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(54) **MOUNTING FRAME DEFINING AN ARCHITECTURAL OPENING DURING CONSTRUCTION WORKS AND KIT IN PARTS COMPRISING SUCH MOUNTING FRAME**

(57) A mounting frame comprising elongated frame members defining a central aperture, each frame member having an L- or T-shaped cross section with a base wall having a surface facing the central aperture and an opposed surface from which a second wall protrudes, characterised in that said frame members are manufactured in a fibre reinforced polymeric material, each of said frame members having a E-modulus in a length direction transversal to the plane of the defined aperture of at least 5 GPa, preferably at least 7 GPa.

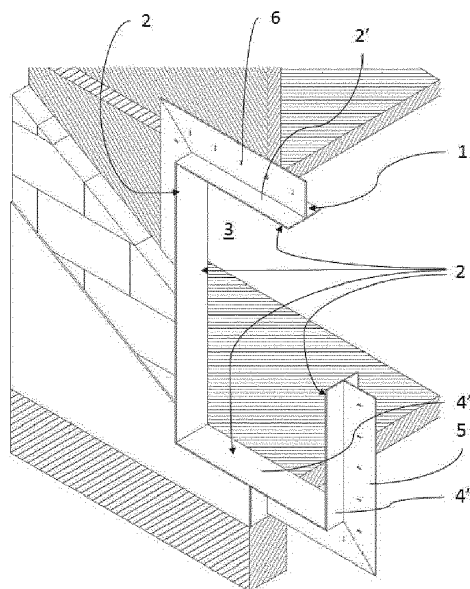


Fig. 1

Description

FIELD OF THE INVENTION

[0001] The present invention concerns a mounting frame used during construction works for defining an architectural opening. The present invention particularly concerns a mounting frame designed for receiving a window or door frame therein. The present invention further concerns a kit-of-parts of a mounting frame with a windowsill and a window frame or door frame.

BACKGROUND OF THE INVENTION

[0002] With the increase use of alternative, non-fossil energy sources and increased energy management in buildings, there is a high focus on insulation, and air-and water tightness of buildings, including the windows and doors. In recent years, insulation/sealing properties of windows and window frames have greatly improved. The zone between the window and door profile and the building carcass however remains a place where insulation/sealing is often poor and jeopardizes overall energy/insulation properties of the building.

[0003] The reason for the poor insulation/sealing properties in the zone is that architectural openings in carcass building are often oversized to fit in a window frame or door frame afterwards, whereby the remaining opening between the carcass and the window or door frame is filled with eg. PU foam that has a relative low insulation/sealing property.

[0004] Also, the required higher overall insulation, results in thicker insulation and thus in thicker walls with much wider cavities.

In such a placement method the insulation remains unprotected and visible for a long time. Furthermore extra supports for the placement of the sills and/or the windows are necessary.

[0005] In order to partly solve the above problems for cavity walls, it is known to use timber frames defining the architectural opening during construction works, whereby carpenters place the timber frame in the carcass aperture after the facade masonry is finished. Only thus, a window or door frame can be installed therein later on. Water and air tightness is obtained through plastic or rubber flashings and sealing tapes around the frame-work.

[0006] For solid walls/one leaf walls, it is also known to mount the window or door frame on the outside of the wall on extra supports. The space between the inner wall and the window or door frame needs to be closed, typically by a roofer, by application of sealing strips such as EPDM rubber strips.

[0007] It is clear that such methods requires several craftsmen such as masonries, carpenters and roofers for erecting a wall, which is both costly, difficult in terms of time management and often results in quality losses in terms of water tightness, air tightness, insulation proper-

ties and overall finishing quality.

[0008] A yet more advanced solution is described in eg. GB2250530, GB2275061 and GB2341198 wherein a polymeric mounting frame is described to be installed during construction works and around which a wall is erected, thereby defining the architectural opening and covering the wall cavity and preventing water leaking into the wall cavity. Such known mounting frames are pre-assembled and define the architectural opening very precisely, matching the dimensions of a window or door to be installed therein, such that no opening remains between the window and the frame. As such a good insulation of the zone between the window or door and carcass can be achieved and guaranteed. A disadvantage of such mounting frames is the impossibility to anchor the window frames in the carcass directly and that as such the mounting frames are subject to high forces transferred by the window or door due to amongst other wind load, pressure differences between the inside and outside of the building and due to expansion and contraction of the window or door frame due to temperature variations. Given the very long lifetime required for windows and doors, the mounting frames are perceived a potential weak link and have not been successfully introduced in the market place to date.

[0009] It is clear from the above that there remains a market need for a mounting frame that alleviates the above problems, disadvantages and negative perceptions, without increasing overall construction time and construction cost.

[0010] The present invention addresses this need and concerns a mounting frame providing high structural bearing properties -thereby avoiding post operations such as anchoring window frames directly into the carcass-, high insulation/sealing properties and is easy to install during construction works.

SUMMARY OF THE INVENTION

[0011] The present invention is defined in the appended independent claims. Preferred embodiments are defined in the dependent claims. In particular the present invention concerns a mounting frame comprising elongated frame members defining a central aperture, each frame member having an L- or T-shaped cross section with a base wall having a surface facing the central aperture and an opposed surface from which a second wall protrudes, characterised in that said frame members are manufactured in a fibre reinforced polymeric material, each of said frame members having an E-modulus perpendicular to the plane of the defined aperture of at least 5 GPa, preferably at least 7 GPa, most preferably at least 15 GPa.

[0012] The present invention also concerns a kit of parts of a mounting frame according to the invention and a windowsill, the windowsill and at least one elongate frame member of the mounting frame comprising cooperating fastening means.

DESCRIPTION OF THE INVENTION

[0013] The mounting frame is preferably manufactured in a particulate reinforced polymeric material having a λ value of maximum 2 W/mK, preferably maximum 1 W/mK, most preferably maximum 0,4 W/mK.

[0014] Preferably, the polymeric material is chosen from the group comprising: polyethylene, polypropylene, polyoxymethylene, polyester, polyvinylchloride, acrylonitrile-butadiene-styrene, polysulfon, polymethylmethacrylaa, polylactic acid or admixtures thereof, whereas the fibre material material is preferably chosen from the group comprising; glass fibres, carbon fibres, basalt fibres, aramid fibres, lignin fibres, cellulose fibres, polyester fibres like for example vectran or admixtures thereof.

[0015] According to a preferred embodiment, the mounting frame comprises upstanding posts and horizontally extending posts. The upstanding posts and horizontally extending posts of the mounting frame (in its position intended for use) can be manufactured from identical materials or material compositions or from different materials or material compositions.

[0016] The dimensions of the mounting frame are preferably such that the width (dimension perpendicular to the plane of the central aperture) is at least 5cm, preferably at least 15 cm, more preferably at least 25 cm, most preferably at least 35 cm.

[0017] According to a preferred embodiment of the mounting frame, through holes are provided in the second wall of each frame member for improving anchoring of the mounting frame in the carcass.

[0018] The base walls of the frame members preferably comprise a slanting edge at at least one of its longitudinal edges, which edges can be used as plaster edge beads during later finishing works.

[0019] The present invention further concerns a method of implementation of a mounting frame to a construction, whereby the mounting frame is fixed to the construction by application of glue or other adhesives, resulting in a water and air tight connection between the mounting frame and the surrounding construction.

DESCRIPTION OF THE FIGURES

[0020]

Fig. 1 shows a perspective view of a mounting frame according to the present invention applied in a wall part;

Fig. 2 illustrates various alternatives for the cross-section of frame members of the mounting frame according to the present invention;

Fig. 3-9 show consecutive construction steps for building a wall and implementation of a mounting frame according to the invention therein;

Fig. 10 schematically shows a cross-sectional view of a mounting frame according to the invention with a window frame and window installed therein;

Fig. 11 shows an alternative embodiment of a mounting frame according to figure 1, wherein additionally a window pane is installed in the mounting frame.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0021] Figure 1 shows a mounting frame 1 according to the present invention comprising elongated frame members (or posts) 2, 2' defining a central aperture 3, each frame member having an L- or T-shaped cross section with a base wall 4 having a surface 4' facing the central aperture and an opposed surface 4" from which a second wall 5 protrudes. In the illustrated embodiment, a series of through holes 6 is provided in this second wall. In accordance with the present invention, the frame members 2, 2' are manufactured in a fibre reinforced polymeric material. Each of said frame members, when taken individually have a E-modulus, perpendicular to the plane defined by the base wall 4, of at least 5 GPa, preferably at least 7 GPa, most preferably at least 15 GPa.

[0022] The polymeric material is chosen from the group comprising: polyethylene, polypropylene, polyoxymethylene, polyester, polyvinylchloride acrylonitrile-butadiene-styrene, polysulfon, polymethylmethacrylaa, polylactic acid or admixtures thereof, whereas the fibre material is preferably chosen from the group comprising; glass fibres, carbon fibres, basalt fibres, aramid fibres, lignin fibres, cellulose fibres, polyester fibres like for example vectran or admixtures thereof. The fibres can be in the form of a web extending in the longitudinal direction of the frame members 2, 2' or in the form of continuous strands, potentially intertwined and generally extending in the longitudinal direction of the frame members 2, 2'.

[0023] The fibres can be uni- or multidirectional, in the form of strands, yarns, rovings, weavings, strand mats, ... They also can be knitted, braided, stitched, ...

[0024] The fibre reinforced polymeric material preferably has a λ value of at maximum 2W/mK, more preferably maximum 1W/mK and most preferably maximum 0,4W/mK.

[0025] According to a preferred embodiment, the mounting frame comprises upstanding posts 2 and horizontally extending posts 2'. The upstanding posts and horizontally extending posts of the mounting frame (in its position intended for use) can be manufactured from identical materials or material compositions or from different materials or material compositions.

[0026] The frame members 4 are preferably manufactured by pultrusion and subsequently assembled into the mounting frame having the desired and predetermined dimensions. Assembly of the mounting frame is preferably performed in a controlled area allowing precise control of the dimensions and high quality links between the different frame members resulting in a structurally rigid frame (form stable) with a high load bearing capacity.

[0027] In figure 2, three alternative cross sections of the frame members are illustrated as an example, where-

by the width W, height H and the position of the second wall 5 on the base wall 4 varies. The thickness T2 of the base wall 4 is preferably smaller than 3 cm, more preferably smaller than 2 cm, most preferably smaller than 1 cm, whereas the thickness T1 of the second wall 5 is preferably smaller than 3 cm, more preferably smaller than 2 cm, most preferably smaller than 1 cm.

[0028] Figures 3 - 9 schematically illustrate the use of a mounting frame according to the invention during wall construction. In figure 2 an inner wall 7 is erected using masonry, although any other known construction material could be used, leaving open an architectural opening. As shown in figure 4, a mounting frame 1 according to the invention is provided in said architectural opening and secured to the inner wall 7 by means of bolts or screws applied in through the through holes 6 into the inner wall.

[0029] Due to the limited thickness of both the base wall 4 and the second wall 5 of the mounting frame, the frame can be used for architectural opening expanding over the entire height of a building store (ground to ceiling) allowing maximal flexibility in architectural design.

[0030] Alternatively only a ground row of bricks or ground portion of concrete is provided whereafter the mounting frame is positioned in place and the remainder of the inner wall 7 is built around the mounting frame while systematically fixing the mounting frame to the erected inner wall. It is also possible to mount the frame in an existing aperture of an already existing wall and or by making a new aperture in an existing wall (eg. renovation) In case the inner wall is built by casing concrete in a formwork, the mounting frame is preferably part of the formwork before casting the concrete in the formwork such that the desired architectural opening is defined upon casting and that the concrete closely fits the outer surface 4" of the mounting frame.

[0031] As mentioned supra, fixation of the mounting frame to the inner wall 7 can be achieved by screws or bolts applied through the through holes 6 in the mounting frame, however glue, mortar or other adhesives can be applied or the flange or second wall 5 can be positioned such that it becomes embedded in concrete during casting of the inner wall. Given the multiple options for fixing the mounting frame to the inner wall, the through holes 6 are not mandatory.

[0032] In figure 5, the wall is further erected to a level above the mounting frame, whereby the mounting frame may have a supporting function for carrying part of the wall above the mounting frame. In this case the wall part above the mounting frame comprises a second architectural opening 20 for a second (vertical) window, while a second floor ceiling defines a third architectural opening 30 for providing a ceiling window or light street. In figure 6, mounting frames 21 and 31 according to the invention are provided in both the second and third architectural openings 20 and 30.

[0033] In figure 7, the wall under construction is further completed by applying layer 8 of insulation material 8 to

the wall, such EPS, XPS panes around the mounting frame 1 on the first building floor or by panes of insulation material such as closed cell PU panes, rock wool or the like around the mounting frame 21 in the second architectural opening.

[0034] The layer 8 of insulation material is subsequently covered (Figure 8) by a finish such as decorative plaster 9 for the mounting frame 1 on the first building floor or an outer wall 29 of, in this case, bricks, for the mounting frame 21 on the second building floor, whereby both the insulation layer as the decorative outer wall are applied around the base wall 4 of the mounting frame and closely fit to the outer surface 4" of said base wall.

[0035] It is clear that the depth of the mounting frame, here defined by the width of the base wall 4 preferably matches the thickness of the wall wherein it is intended to be applied. As such the base wall 4 of the mounting frame can act as a cavity closer closing protecting the space between inner and outer walls 7, 9. Appropriate widths of the mounting frame therefore start from 5 cm and are preferably even 15 cm or 25 cm or 35 cm or more. In order to effectively seal the space between inner and outer walls 7, 9 from water or air ingress, which can be detrimental for insulation capacity, it is preferred to apply a layer of mortar or adhesive between base wall 4 of the mounting frame and the inner wall 7 and between the mounting frame and the outer wall 9. For a better adhesion of mortar or adhesive to the outer surface 4" of the base wall is preferably provided with a zone of high roughness, increasing the effective contact area between the mortar or adhesive and the outer surface 4".

[0036] Further, in case the mounting frame is intended to be used in a wall whereon decorative plaster is to be applied on the inner wall and/or outer wall, it is preferred that the mounting frame is provided with base walls 4 having slanting edges on its longitudinal sides that will function as plaster edge beads and render the edges of the mounting frame nearly or entirely invisible after application of the plaster.

[0037] In figure 9, a window is installed in the mounting frame, thereby finishing the wall.

[0038] As illustrated in more detail in figure 10 the window is installed in the mounting frame by first providing a window mounting bead 10 on the inner surface 4' of the base wall 4 of the mounting frame. This mounting bead 10 can be fixed by for example gluing and/or screwing and allows subsequent insertion of a window frame with window pane in the mounting frame. The window mounting bead 10 in this case comprises 4 elongated profiles fixed on the base walls 4 of each of the mounting frame's members 2 to define a continuous abutment surface against which a window frame can be slid in the mounting frame. The window frame can subsequently be fastened by a profile applied or fixed to the mounting frame base wall 4 such that the window frame is clamped between the window mounting bead 10 and the additional profile 11 as schematically represented in figure 11. In this case the additional profile is executed as a window

sill on the bottom edge of the window and as a decorative or ventilation panel on the other edges of the window.

[0039] Although in figure 10, the window frame is clamped between the window mounting bead 10 and the additional profile 11, other means of fastening such as clipping or gluing can be applied equally, moreover the window mounting bead can be made part of the mounting frame by extruding, pultruding or co-extruding it simultaneously. Due to the structural strength of the mounting frame, the position of the window can be varied along the width of the inner surface 4' of the mounting frame, while the mounting frame provides sufficient support for the window even when subject to heavy wind loads.

[0040] Figure 11 shows an alternative mounting frame, wherein the mounting frame is manufactured as a sandwich panel of two layers 12 with for example a fibre reinforced polymeric material 13 there between.

Claims

1. A mounting frame comprising elongated frame members defining a central aperture, each frame member having an L- or T-shaped cross section with a base wall having a surface facing the central aperture and an opposed surface from which a second wall protrudes, **characterised in that** said frame members are manufactured in a fibre reinforced polymeric material, each of said frame members having a E-modulus in a length direction transversal to the plane of the defined aperture of at least 5 GPa, preferably at least 7 GPa.
2. The mounting frame according to claim 1, the particulate reinforced polymeric material having a lambda value of maximum 2 W/mK, preferably maximum 1 W/mK, most preferably maximum 0,4 W/mK.
3. The mounting frame according to claim 1 or 2, having a width (dimension perpendicular to the plane of the central aperture) of at least 5 cm, preferably at least 15 cm, more preferably at least 25 cm, most preferably at least 35 cm.
4. The mounting frame according to any of the preceding claims, wherein said polymeric material is chosen from the group comprising: polyethylene, polypropylene, polyoxymethylene, polyester, polyvinylchloride, acrylonitrile-butadiene-styrene, polysulfon, polymethylmethacrylate, polylactic acid or admixtures thereof.
5. The mounting frame according to any of the preceding claims, wherein said fibre material is chosen from the group comprising: glass fibres, carbon fibres, basalt fibres, aramid fibres, lignin fibres, cellulose fibres, polyester fibres or admixtures thereof.

6. The mounting frame according to any of the preceding claims, wherein through holes are provided in the second wall of each frame member.

7. The mounting frame according to any of the preceding claims, wherein the base walls of the frame members comprise a slanting edge at least one of its longitudinal edges (plaster edge bead).

8. Kit of parts of a mounting frame according to any of claims 1-7 and a window mounting bead, the window mounting bead and at least one elongate frame member of the mounting frame comprising cooperating fastening means.

10. Kit of parts of a mounting frame according to any of claims 1-7 and a windowsill, the windowsill and at least one elongate frame member of the mounting frame comprising cooperating fastening means.

11. The kit in parts according to claim 10, further comprising a door or window unit, wherein the door or window unit comprising a frame and a pane and the elongated members of the mounting frame comprise cooperating fastening means.

12. Method of implementing a mounting frame as identified in any of claims 1-7 to a construction, whereby the mounting frame is fixed to the construction by application of glue or other adhesives, resulting in a water and air tight connection between the mounting frame and the surrounding construction.

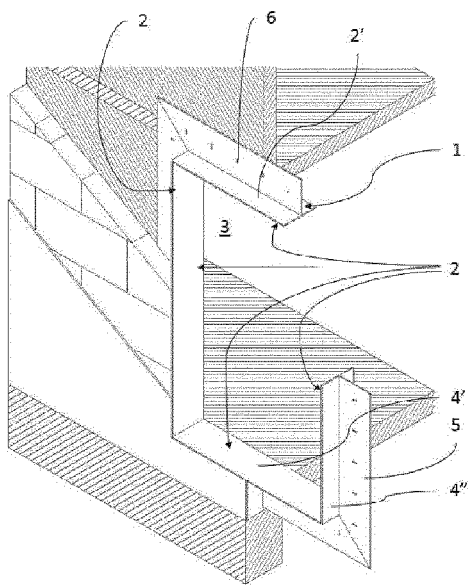


Fig. 1

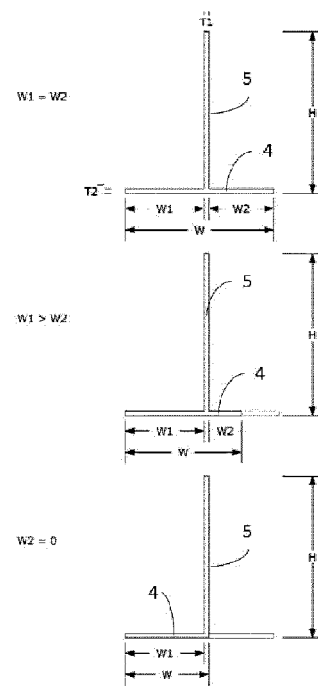


Fig. 2

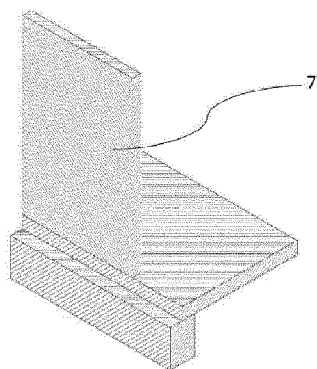


Fig. 3

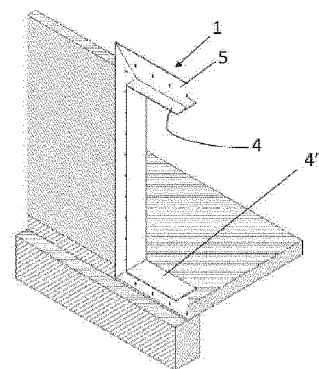


Fig. 4

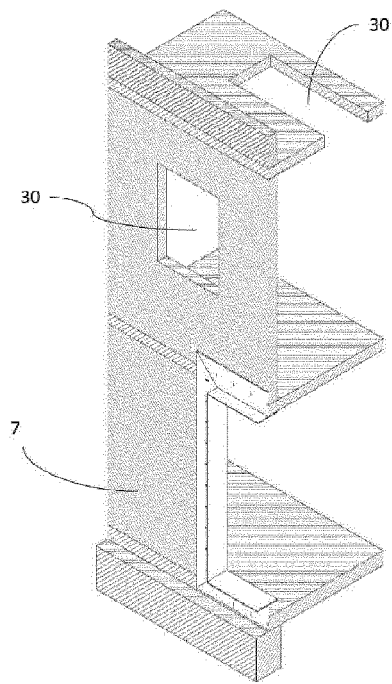


Fig. 5

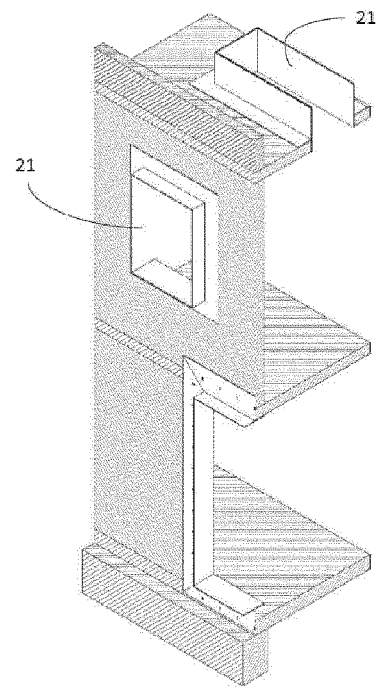


Fig. 6

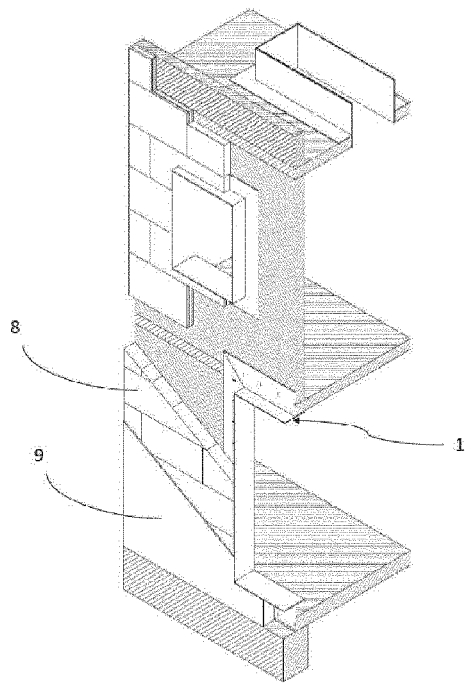


Fig. 7

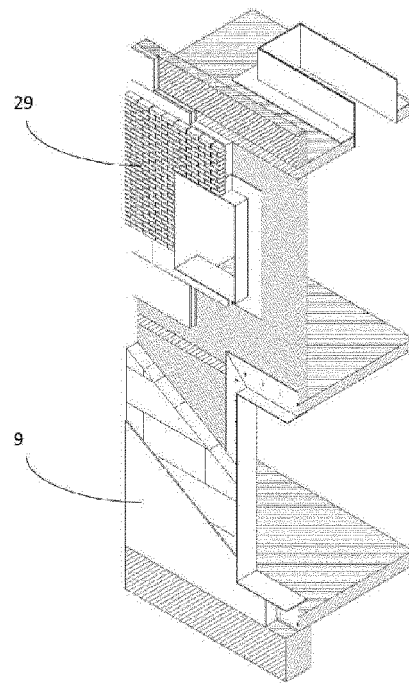


Fig. 8

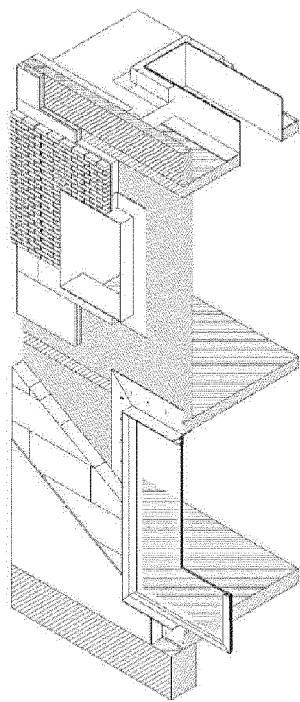


Fig. 9

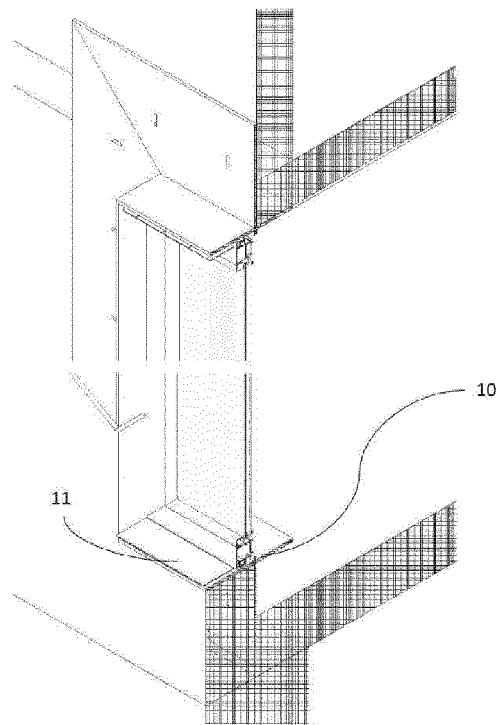


Fig. 10

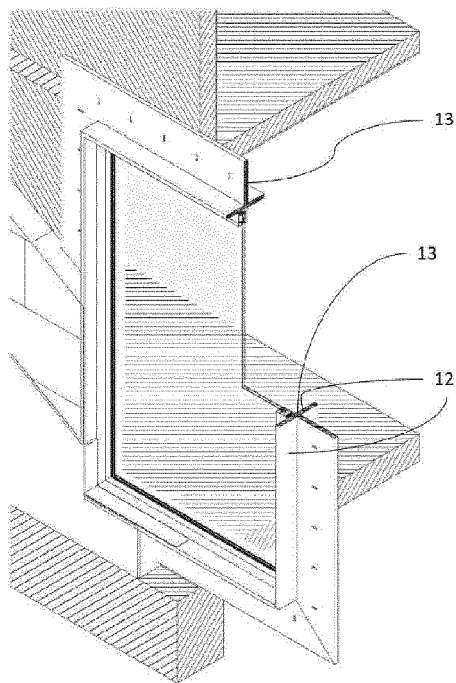


Fig. 11



EUROPEAN SEARCH REPORT

Application Number
EP 15 16 2862

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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 A	EP 2 246 512 A2 (MILGARD MFG INC [US]) 3 November 2010 (2010-11-03) * paragraphs [0007] - [0009], [0012]; figures 1-4, 11, 19 *	1-8, 10, 11 12	INV. E06B1/02 E06B1/26
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			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 15 September 2015	Examiner Gallego, Adoración
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EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 15 16 2862

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