end of the wedge element and a second, free end, whereby the wedge element and the clip element are configured so that they define a gap between the wedge element and the clip element, and the wedge element has a first surface and a second surface, the second surface facing the clip element,

wherein the wedge element or the clip element or both are formed from resilient materials such that the gap between the wedge element and the clip element can be increased by application of force.

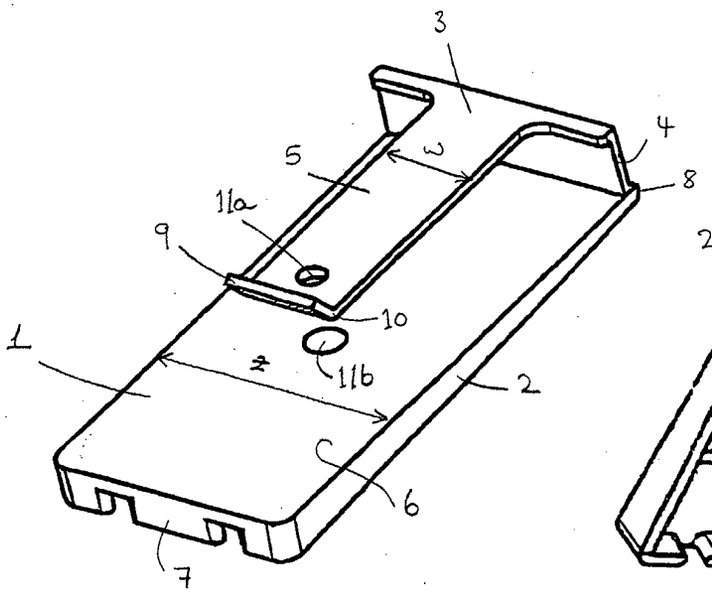

Figure 1

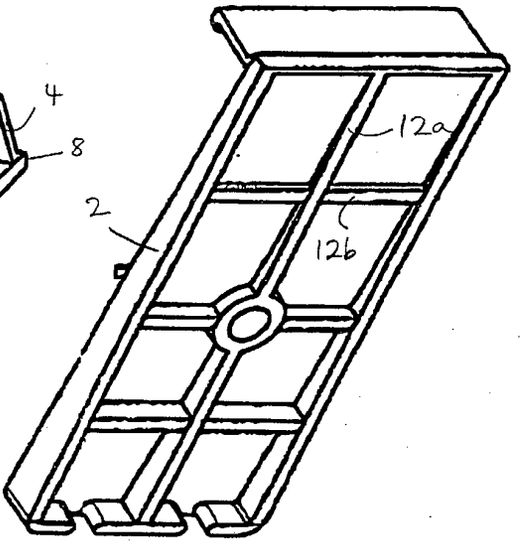

Figure 2

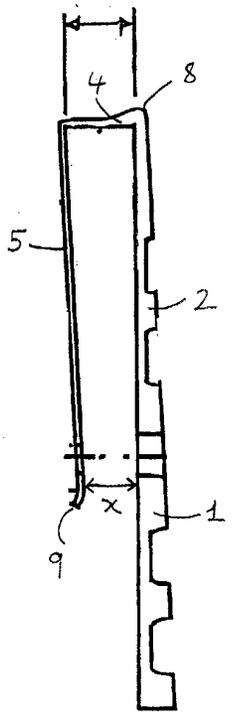

Figure 3

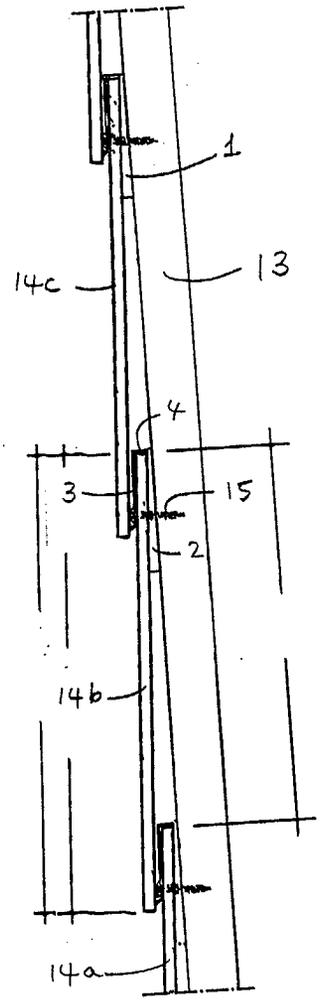

Figure 4

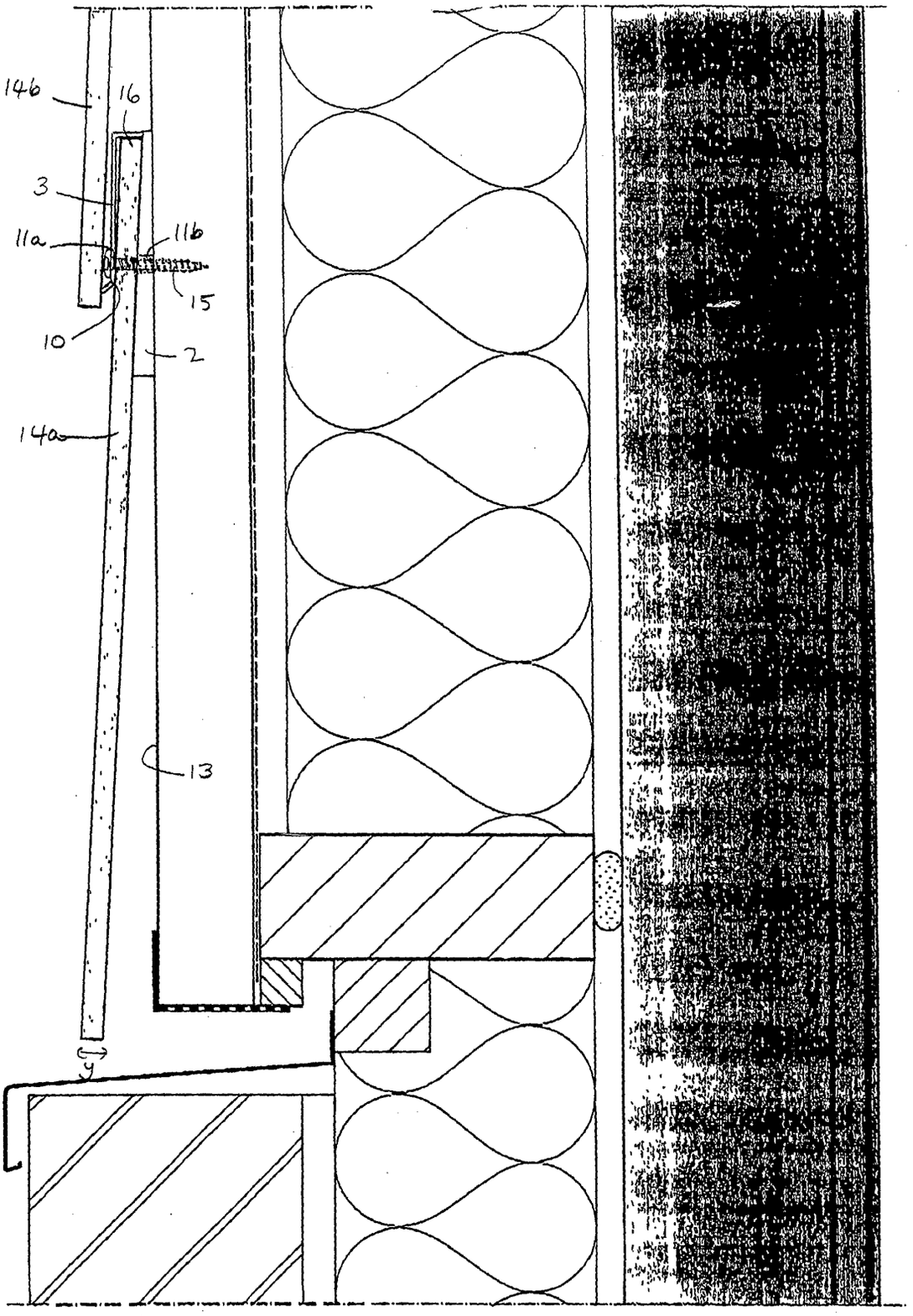

Figure 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 25 0673

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	WO 01 38665 A (CERAMIT AG ;WOLFSEHER ROLAND (CH)) 31 May 2001 (2001-05-31) * page 5, line 7 - page 21, line 35; figures 1-12C *	1-4,6-8	E04F13/08
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A	US 2003/014936 A1 (WATANABE MORIMICHI) 23 January 2003 (2003-01-23) * page 3, right-hand column, line 28 - page 6, right-hand column, line 39; figures 1-12 *	1-4,7,8	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E04F E04D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	8 July 2003	Ayiter, J

CATEGORY OF CITED DOCUMENTS

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08-07-2003

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