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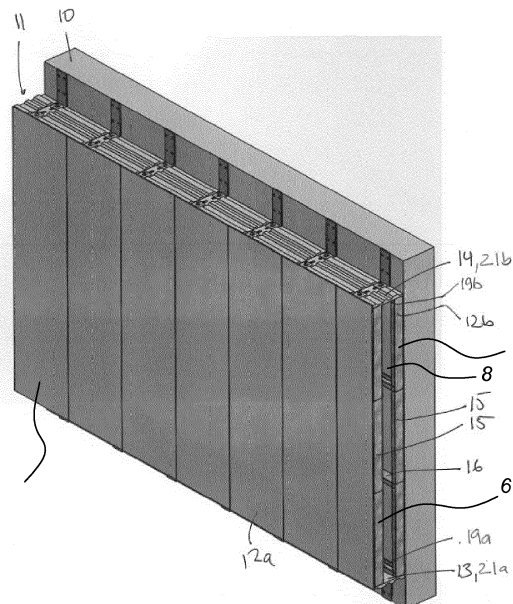
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(54) **AN INSULATING MODULE AND A METHOD FOR POST-INSULATING AN EXISTING BUILDING BY MEANS OF ONE OR MORE INSULATING MODULES**

(57) Disclosed is an insulating module (11) for mounting on the façade of an existing building (10). The insulating module (11) comprises an inner wall (1) including a transversal roof metal profile (2) and a transversal foundation metal profile (3) between which a number of intermediate metal profiles (5) extend. The insulating module (11) also comprises an outer wall (6) including a transversal roof metal profile (2) and a transversal foundation metal profile (3) between which a number of intermediate metal profiles (5) extend, and wherein an outside surface of the outer wall (6) is provided with façade cladding (12c, 12d). The inner wall (1) and the outer wall (6) are mutually fixed at the transversal metal roof profiles (2) and the transversal metal foundation profiles (3) so that a cavity (8) is formed between the inner wall (1) and the outer wall (6).

A method for post-insulating an existing building (10) by means of one or more insulating modules (11) is also disclosed.



*Fig. 1*

## Description

### Field of the invention

[0001] The invention relates to an insulating module for mounting on the façade of an existing building and a method for post-insulating an existing building by means of one or more insulating modules.

[0002] The present invention also relates to a modular system for post-insulation and/or facade renovation of an existing building.

### Background of the invention

[0003] In post-insulation of existing buildings, it is most often desirable to perform the post-insulation on the outside of the building to avoid a reduction of the indoor area.

[0004] This post-insulation can be performed e.g. by manually mounting vertical posts and transversal beams on the building envelope. Insulation material is then placed in between these posts and beams, and facade cladding is applied at the outermost, constituting the new building envelope of the building.

[0005] However, this way of post-insulating is time-consuming, as it is necessary to measure distances between posts, respectively beams, and whether these are mounted respectively vertically or horizontally etc. for each post or beam fixes to the external wall. Then, the insulation and the building envelope must also be mounted.

[0006] The traditional post-insulation methods require the use of workmen with great professional competence.

[0007] As this work takes place outdoors on the existing construction, the work is sensitive to poor weather at the construction site. Periods of poor weather will require covering of the construction site or will increase the construction time until the work is completed, which in both cases increases the costs of the post-insulation of the construction.

[0008] There has thus for several years been a wish to rationalise the process of post-insulation of existing buildings in order to avoid these drawbacks.

### Object of the invention

[0009] It is the object of the invention to provide a cost-efficient system for facade renovation and/or post-insulation of existing buildings.

### Description of the invention

[0010] The invention relates to an insulating module for mounting on the façade of an existing building. The insulating module comprises an inner wall including a transversal roof metal profile and a transversal foundation metal profile between which a number of intermediate metal profiles extend. The insulating module also comprises an outer wall including a transversal roof metal

profile and a transversal foundation metal profile between which a number of intermediate metal profiles extend, and wherein an outside surface of the outer wall is provided with façade cladding. The inner wall and the outer wall are mutually fixed at the transversal metal roof profiles and the transversal metal foundation profiles so that a cavity is formed between the inner wall and the outer wall.

[0011] Forming both the inner wall and the outer wall of the insulating module from metal profiles is advantageous in that it enables that both walls easily can be transported around and be assembled in situ. This reduces the transportation cost and ensures a fast in situ assembly. And providing the outer wall with façade cladding is advantageous in that it hereby is possible to form a closed space inside the insulating module hereby lowering the thermal conductivity of the wall, and as the same time increasing the soundproofing quality of the insulating module and protecting the original facade of the building better.

[0012] One big drawback with forming the insulating modules from metal profiles is that metal typically is an excellent thermal conductor and the risk of unwanted conducting of heat in or out of the building is therefore increased. However, air is a poor thermal conductor and by forming a cavity between the inner wall and the outer wall so that the two walls are only mutually connected at the transversal metal roof profiles and the transversal metal foundation profiles ensures that such an insulating module has a very low thermal conductivity - particularly in light of its weight, cost and thickness.

[0013] It should be noted that the reference to roof and foundation in e.g. the transversal roof metal profile and the transversal foundation metal profile refers to the roof end and the foundation end of the building on which the insulating module is mounted or is to be mounted - i.e. roof refers to upper end and foundation refers to lower end.

[0014] In an aspect of the invention, the inside surface of the inner wall comprises a vapour barrier.

[0015] Forming a vapour barrier on the inside surface of the inner wall is advantageous in that the risk of moisture build-up or condensing inside the existing building construction is hereby reduced.

[0016] In an aspect of the invention, the inside surface of the inner wall and/or the outside surface of the outer wall comprises a fire-resistant layer.

[0017] Providing the inside surface of the inner wall and/or the outer surface of the outer wall with a fire-resistant layer - such as gypsum boards, metal sheets, slate, concrete plates or other - is advantageous in that it reduces the risk of fire spreading and reduces the damage of a fire. In an embodiment the façade cladding is a fire-resistant layer.

[0018] In an aspect of the invention, the insulating module comprises brackets for mounting the module on a building façade.

[0019] Providing the module with brackets is advanta-

geous in that it hereby is easier to mount the module.

**[0020]** In an aspect of the invention, the outer sheathing comprises façade cladding.

**[0021]** Providing the outer surface of the outer wall with façade cladding is advantageous in that it hereby is possible to provide the outside of the wall with desired qualities and look.

**[0022]** In an aspect of the invention, the metal profiles are interconnected by connection means.

**[0023]** Interconnecting the metal profiles by means of connection means - such as screws, nails, rivets, welding, adhesive, interlocking geometry or other - is advantageous in that it ensures simple assembly and a more rigid structure.

**[0024]** In an aspect of the invention, the metal is steel.

**[0025]** Steel is strong in relation to its weight - particularly if it is in the form of profiled sheet metal-, it is easy to machine and it is relatively inexpensive.

**[0026]** In an aspect of the invention, thermal insulation means is arranged inside the cavity.

**[0027]** Further arranging thermal insulation means inside the cavity is advantageous in that it reduces the thermal conductivity through the insulating module.

**[0028]** In an aspect of the invention, thermal insulation means is arranged between the metal profiles of the inner wall and between the metal profiles of the outer wall.

**[0029]** Further arranging thermal insulation means between the metal profiles of the inner wall and between the metal profiles of the outer wall is advantageous in that it reduces the thermal conductivity through the insulating module.

**[0030]** In an aspect of the invention, each metal profile of the inner wall and the outer wall comprise identification means enabling that each unique metal profile can be uniquely identified.

**[0031]** Enabling unique identification of each unique metal profile is advantageous in that it hereby is possible to deliver the wall as an assembly kit in that the wall hereby easily can be assembled in situ according to a pre-made plan in which the assembly order and the specific placement of the specific metal profiles is laid out. There is therefore no need to measure the profiles as they can easily be identified from their identification means.

**[0032]** The term "identification means" is in this context to be understood as any kind of label, tag, inscription, marking, embossing, stamping, RFID tag, EPROM (Erasable Programmable Read Only Memory) or any other kind of manual or electrical means capable of holding information regarding the specific profile type.

**[0033]** In an aspect of the invention, the metal profiles are U-profiles.

**[0034]** Forming the metal profiles as U-profiles is advantageous in that a U-profile is strong, rigid and easy to manufacture.

**[0035]** In an aspect of the invention, a majority of the intermediate metal profiles of the inner wall is displaced in relation to a majority of the intermediate metal profiles of the outer wall as seen in a direction perpendicular to

the inner wall.

**[0036]** After the wall has been assembled the wall will most likely be filled with insulation material. And to ensure that this material gets into all nooks and corners of the inside of the wall this insulation material could advantageous be blown-in granular insulation material such as shredded paper, Lightweight expanded clay aggregate (LECA), Styrofoam beads or similar insulation material suited for being injected into the inside of a metal profile cavity wall structure.

**[0037]** In an aspect of the invention, the transversal roof metal profile of the inner wall is parallel with the transversal roof metal profile of the outer wall and wherein the transversal foundation metal profile of the inner wall is parallel with the transversal foundation metal profile of the outer wall.

**[0038]** Forming the roof and foundation profiles parallel is advantageous in that it provides for parallel inner and outer walls and thus a constant thickness of the insulating module.

**[0039]** In an aspect of the invention, the transversal roof metal profile of the inner wall is parallel with the transversal foundation metal profile of the inner wall and wherein the transversal roof metal profile of the outer wall is parallel with the transversal foundation metal profile of the outer wall.

**[0040]** Forming the roof and foundation profiles parallel in each wall is advantageous in that ensures flush wall that are easier to install.

**[0041]** In an aspect of the invention, the intermediate metal profiles extends perpendicular in relation to the transversal roof metal profiles and the transversal foundation metal profiles.

**[0042]** Forming the intermediate metal profiles perpendicular to the transversal roof metal profiles and the transversal foundation metal profiles is advantageous in that the intermediate profiles hereby will be substantially vertical in the finished erected wall - which in turn will ensure that the intermediate metal profiles will be able to carry more weight of the superjacent roof structure or superjacent floor/storey.

**[0043]** The invention also relates to a method for post-insulating an existing building by means of one or more insulating modules. The method comprises the steps of:

- assembling a number of prefabricated metal profiles according to a predefined plan to form an inner wall of the insulating module,
- assembling a number of prefabricated metal profiles according to a predefined plan to form an outer wall of the insulating module,
- mutually fixing the inner wall and the outer wall in relation to each other along two opposing edges of the inner wall and the outer wall so that a cavity is formed between the inner wall and the outer wall
- providing façade cladding to an outside surface of the outer wall, and
- connecting the insulating module to a façade of an

existing building.

**[0044]** Forming the insulating module from metal profiles ensures a strong, thin and inexpensive module which easily and quickly can be assembled on site by means of a premade assembly instruction in that such a wall can be made of relatively few profiles - due to the double hull wall design. And by forming the inner and outer wall so that they in respect to thermal conductivity substantially is only connected at the two opposing edges - hereby forming an substantially continuous cavity between the inner and outer wall - is advantageous in that thermal condition through the insulating module hereby is reduced even if metal is an excellent thermal conductor.

**[0045]** It is important to point out that the last step mentioned is not necessary the last step chronologically. In an embodiment the module would be constructed directly on the building façade. And all the other steps could also be performed in different order.

**[0046]** In an aspect of the invention, the insulation module is connected to the building through brackets.

**[0047]** In an aspect of the invention, the method further comprises the step of substantially covering an inside surface of the inner wall with an inner sheathing.

**[0048]** Providing an inner sheathing to the inside surface of the inner wall - i.e. the surface facing into the building - is advantageous in that it can aid in providing rigidity to the wall structure, it can act as a vapour barrier and/or a fire-resistant layer and it can act as a barrier for insulating material in the wall.

**[0049]** In an aspect of the invention, the method further comprises the step of substantially covering an outside surface of the outer wall with an outer sheathing.

**[0050]** Providing an outer sheathing to the outside surface of the outer wall - i.e. the surface facing away the building - is advantageous in that it can aid in providing rigidity to the wall structure, it can act as a vapour barrier and/or a fire-resistant layer and it can act as a barrier for insulating material in the wall as well as giving the building the desired façade look etc.

**[0051]** In an aspect of the invention, the method further comprises the step of arranging thermal insulation means inside the cavity.

**[0052]** Arranging thermal insulation means inside the cavity after the inner and outer walls have been erected and fixed is advantageous in that this will further reduce thermal conductivity of the wall.

**[0053]** In an aspect of the invention, the method further comprises the step of arranging thermal insulation means between the metal profiles of the inner wall and between the metal profiles of the outer wall.

**[0054]** Arranging thermal insulation means between the metal profiles of the inner wall and between the metal profiles of the outer wall after the inner and outer walls have been erected and fixed is advantageous in that this will further reduce thermal conductivity of the wall.

**[0055]** In an aspect of the invention, the method further

comprises the step of providing identification means to metal profiles.

**[0056]** Different metal profiles could be uniquely identified by measuring them, visually inspecting their design or in other ways detecting how they are different from other metal profiles. But this is difficult and time consuming and it is therefore much more efficient to provide the metal profiles with identification means before the wall is to be assembled so that the onsite assembly time is reduced.

**[0057]** In an aspect of the invention, the insulating module is an insulating module according to any of the previously mentioned insulating modules.

**[0058]** The present invention further relates to using a modular system of the type initially mentioned, distinctive in that the bottom face and the upper face comprise a transversal roof metal profile for a front wall and a transversal roof metal profile for a back wall of a module, which transversal roof metal profile comprises a profile, preferably a U-profile or an angle profile, having a horizontal flange in use as well as at least one vertical flange in use,

- each post comprises a second guide profile located between the transversal roof metal profiles in the front wall or the back wall, which second guide profile comprises a U-profile having two opposite flanges located in parallel planes, and which are mutually connected by a central flange,
- the bottom face and the upper face are each formed by a edge profile which comprises a back side, to which the transversal roof metal profile for the front wall and the transversal roof metal profile for the back wall are fixed, and that the front side of the edge profile comprises one or more grooves as well as one or more protrusions running in parallel in the longitudinal direction of the edge profile, the shape of the cross-section of a protrusion corresponding to the shape of the cross-section of a groove, and that groove and protrusion are placed on the front side in such a way that a groove on a edge profile can engage with a slot on a second similar edge profile on another module.

**[0059]** The profiles are manufactured in advance and in well-defined lengths, depending on the size of the module(s) to be manufactured. Long profiles can be composed of several profile units, e.g. to form a sufficiently wide module, so that the new facade that appears after an external post-insulation or facade renovation of a building can meet the wishes of the builder and/or architect for the appearance of the new facade of the building.

**[0060]** The modules are placed against the external wall of a building and fixed using brackets to the existing external wall, e.g. a concrete wall, brick wall or similar.

**[0061]** The modules can be assembled as pre-fabricated units at the factory with insulation layers as well as wind and water-resistant cladding, so that they merely have to be fixed against the external wall of the existing

building at the construction site. This reduces the time consumption for the work at the construction site significantly, which reduces the total costs for the building renovation. Furthermore, assembly of the modules at the factory is independent of the weather at the construction site, which increases the certainty that the building renovation does not exceed the deadlines set as a result of poor weather.

**[0062]** Insulation, wind and water-resistant building envelope and/or external facade cladding can be mounted at the factory or at the construction site, as described in more detail below.

**[0063]** Alternatively, the modules can be assembled at the construction site, which renders a particularly flexible solution involving great security of supply, as the supplier or the builder merely need to stock a few different parts in order to be able to manufacture modules of varying size and with varying thicknesses of the insulation layer in the module. For instance, it is possible to change the thickness of the insulation layer by merely using a wider or smaller edge profile, without it being necessary to wait for the procurement of other modules.

**[0064]** The width of the edge profile defines the depth of the module and thus the thickness of the layer of insulation used for the post-insulation of the building.

**[0065]** The edge profile has a back side, to which the transversal roof metal profile for the front wall and the transversal roof metal profile for the back wall are fixed. The front side of the edge profile comprises one or more grooves as well as one or more protrusions running in parallel in the longitudinal direction of the edge profile. The shape of the cross-section of a protrusion placed at a distance from a side edge corresponds to the shape of the cross-section of a groove placed at a distance from the opposite longitudinal side edge of the profile. Groove and protrusion are placed in such a way on the front side that a groove on an edge profile can engage with a protrusion on another similar edge profile on a second module, as the edge profile is mounted at the bottom of a module in one direction, and the module at the top of the module is turned 180 degrees and thus mounted in the opposite direction. In this way, the first end of the third profile at the top of a first module will lie across from the other end of the similar profile at the bottom of the next module, which is placed on top of the first module. This reduces the number of different profiles, as it is merely necessary for the factory or the construction company/builder to have variants of the edge profile having different widths corresponding to the specifications for the insulation layer to be used in the post-insulation of the individual buildings.

**[0066]** The protrusions of the edge profile preferably have an upper face which is parallel on the opposite side face of the guide profile. The sides of the protrusions are oblique or perpendicular to the surface or have one oblique and one perpendicular side face. The shape of the grooves correspond to the shape of the corresponding protrusion. In case of several rows of grooves and pro-

trusions, groove and protrusion may be designed with identical or with different form.

**[0067]** By having the modules constructed from the same type of guide profiles, it is thus possible to use the same guide profiles for variants of modules having varying specifications, such as insulating capacity, surface materials, and/or of varying height, width and depth.

**[0068]** As the guide profiles can be formed in advance, it is also possible to pack them in sets containing the number and the combination of guide profiles to be used for a predefined number of modules for post-insulation and/or facade renovation of a current building. Alternatively, standardised packs of materials can be packed for a module in a predefined size.

**[0069]** Using the system according to the invention achieves a significantly increased security of correct assembly without the need for special workman skills.

**[0070]** The guide profiles can be assembled using traditional fixing means such as screws, rivets and similar. Alternatively, the guide profiles are assembled using systems based on mechanical cold work of the metal, also referred to as clinching. In mechanical cold work, two or more plate-shaped metal layers are joined by using a special tool to perform local cold work on the metal layers, thereby joining them. Mechanical cold work can be used to join steel and stainless steel as well as aluminium and/or non-ferrous materials based on a cost-efficient and environmentally friendly process. An example of such systems is e.g. so-called spot clinching® from Attexor Clinch Systems SA in Switzerland.

**[0071]** As the guide profiles are preferably provided with connecting means used for coupling of guide profiles, a predefined placing of the connecting means will ensure that correct mutual connection of the guide profiles also takes place.

**[0072]** Alternatively, the guide profiles may comprise markings for mounting of guides with fixed gaps when the above-mentioned clinching is used.

**[0073]** In this way, vertical posts placed between a bottom face and an upper face will be placed with a well-defined distance. Hereby, the position of the posts is determined, and the distance between bottom guide and top guide will also be determined on the basis of the length of the posts.

**[0074]** The connecting means are preferably pre-formed holes in the at least one flange and/or tabs of the guide profile, which stand perpendicularly from the bottom flange in the first and/or second guide profile, as described in more detail below. The connecting means are preferably placed with predefined distances which, in addition to acting as fixing for other guide profiles in the system, also define the distances between two neighbouring columns, beams etc. The connecting means are thus e.g. formed with a fixed distance of e.g. 200-800 mm, e.g. for each 300 or 600 mm.

**[0075]** The bottom row of modules is located on a supplementary foundation made for this purpose or on a row of angle brackets measured and fixed in the existing ex-

ternal wall of the building, so that the bottom edge of the module forms the lower line of the new external wall. Once a module is placed correctly, the upper face of the module is fixed to the existing external wall of the building using an angle bracket. The next row of modules is then placed by the bottom face of the next module being placed on the upper face of a module in the first row etc. protrusions and slots in the edge profile at the bottom of the second module thereby cooperate with similar protrusions and slots in the edge profile at the top of a module in the first row, which ensures correct placing of the modules in relation to the next row in relation to the modules in the row below.

**[0076]** This ensures that the modules are easily and quickly placed correctly on the module below, and that there is no need for intermediate measurements between mounting of the individual rows of modules.

**[0077]** Posts in the front wall and the back wall of the module are preferably displaced in relation to each other, which prevents thermal bridges from occurring in the wall.

**[0078]** Furthermore, between two neighbouring posts in the front wall and/or the back wall, one or more horizontal beams are preferably mounted, which comprise an eighth guide profile comprising two opposite flanges located in parallel planes, and which are mutually connected by a central flange, the first of the opposite flanges being adapted for mounting of the back wall against the wall of the existing building or for mounting of outer cladding on the front wall.

**[0079]** This achieves stability in the modules, and deflection in the walls is reduced or completely eliminated.

**[0080]** Once a structure has been manufactured with a bottom guide and top guide and posts located in between, horizontal beams in the form of the ninth guide profile can be placed on the outside of vertical posts. These ninth guide profiles are used on the outside of the module to mount outer cladding. A module according to the invention will thus be manufactured with front wall and back wall.

**[0081]** Insulation is placed in the gap between front wall and back wall in the modules, and this can also be used for ducting wires and cables for installations in the building, if necessary. The insulation may be in plate shape, e.g. made from mineral wool, including rock wool or glass wool, foamed polystyrene or similar commonly used plate-shaped insulation materials. When plate-shaped insulation is used, this will preferably be mounted before the wind and water-resistant building envelope is fixed to the outside of the module. It is also possible to add the insulation by blowing into the modules. In this case, the wind and water-resistant building envelope will be mounted on the modules after they have been fixed to the angle bracket mounted below or to the module mounted below. The insulation material is then blown into a module or into several modules in a row at the same time.

**[0082]** The edge profile is manufactured from a screwable plate material having a high strength and a low  $\lambda$

value. The dimensional stability and strength of the plate material contributes to the assembled modules being stable. Furthermore, the excellent insulation properties of the plate material, i.e. low thermal conductivity, as expressed in a low  $\lambda$  value, will contribute to reducing or eliminating the risk of thermal bridges occurring in the wall. This is due, among other things, to the edge profile insulating the connection between the framework of guide profiles in the modules and angle brackets which fix the modules to the existing external wall. Thereby, a thermal bridge cannot occur through the modules.

**[0083]** The edge profile is preferably provided with indents for angle brackets. These indents are perpendicular to the grooves and protrusions and are placed with predefined mutual distance. The depth of the indents is adapted to the angle brackets used to fix the modules to the external wall of the building, so that the depth of the indents measured from the bottom face of the grooves substantially corresponds to the material thickness of the angle brackets.

**[0084]** Foamed PVC in plate shape is well suited as material for the edge profile, as it has excellent insulation properties and low thermal conductivity, low combustibility, high strength and low weight and furthermore absorbs negligible amounts of moisture.

**[0085]** Slots and protrusions in the one surface of the edge profile are manufactured by extruding the guide profile in the desired shape and cutting these into appropriate lengths or alternatively by chip cutting and possibly adapting length and/or width on a pre-manufactured plate.

**[0086]** The second guide profile and/or the eighth guide profile is preferably a U-, H- or Z-shaped profile, the U-profile being preferred. In posts and beams, the guide profile has two parallel side faces, which in a post or beam contribute to stability, which entails that the profile can be manufactured at a lower material thickness without reduced stability. Furthermore, it is possible to use the outermost of the two parallel side faces on the posts as anchor for the mounting of a wind and water-resistant building envelope and/or facade cladding and/or further profiles which carry the facade cladding. Furthermore, it is possible to fix frame profiles for mounting of doors and windows in the side faces.

**[0087]** The first, second and eighth guide profile are preferably identical guide profiles, preferably U-profiles, manufactured with a crimp of at least one or preferably both ends of the guide profile to reduce the dimensions of the end areas of the guide profile.

**[0088]** This ensures that an end of a guide profile can engage in the opening of a second guide profile and subsequently be fixed, e.g. using rivets, screws, blind fastener nuts with associated bolts, blind fastener bolts or similar commonly used fixing means in construction.

**[0089]** To this end, the guide profiles are alternatively provided with connecting means used for coupling of guide profiles, comprising a tab raised to perpendicular position in relation to the flange in which the tab is cut.

This predefined placing of connecting means ensures that correct mutual connection of the guide profiles also takes place.

**[0090]** Vertical posts placed between a bottom guide and a top guide will thus be placed and fixed in connection with tabs on the bottom guide and the top guide. Hereby, the position of the posts is determined, and the distance between the bottom face and the upper face of the modules will likewise be determined on the basis of the length of the posts. Thereby, the posts can be fixed to the tab on the bottom or top guide using traditional fixing means or using a resilient tab able to engage with a hole in the first tab on the bottom guide or the top guide. This will achieve a very quick and simple assembly of these elements.

**[0091]** The coupling elements are normally designed for temporary retention of the elements during mounting and will therefore be supplemented by a nailing together or other fixed coupling of the elements in the finished building.

**[0092]** The resilient engagement between a tab and a hole can be combined with a nailing together or other form of fixing. However, it may turn out that several assemblies do not require supplementing by the fixed coupling. The construction will thus be able to take place very quickly, and the mutual connections between guide profiles will have a strength defined in advance on the basis of the design of the resilient tabs.

**[0093]** The horizontal guides mounted on the outside of the vertical posts may be mounted in predefined positions, as the vertical posts may be provided with connecting means that are placed with predetermined gaps, and which are adapted to cooperate with corresponding connecting means on the horizontal guides.

**[0094]** A very uniform placing of the horizontal guides can thus be achieved and thus also of the facade cladding subsequently mounted on the guides.

**[0095]** According to a further embodiment, the system according to the invention is distinctive in that posts in the front wall and the back wall are displaced in relation to each other, e.g. by the posts preferably being mounted in every second of the first tabs of the transversal roof metal profiles.

**[0096]** With this embodiment, thermal bridges are avoided in the wall structure. As there are gaps between the front wall and the back wall, and as posts located in the gap between the front wall and the back wall are displaced in relation to each other, the risk of thermal bridges is reduced.

**[0097]** It is preferred that the top guides and the bottom guides are manufactured as identical. To this end, first tabs are provided having a distance corresponding to the distance between two subsequent posts located in front wall and back wall, respectively. The posts thus merely need to be placed in every second of the first tabs.

**[0098]** Alternatively, a longer distance may have been provided between the tabs, corresponding to the distance between the posts in the front wall and the distance be-

tween the posts in the back wall. In this connection, it must merely be ensured that the bottom guide and the top guide are placed in such a way on the edge profiles that the first tabs in the guide profile for the front wall is displaced in relation to the tabs in the transversal roof metal profile for the back wall.

**[0099]** According to a further embodiment, the system according to the invention is distinctive in that the first tab is formed by a punched part of the horizontal flange, and that the first tab is connected to the horizontal flange along a folding line and is folded to a position perpendicular to the horizontal flange. By forming the tab as a punched part of the horizontal flange, a particularly appropriate manufacture is achieved. Materials savings are thus achieved while avoiding the need for loose tabs that need to be connected with the transversal roof metal profile. The first tab is folded around a folding line in the horizontal flange, so that it is perpendicular to the horizontal flange. This makes the tabs face downwards, depending on whether the transversal roof metal profile is used for the sill or for the head.

**[0100]** According to a further embodiment, the system according to the invention is distinctive in that the hole in the first tab is a rectangular hole. The hole being rectangular achieves a safe engagement with a tab which also has a rectangular shape. This way, a positioning is achieved in the transversal direction by dimensioning the tab so that it has a width that fits into the width of the rectangular hole.

**[0101]** According to a further embodiment, the system according to the invention is distinctive in that the second tab in the second guide profile is S-shaped and adapted to engage with the hole in a first tab. An S-shape on the first tab achieves a resilient effect in a particularly simple way. When the S-shape is folded partly out of the plane from the flange, it will be possible to fold it to such a position that it establishes a larger or smaller resilient force and thus safe engagement.

**[0102]** According to a further embodiment, the system according to the invention is distinctive in that the second tab is formed by a punched part of the central flange of the second guide profile, and that the second tab is connected to the central flange along a folding line and is folded to a position outside on the central flange. At the second profile, the most important condition is that two opposite flanges are placed. The profile may thus have different profile shapes, as the flange element connecting the two different flanges may be placed centrally, askew or at one side.

**[0103]** The modular system may also be assembled by the two opposite flanges in the second guide profile for the posts comprising connecting means provided with predefined mutual distance for cooperation with corresponding connecting means on the horizontal beams of the eighth guide profile.

**[0104]** As the second guide profile used for the posts is provided with connecting means having a predefined mutual distance, it is possible to place the horizontal

beams with the distance corresponding to the mutual distance between the connecting means, or alternatively by placing the horizontal beams between every second or third connection means in a vertical post.

**[0105]** This ensures correct mounting of the horizontal beams. The connecting means used between the horizontal beams and the vertical posts may be of the type described in the pending patent application and submitted by the same inventor as the present invention.

**[0106]** The modular system can be adapted to the existing building by having horizontal frame profiles fixed to posts for mounting of windows and doors in the wall structure. This makes it possible to mount door and window openings, so that they fit with the door and window openings already existing in the building. These door and/or window frames can be covered by a wind and water-resistant building envelope and subsequently facade cladding or windows, and/or doors from the building can be moved from the external wall of the existing building to the frame profiles in the modules, depending on the appearance desired on the facade after the renovation. Furthermore, it is possible to mount windows or doors in the frame profiles prior to the mounting of the modules on the external wall of the building. This achieves quick completion of the outer building envelope on the building, and subsequent final work around doors and/or windows can be carried out from the inside.

**[0107]** According to a further embodiment, the system according to the invention is distinctive in that a first angle bracket is fixed to posts for fixing of horizontal frame profiles for mounting of windows and doors in the wall structure, the first angle bracket comprising coupling means that cooperate with corresponding coupling means at the end of the horizontal frame profile.

**[0108]** As windows and doors often require special frames, it is advantageous for the posts to have angle brackets. To this end, horizontal frame profiles may be fixed, which are used at the top or bottom of a window or a door. This first angle bracket has coupling means which cooperate with corresponding coupling means at the end of the horizontal frame profile.

**[0109]** It is preferred that the horizontal frame profiles are identical to the second guide profile. The profiles can thus be provided with holes corresponding to the holes in the second tab on the second guide profile. To this end, the first angle bracket will advantageously be manufactured with resilient tabs designed for engagement with the holes on the horizontal frame profiles.

**[0110]** A reverse design, wherein the tabs are a part of the horizontal frame profiles and the holes are provided on the angle brackets, is also possible.

**[0111]** Although it is easy to have the resilient tabs placed on a central flange, it will also be possible to place the resilient tabs on two side flanges in a U-shaped profile. In this way, a coupling can be achieved having greater strength, as more tabs are used for the coupling of guide profiles, regardless whether it is the first, second or eighth guide profile.

**[0112]** Between two horizontal frame profiles or two horizontal beams, it is possible to mount at least one vertical frame profile for mounting of windows and doors. This allows the mounting of windows and doors having a smaller width than the distance between two posts in the wall structure. The vertical frame profile is e.g. mounted on a horizontal frame profile using a second angle bracket for fixing of the vertical frame profile, the second angle bracket comprising coupling means which cooperate with corresponding coupling means at the end of the vertical frame profile.

**[0113]** In order to be able to mount windows or doors having a smaller width than the distance between two subsequent posts in the wall structure, at least one vertical frame profile is placed between two horizontal frame profiles located above each other.

**[0114]** Alternatively, a vertical frame profile can also be placed between a horizontal frame profile and a top guide or a bottom guide. This depends on where the building opening is placed. On the second frame profile, a second angle bracket is mounted, to which the vertical frame profile can be fixed. The second angle bracket will preferably be designed with a C-shape or hook shape, so that it can be swung over the horizontal frame profiles and be displaced along these. In this way, it becomes possible to adjust the size of the wall opening formed in the wall structure. The second angle bracket comprises coupling means which cooperate with corresponding coupling means in the vertical frame profiles.

## Description of the drawings

**[0115]** In the following, the invention will be described with reference to the drawings, wherein

- Fig. 1 shows a module for the system for facade renovation and/or post-insulation of an existing building according to the invention, the module being fixed to an external wall of a building, seen in perspective,
- Figs. 2a-2c show different sections of the module of Fig. 1,
- Figs. 3-4 show mounting brackets for modules fixed to an existing external wall in a building,
- Figs. 5a-5b show the mounting of angle brackets at the upper face of the module for fixing to the existing external wall of the building,
- Figs. 6a-6b show the location of a further row of modules on top an already mounted first row of modules,
- Figs. 6c-6d show the joint between a edge profile at the top of a first module and at the bottom of a second module,
- Fig. 7 shows the mounting of mounting guides for facade cladding,

- Figs. 8a-8b show a variation of mounting guides for facade cladding,
- Fig. 9 shows alternative angle mounting bracket for a first row of modules and variants of a first and second guide profile and the joint between them,
- Fig. 10 shows a principle sketch with a module, wherein a front wall and a back wall is mounted on the edge profile with displaced posts
- Figs. 11a-11b show a detail of the mounting of a post on a bottom guide or a top guide and an enlarged image, in partial cross-section, through the connection shown in Fig. 11a,
- Fig. 12 shows a principle sketch for formation of an opening for mounting of a window in the wall structure, constructed using a system according to the invention,
- Fig. 13 shows details of the structure shown in Fig. 12, and
- Figs. 14-16 show further details of the mounting of the frame profiles shown in Figs. 12 and 13,
- Fig. 17 discloses a module section wherein the metal profiles comprise identification means 29

#### Detailed description of the invention

**[0116]** In the following, the invention will be described in more detail with reference to different figures, wherein identical or similar elements have the same reference designation. All structure elements will thus not be detailed in detail in connection with each figure.

**[0117]** Fig. 1 shows the external wall of a building 10 being post-insulated and facade renovated using an insulating module 11 according to the system of the invention. The system modules 11 comprise a front wall 12a, which constitutes the new external wall of the building, and a back wall 12b placed against the former external wall of the building 10.

**[0118]** In this embodiment the module 11 has a bottom face 13, an upper face 14 and vertical posts 15 placed between the bottom face 13 and the upper face 14. The module further comprises horizontal beams 16. These elements are used for the manufacture of the sandwich structure of the modules.

**[0119]** In this embodiment the modules 11 are placed on a first set of angle brackets 18a which are placed at the bottom of the external wall of the building 10 or on top of the foundation of the building 10 and fixed to the angle brackets using fixing means, e.g. bolts, screws, nails or other. The back wall 12b is placed against the external wall of the building 10. Along the upper edge of the module 11, a second set of angle brackets 18b is placed, see Figs. 2-4, which fix the upper end of the modules 11 to the external wall of the building 10.

**[0120]** Between the angle brackets 18a, 18b and the external wall, an insulation block 23 is laid to prevent a thermal bridge from occurring. The insulation block is preferably a screw secure expanded plastic material, e.g. PVC, sold under the name Vikupor, among others.

**[0121]** However, in another embodiment the modules 11 could be mounted on the building in other ways, such as by means of connection means - like bolts or screws - extending through the modules 11, by means of other types of brackets, by means of adhesive or other ways or any combination thereof.

**[0122]** Figs. 2a-2c shows a more detailed view of the construction of the modules 11.

**[0123]** Fig. 2a and 2c among other disclose that the insulating module 11 comprises an inner wall 1 including a load-bearing structure formed by a transversal roof metal profile 2 and a transversal foundation metal profile 3 between which a number of intermediate metal profiles 5 extend. The insulating module 11 also comprises an outer wall 6 including a load-bearing structure formed by a transversal roof metal profile 2 and a transversal foundation metal profile 3 between which a number of intermediate metal profiles 5 extend, and wherein an outside surface 7 of said outer wall 6 is provided with façade cladding 12c, 12d.

**[0124]** In this embodiment the inner wall 1 and the outer wall 6 are mutually fixed at the transversal metal roof profiles 2 - i.e. at the upper edge of the module 11 - and the transversal metal foundation profiles 3 - i.e. at the lower edge of the module 11 - by means of edge profiles 21a, 21b which in this case are adapted with matching surface contours to enable simple and precise assembly. The edge profiles 21a, 21b fixate the walls 1, 6 so that a cavity 8 is formed between the inner wall 1 and the outer wall 6. However in another embodiment the walls 1, 6 could be mutually fixed in other ways - such as by means of special fittings, by means of the disclosed brackets 18a, 18b, by means of beams of other protruding from the building 10, and external structure or other or any combination thereof.

**[0125]** In this embodiment the intermediate metal profiles 5 of the inner wall 1 and the outer wall 6 are arranged coinciding as seen perpendicularly to the inner wall 1 but in a preferred embodiment the intermediate metal profiles 5 of the inner wall 1 and the outer wall 6 would be displaced in relation to each other to reduce the risk of forming thermal bridges and ensure a more even distribution of injected insulating material.

**[0126]** In this embodiment the intermediate metal profiles 5 are arranged vertically however in another embodiment some or all of the intermediate metal profiles 5 could be arranged to extend horizontally, sloping, non-linearly or other.

**[0127]** Instead of placing the modules on a first set of angle brackets 18a, see Figs. 3 or 9, an extra foundation (not shown) can be manufactured in parallel with the existing foundation of the building 10, e.g. in connection with external post-insulation of a basement floor. The

base consists of e.g. foundation blocks, which are preferably provided with insulation plates made from expanded polystyrene (EPS) between outer and inner foundation blocks 4. If a foundation is used, a vapour seal will be placed on top of the base. This is preferably an EPDM rubber membrane. It preferably has a thickness of 5 mm.

**[0128]** The bottom comprises a transversal roof metal profile 19a provided in the form of a U-shaped steel profile.

**[0129]** In all embodiments inner wall 1 is the same as back wall 12b and the outer wall 6 is the same as front wall 12a. And vertical posts 15 are in many embodiments the same as intermediate metal profiles 5.

**[0130]** In the transversal roof metal profiles 19a, 19b for outer and back wall 12a, 12b, a second guide profile 20 is mounted, which constitutes the posts 15 of the wall. The vertical posts 15 are formed by a second guide profile 20. The second guide profile 20 is located between a transversal roof metal profile in the bottom face 13 and the upper face 14 in the external wall 12a and back wall 12b of the insulating module 11.

**[0131]** Between the posts 15 in the inner wall and external wall, horizontal beams 16 in the form of an eighth guide profile 22 are mounted.

**[0132]** Between the outer and the back wall, insulation material is located in the layer thickness that the builder and/or legislation/regulations require.

**[0133]** The first 19a, 19b, second 20 and eighth 22 guide profiles are preferably identical U-profiles manufactured with a crimp of at least one or preferably both ends of the guide profile to reduce the dimensions of the end areas of the guide profile, so that one end of a guide profile may engage in the opening between the parallel side walls of another U-shaped guide profile.

**[0134]** As can be seen from Figs. 7, 8a-8b, the external wall 12a is provided with an outer cladding 12c. The outer cladding 12c may e.g. be selected from shale, (painted) aluminium, facade stone, fibre cement and/or other facade claddings that may be desirable for use.

**[0135]** In the design shown in Fig. 1-8, a power board 12c is used as water and wind-resistant outer facade cladding 12d.

**[0136]** Figs. 6a-6d show how the modules 11 are placed in relation to each other on an external wall of an existing building 10 for facade renovation and/or post-insulation of the building 10. The front side of the edge profile 21 comprises one or more grooves 24 as well as one or more protrusions 25 which run in parallel in the longitudinal direction of the edge profile. The shape of the cross-section of a protrusion 25 placed at a distance from a side edge of the profile corresponds to the shape of the cross-section of a groove 24 placed at a distance from the opposite longitudinal side edge of the profile. The edge profile 21a is mounted at the bottom of an insulating module 11 in one direction, and at the top of the module, the edge profile 21b is turned 180 degrees and thus mounted in the opposite direction. Groove 24 and Protrusion 25 are therefore placed on the front side of

the edge profile 21, so that a groove 24 in the edge profile 21a can engage with a protrusion 25 on another similar edge profile 21b on a first insulating module 11a. In this way, the first end of the third profile 21b at the top of a first module will lie across from the other end of the similar profile 21a at the bottom of the next insulating module 11b, which is placed on top of the first insulating module 11a. This reduces the number of different profiles, as it is merely necessary for the factory or the construction company/builder to have variants of the edge profile 21 having different widths corresponding to the specifications for the insulation layer to be used in the post-insulation of the individual buildings 10.

**[0137]** The protrusions 25 in the edge profile 21 have an upper face which is substantially parallel on the opposite side face of the guide profile 21. The sides of the protrusions are oblique or perpendicular to the surface or have one oblique and one perpendicular side face. The shape of the grooves 24 corresponds to the shape of the corresponding protrusion. If there are several rows of grooves 24 and protrusions 25, grooves 24 with associated protrusions 25 may be designed with identical or with different shape in relation to other grooves 24 with protrusions 25.

**[0138]** The edge profile 21 is preferably manufactured from an insulating screw secure expanded plastic material, e.g. PVC, sold under the name Vikupor, among others. The facade cladding 12d is in this embodiment mounted using mounting guide profiles 27, see Figs. 8a, 8b.

**[0139]** This ninth guide profile 27 is e.g. a U-profile having mounting flanges, which is mounted on the outside of the vertical posts 15. Alternatively, this mounting guide profile is Z-shaped 28 and is preferably mounted horizontally on the outside of the posts 15 of the external wall. The mounting guides are preferably manufactured from aluminium or steel profiles.

**[0140]** Figs. 9-11 show an alternative guide system, in which the other guide profiles 20' are placed on the transversal roof metal profiles 19'. The transversal roof metal profiles 19' are provided with tabs 30 located with a pre-defined distance. The transversal roof metal profile 19' is formed as an L-shaped profile with a vertical flange 31 and a horizontal flange 32. The tabs are formed from a punched part of the horizontal flange, which is folded along a folding line 33 from the horizontal flange 32, so that it is substantially perpendicular to the first flange 32. The tabs 30 are used for mounting of the second guide profile 20'.

**[0141]** Figs. 12a and 12b show more clearly how a tab 30 is folded out of the plane of the horizontal flange 32. The tab 30 is provided with a hole 34. The hole 34 serves to receive a resiliently springy tab 35 in the second guide profile 20.

**[0142]** The second guide profile 20 comprises two opposite flanges 35, 36, which are mutually connected by a central flange 37, so that a U-shaped profile is formed. The tab 38 is punched and pressed out from the central

flange 37.

**[0143]** The tab 38 has an S-shaped configuration, so that a central part of the tab in a resilient way is pressed into the hole 34 when the second guide profile 20' is pressed down into abutment with the transversal roof metal profile 19'. Hereby, a mutual retention and a correct positioning of the two guide profiles are established. This mutual retention establishes a safe fixing during mounting of the building 10. Subsequently, the two guide profiles will be fixed permanently to each other, e.g. by nailing using a gas-powered gun or by riveting or by other appropriate permanent connections between the two guide profiles.

**[0144]** However, the metal profiles 2, 3, 5, 9, 16 could be assembled in countless other ways such as directly by means of screws, rivets, welding, adhesive, special fittings or other.

**[0145]** Figs. 12 and 13 show how a window opening 39 or door opening is formed in a building structure 10. Figs. 14 and 15 show the details of this window opening.

**[0146]** It can be seen here that on the second guide profile 20, a first angle bracket 40 is fixed. To this, a horizontal frame profile 41 is fixed. The frame profile 41 is mounted at an angle profile 40 at each end, the angle profile having a resiliently springy tab 38 corresponding to the tab shown in Figs. 5 and 6. The resiliently springy tab 38 cooperates with a hole 42, which is punched in the horizontal frame profile 41 at the end of this frame profile 41.

**[0147]** Between two horizontal frame profiles 41, at least one vertical frame profile 43 is provided for delimitation of a window opening or door opening, which has a smaller width than the distance between two subsequent second guide profiles 20 which constitute the posts of the wall structure.

**[0148]** On the horizontal frame profile 41, as shown in Fig. 16, a second angle bracket 44 is mounted. This is placed displaceably in the longitudinal direction of the horizontal frame profile 41. The angle bracket 44 has a first flange 45 for engagement with the underside of the frame profile 41 and an intermediate flange part 46 which is in engagement against the side of the frame profile 38 as well as a third flange part 47 which is designed to abut the upper side of a frame profile, respectively the underside of a frame profile, depending on whether the frame profile is placed at the upper or lower end of a vertical frame profile 40. In the third flange part 47 is a folded part 48, wherein an opening 49 is provided. The opening 46 serves for cooperation with a resilient tab 38 from the vertical frame profile 43. The second angle bracket can be displaced to a desired position which depends on the width of the window opening that is desired to be established.

**[0149]** The first angle bracket 40 can be displaced in the height direction along the second guide profile 20, so that the horizontal frame profile 41 is placed at a desired height.

**[0150]** Following the temporary fixing, the elements

can be mutually fixed permanently by nailing with a gas-powered gun, riveting or by another permanent fixing.

**[0151]** Alternatively, the tabs and the holes in the profiles are left out, and U-profiles are used with crimps at one or both ends, as described above, for the vertical and/or horizontal frame profiles for doors and/or windows. Instead, blind fastener nuts are mounted in the guide profiles, which cooperate with holes in the profiles, and the profiles are then screwed together using bolts or screws, which engage the screw fastener nuts, as described for the U-profiles above.

**[0152]** Fig. 17 discloses a module section wherein the metal profiles 2, 3, 5, 9, 16 comprise identification means 29.

**[0153]** In this embodiment a digital representation of the building 10 is first constructed in a computer program such as a CAD program. From these CAD information the different metal profiles 2, 3, 5, 9, 16 are manufactured - or at least cut to length - in an automated process. Substantially at the same time these metal profiles 2, 3, 5, 9, 16 are provided with identification means 29 so that each type of metal profile 2, 3, 5, 9, 16 can be uniquely identified from the identification means 29. In this embodiment the identification means 29 are letters A, B, C and D written on the profiles by an inject printer. However numerous other identification means 29 could be used for this purpose.

**[0154]** All the metal profiles 2, 3, 5, 9, 16 - forming modules to cover the entire building 10 - or at least forming elements to form one or more modules 11 will be delivered unassembled to the erection site, where the metal profiles 2, 3, 5, 9, 16 can be correctly assembled using an assembly plan showing how the uniquely marked metal profiles 2, 3, 5, 9, 16 shall be assembled. This approach severely reduces transportation cost in that only small packages of metal profiles 2, 3, 5, 9, 16 have to be shipped instead of complete modules. And given the identification means 29 the modules 11 can still be assembled quickly either directly on the building 10 or preferably near the building 10 and then attached to the building 10 after assembly.

**[0155]** After assembly of the entire façade cladding 12c, 12d is provided where after insulation material 26 can be injected into the module 11 in most cases. If insulation material 26 is provided in the modules 11 before they are attached to the building 10 the insulation means 26 could preferably be in the form of batts or if granular insulation material was used, all side openings, the back side and other openings in the module structure would have to be sealed. When using injected granular insulating material 26 it is preferably not injected until all modules 11 are mounted on the building 10 and a closed module structure 11 is formed.

**[0156]** The invention has been exemplified above with reference to specific examples of inner walls 1, outer walls 6, metal profiles 2, 3, 5, 9, 16 and other. However, it should be understood that the invention is not limited to the particular examples described above but may be

designed and altered in a multitude of varieties within the scope of the invention as specified in the claims.

## List

[0157]

1. Inner wall
2. Transversal roof metal profile
3. Transversal foundation metal profile
4. Foundation block
5. Intermediate metal profiles
6. Outer wall
7. Outside surface of outer wall
8. Cavity
9. Strut
10. Building
11. Insulating module
- 11a. First module
- 11b. Next module
- 12a. Front wall
- 12b. Back wall
- 12c. Outer cladding / Power board
- 12d. Facade cladding
13. Bottom face
14. Upper face
15. Vertical posts
16. Horizontal beams
17. Connection means
- 18a. First set of angle brackets
- 18b. Second set of angle brackets
- 19', 19a, 19b. Transversal roof metal profile
- 20, 20'. Second guide profile
- 21, 21a, 21b. Edge profile
22. Eighth guide profile
23. Insulation block
24. Grooves
25. Protrusion
26. Thermal insulation means
27. Mounting guide profile
28. Z-shaped mounting guide profile
29. Identification means
30. Tabs provided by the transversal roof metal profile
31. Vertical flange
32. Horizontal flange
33. Folding line
34. Hole
35. Resiliently spring tab
36. Flange of the second guide profile
37. Central flange
38. Resiliently spring tab of the angle profile
39. Window opening
40. First angle bracket
41. Horizontal frame profile
42. Hole cooperating with resiliently spring tab
43. Vertical frame profile
44. Angle bracket
45. First flange

46. Intermediate flange part
47. Third flange part
48. Folded part
49. Opening

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## Claims

1. An insulating module (11) for mounting on the façade of an existing building (10), said insulating module comprising an inner wall (1) including a transversal roof metal profile (2) and a transversal foundation metal profile (3) between which a number of intermediate metal profiles (5) extend, and an outer wall (6) including a transversal roof metal profile (2) and a transversal foundation metal profile (3) between which a number of intermediate metal profiles (5) extend, and wherein an outside surface (7) of said outer wall (6) is provided with façade cladding (12c, 12d), wherein said inner wall (1) and said outer wall (6) are mutually fixed at said transversal metal roof profiles (2) and said transversal metal foundation profiles (3) so that a cavity (8) is formed between said inner wall (1) and said outer wall (6).
2. An insulating module (11) according to claim 1, wherein an inside surface (59) of said inner wall (1) and/or an outside surface (7) of said outer wall (6) comprises a fire-resistant layer.
3. An insulating module (11) according to claim 1 or 2, wherein said module comprises brackets (18a, 18b) for mounting said module (11) on a building façade.
4. An insulating module (11) according to any of the preceding claims, wherein said metal profiles (2, 3, 5, 9, 16) are interconnected by connection means (17).
5. An insulating module (11) according to any of the preceding claims, wherein said metal is steel.
6. An insulating module (11) according to any of the preceding claims, wherein thermal insulation means (26) is arranged inside said cavity (8).
7. An insulating module (11) according to any of the preceding claims, wherein thermal insulation means (26) is arranged between said metal profiles (2, 3, 5, 9, 16) of said inner wall (1) and between said metal profiles (2, 3, 5, 9, 16) of said outer wall (6).
8. An insulating module (11) according to any of the preceding claims, wherein each metal profile (2, 3, 5, 9, 16) of said inner wall (1) and said outer wall (6) comprises identification means (29) enabling that

each unique metal profile (2, 3, 5, 9, 16) can be uniquely identified.

9. An insulating module (11) according to any of the preceding claims, wherein a majority of said intermediate metal profiles (5) of said inner wall (1) is displaced in relation to a majority of said intermediate metal profiles (5) of said outer wall (6) as seen in a direction perpendicular to said inner wall (1). 5
10. A method for post-insulating an existing building (10) (11) by means of one or more insulating modules (11), said method comprising the steps of 10
  - assembling a number of prefabricated metal profiles (2, 3, 5, 9, 16) according to a predefined plan to form an inner wall (1) of said insulating modules (11), 15
  - assembling a number of prefabricated metal profiles (2, 3, 5, 9, 16) according to a predefined plan to form an outer wall (6) of said insulating modules (11), 20
  - mutually fixing said inner wall (1) and said outer wall (6) in relation to each other along two opposing edges of said inner wall (1) and said outer wall (6) so that a cavity (8) is formed between said inner wall (1) and said outer wall (6), 25
  - providing façade cladding (12c, 12d) to an outside surface of said outer wall (6), and
  - connecting said insulating module (11) to a façade of an existing building (10). 30
11. A method according to any of claims 10, wherein said insulation module (11) is connected to said building (10) through brackets (18a, 18b). 35
12. A method according to any of claims 10 or 11, wherein said method further comprises the step of arranging thermal insulation means (26) inside said cavity (8). 40
13. A method according to any of claims 10 to 12, wherein said method further comprises the step of arranging thermal insulation means (26) between said metal profiles (2, 3, 5, 9, 16) of said inner wall (1) and between said metal profiles (2, 3, 5, 9, 16) of said outer wall (6). 45
14. A method according to any of claims 10 to 13, wherein said method further comprises the step of providing identification means (29) to said metal profiles (2, 3, 5, 9, 16). 50
15. A method according to any of claims 10 to 14, wherein said method is a method for post-insulating an existing building (10) by means of an insulating module (11) according to any of claims 1-9. 55

16. A post-insulation and/or facade renovation modular system for facade renovation and/or post-insulation of an existing building (10), wherein a module comprises a bottom face, an upper face and vertical posts between the bottom face and the upper face, **characterised in that**

- the bottom face and the upper face comprise a transversal roof metal profile for a front wall and a transversal roof metal profile for a back wall of a module, which transversal roof metal profile comprises a profile, preferably a U-profile or an angle profile, having a horizontal flange in use as well as at least one vertical flange in use,
- each post comprises a second guide profile located between the transversal roof metal profiles in the front wall or the back wall, which second guide profile comprises a U-profile having two opposite flanges located in parallel planes, and which are mutually connected by a central flange,
- the bottom face and the upper face are each formed by a edge profile which comprises a back side, to which the transversal roof metal profile for the front wall and the transversal roof metal profile for the back wall are fixed, and that the front side of the edge profile comprises one or more grooves as well as one or more protrusions running in parallel in the longitudinal direction of the edge profile, the shape of the cross-section of a protrusion corresponding to the shape of the cross-section of a groove, and that groove and protrusion are placed on the front side in such a way that a groove on a edge profile can engage with a slot on a second similar edge profile on another module.

17. A modular system according to claim 16, **characterised in that** posts in the front wall and the back wall are displaced in relation to each other.
18. A modular system according to claim 16 or 17, **characterised in that** between two neighbouring posts in the front wall and/or the back wall, one or more horizontal beams are mounted, which comprise an eighth guide profile comprising two opposite flanges located in parallel planes, and which are mutually connected by a central flange, the first of the opposite flanges being adapted for mounting of the back wall against the wall of the existing building (10) or mounting of outer cladding on the front wall.
19. A modular system according to any of claims 16-18, **characterised in that** the edge profile is manufactured from a screw secure plate material having a high strength and a low  $\lambda$  value.
20. A modular system according to any of claims 16-19,

**characterised in that** the second guide profile and/or the eighth guide profile is a U-, H- or Z-shaped profile.

21. A modular system according to any of claims 16-20, **characterised in that** the first, second and eighth guide profiles are identical guide profiles, preferably U-profiles manufactured with a crimp of at least one or preferably both ends of the guide profile to reduce the dimensions of the end areas of the guide profile, so that one end of a guide profile may engage in the opening of another guide profile.
22. A modular system according to any of claims 16-21, **characterised in that** the two opposite flanges of the second guide profile comprise connecting means provided with a predefined mutual distance for co-operating with corresponding connecting means on the eighth guide profile.
23. A modular system according to any of claims 16-22, **characterised in that** horizontal frame profiles are fixed to posts for mounting of windows and doors in the wall structure.
24. A modular system according to claim 23, **characterised in that** between two horizontal frame profiles, at least one vertical frame profile is mounted for mounting of windows and doors.
25. A modular system according to claim 23, **characterised in that** on a horizontal frame profile, a second angle bracket is preferably mounted for fixing of the vertical frame profile, the second angle bracket comprising coupling means which cooperate with corresponding coupling means at the end of the vertical frame profile.

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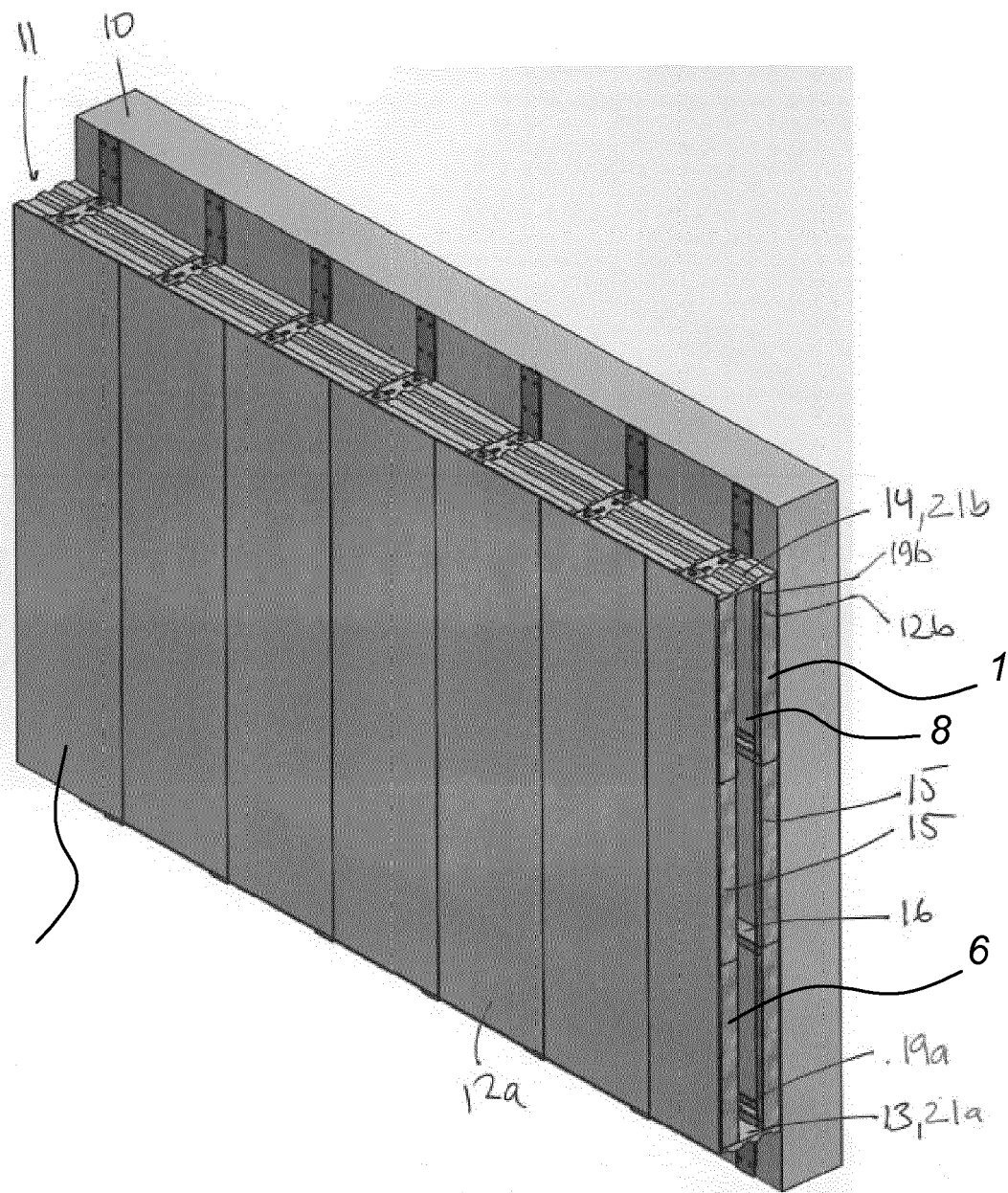
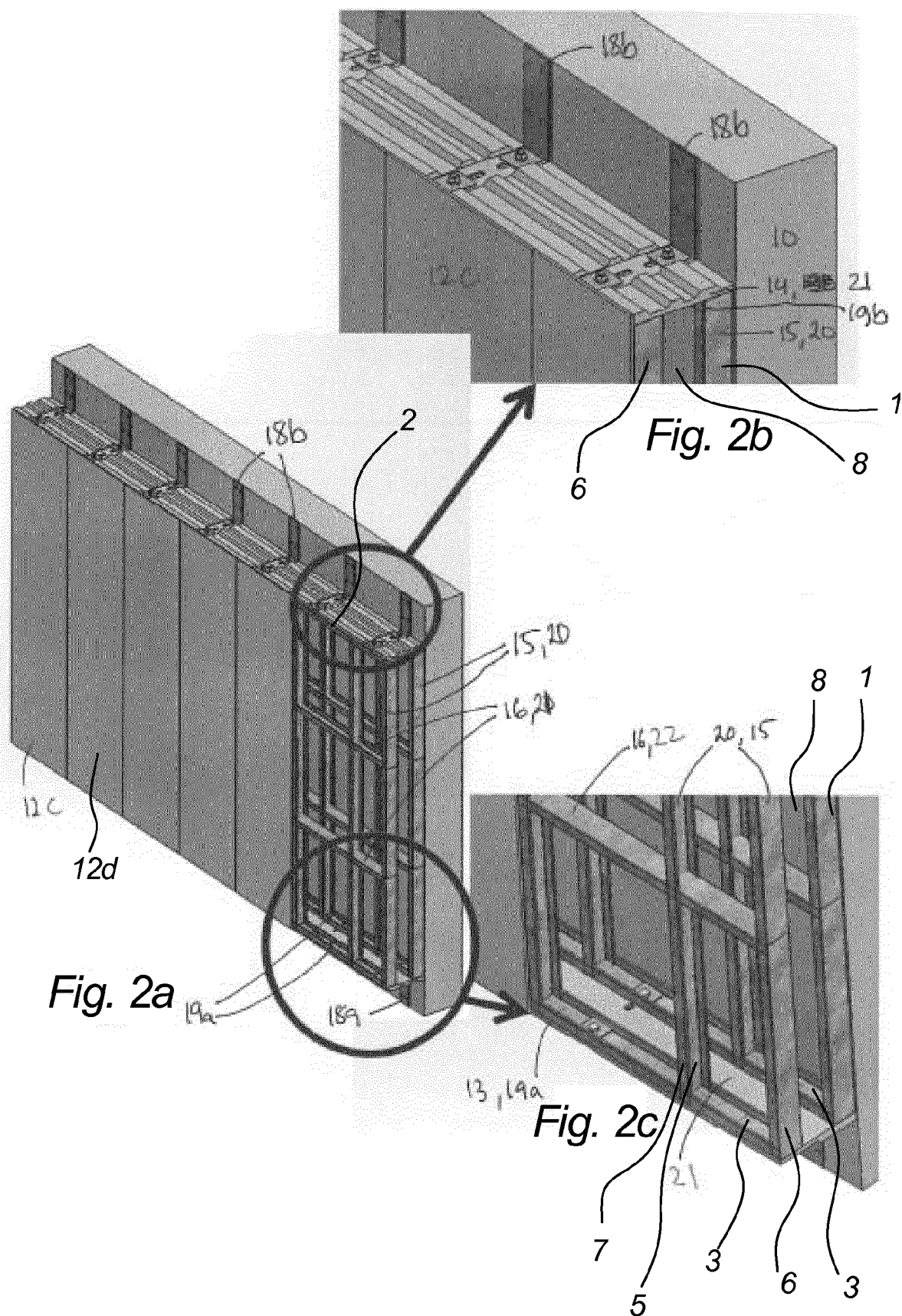
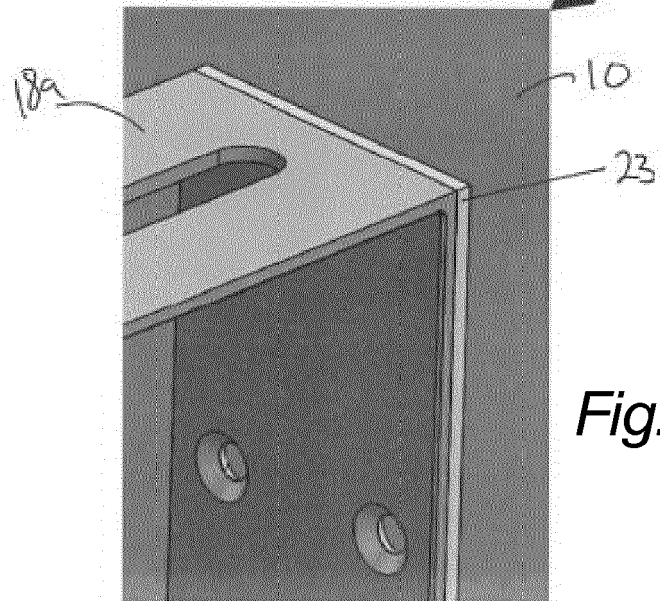
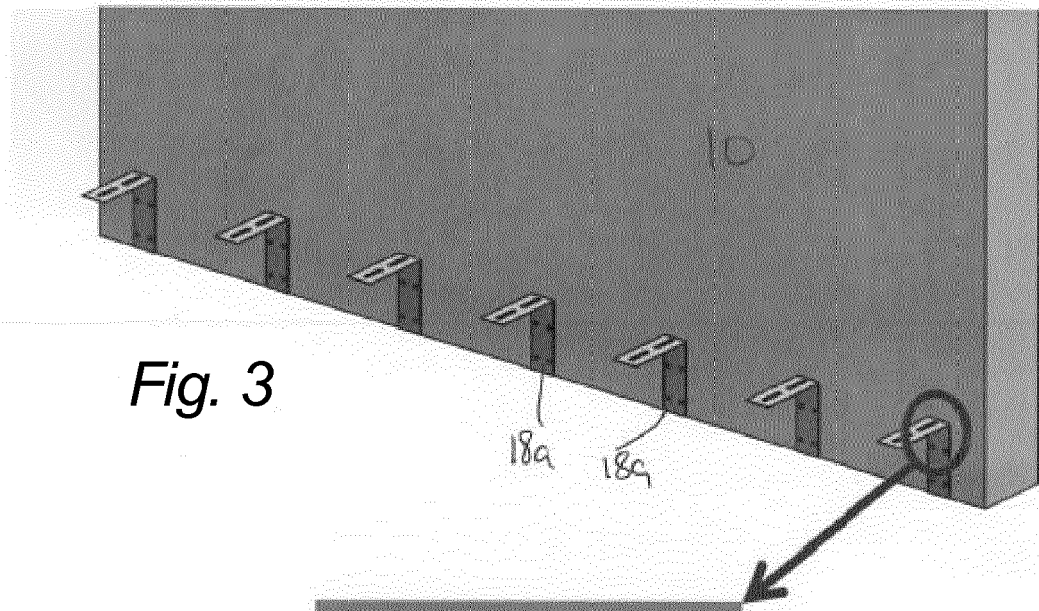
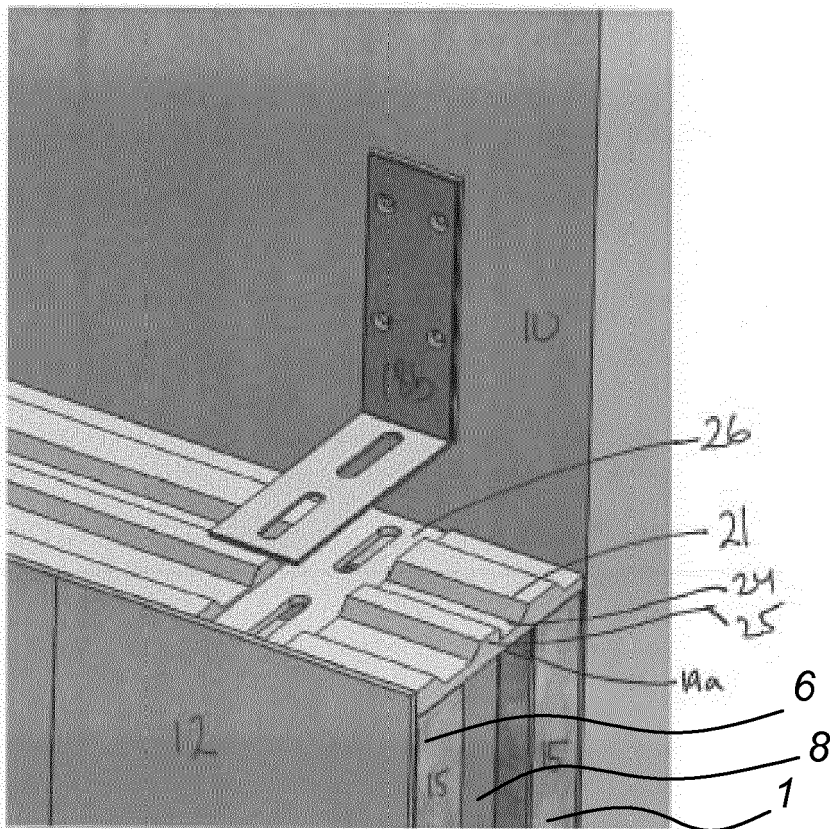


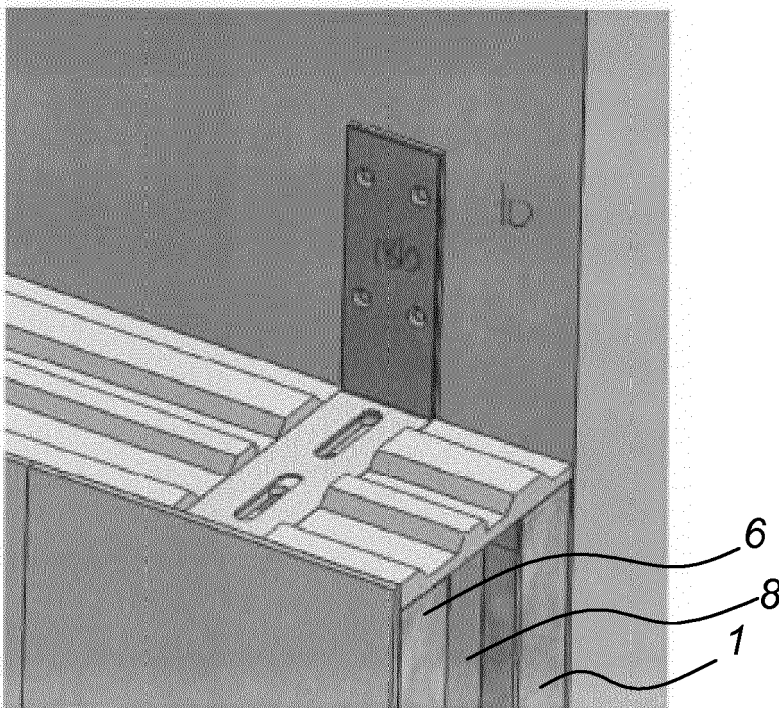
Fig. 1



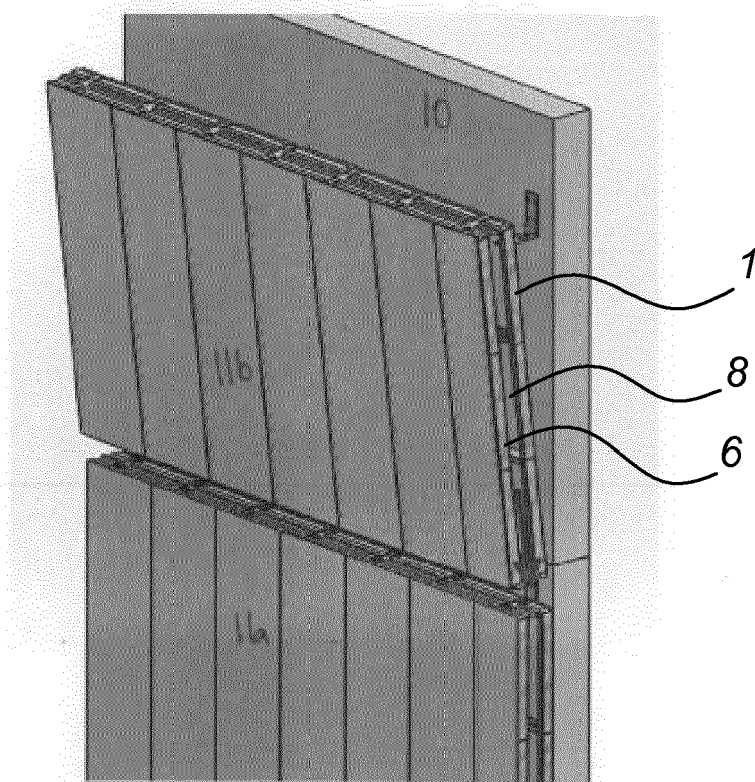




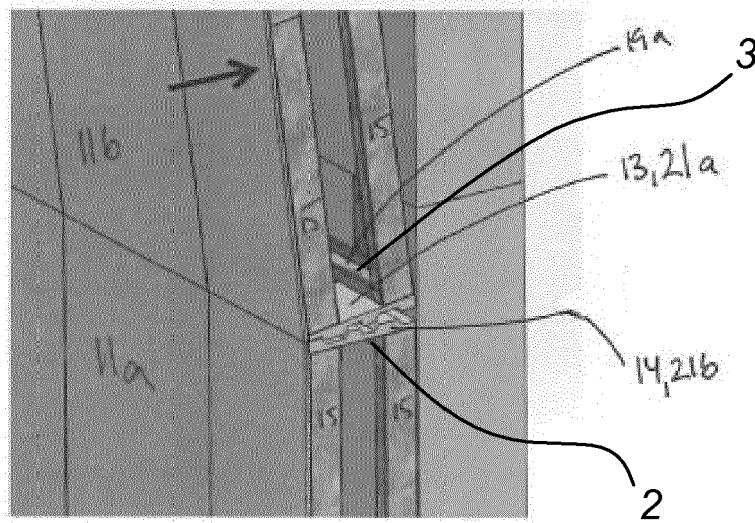
*Fig. 5a*



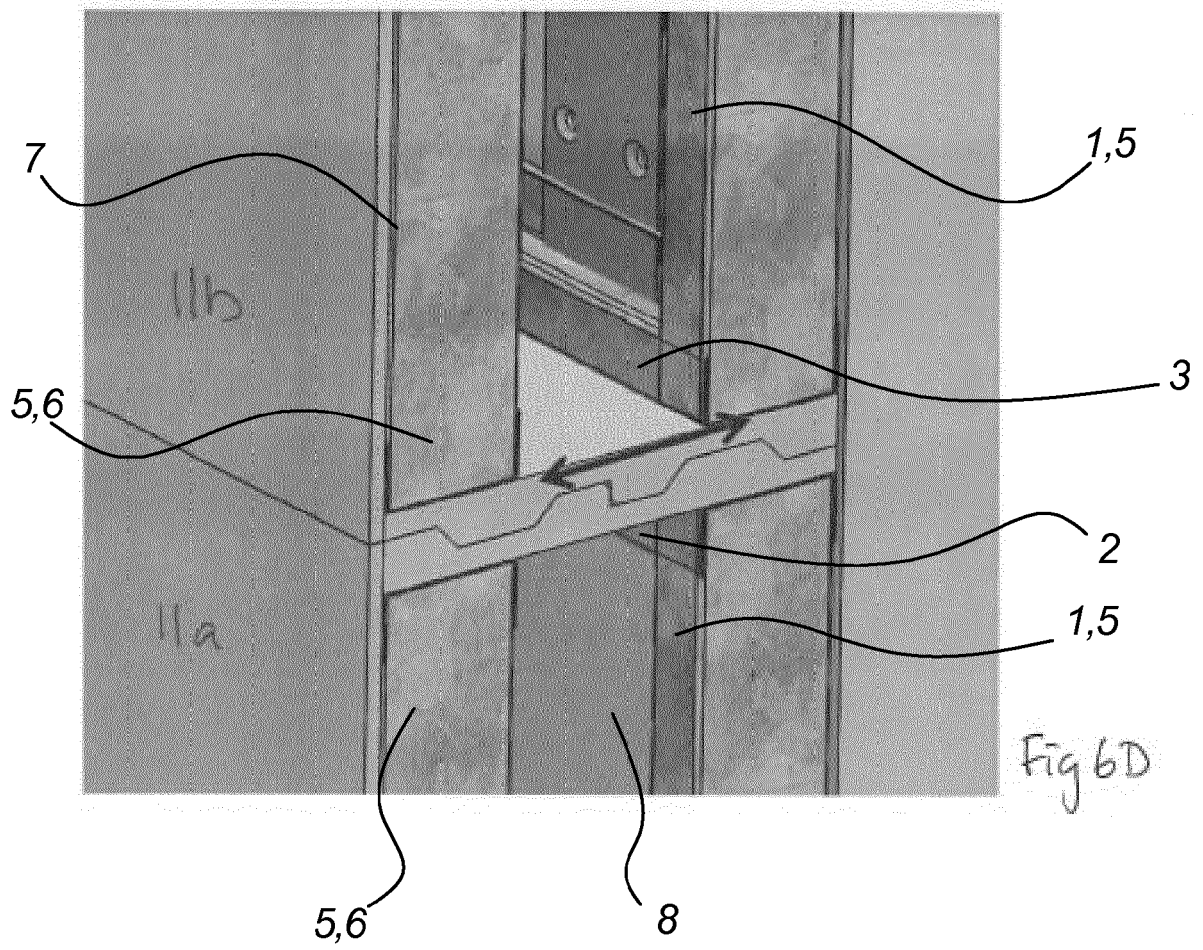
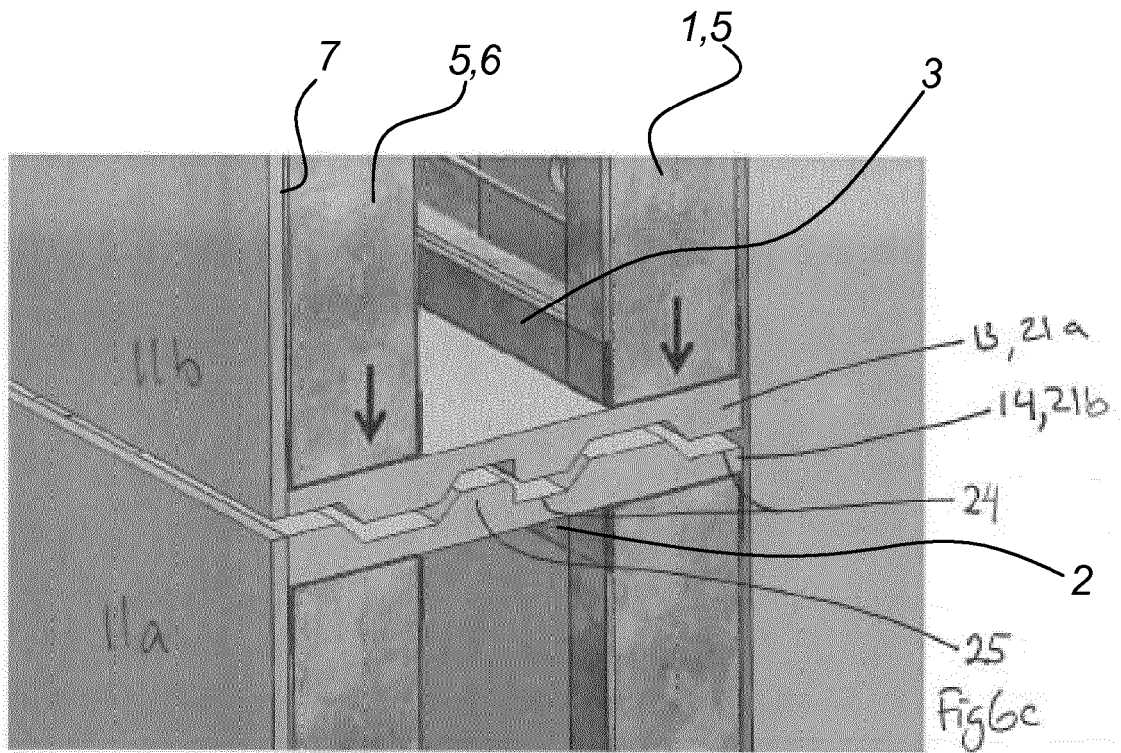
*Fig. 5b*

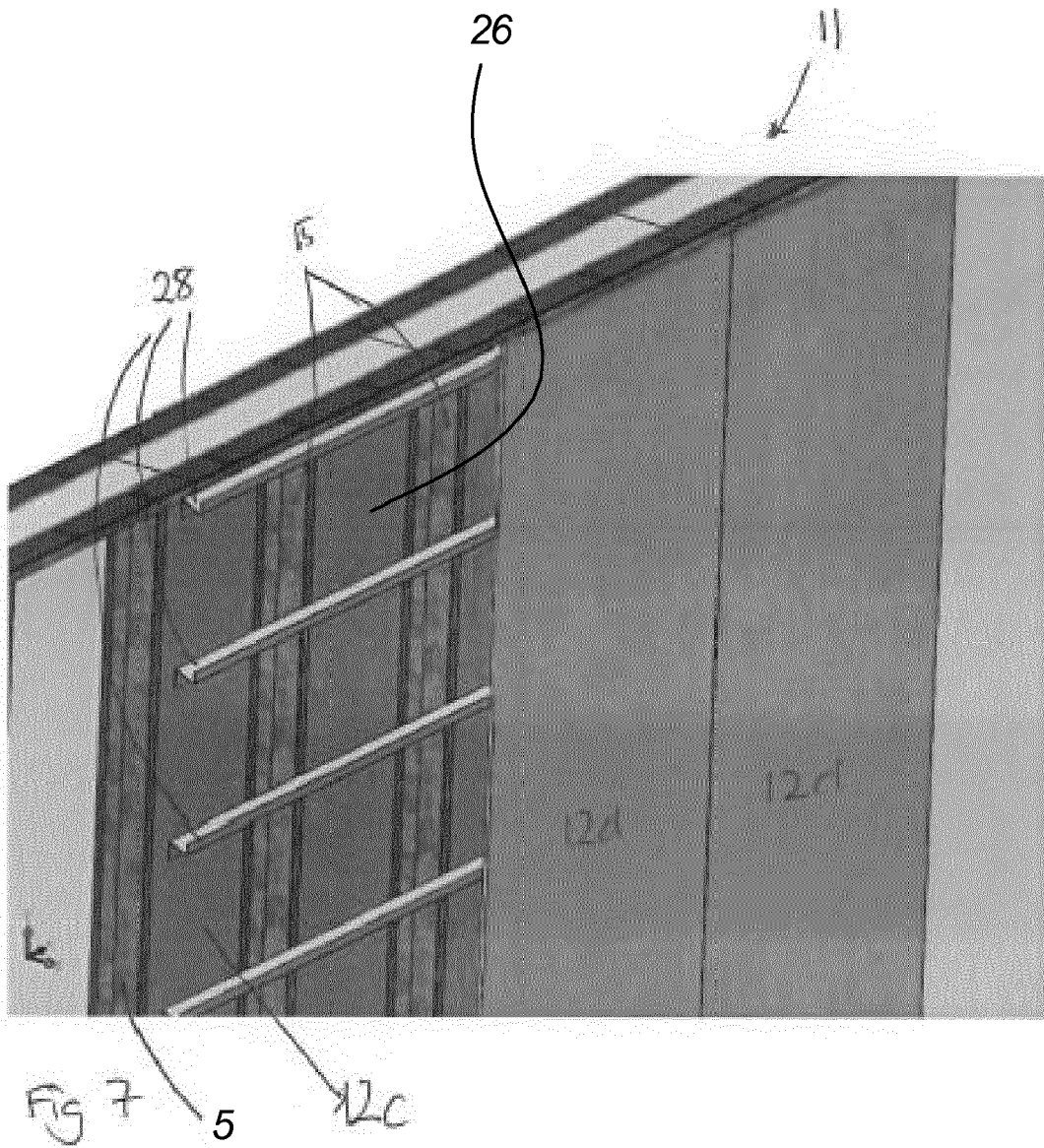


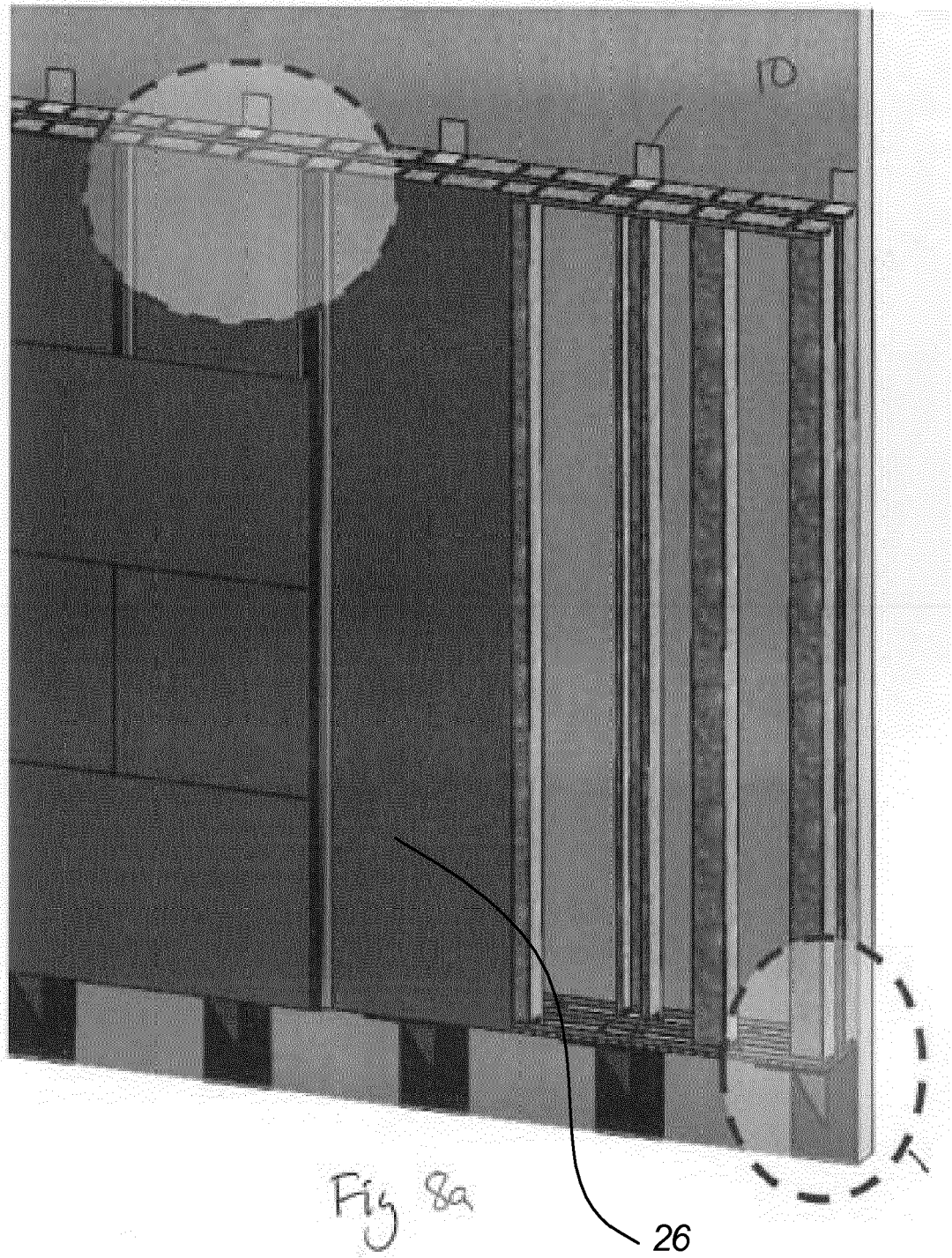
*Fig. 6a*

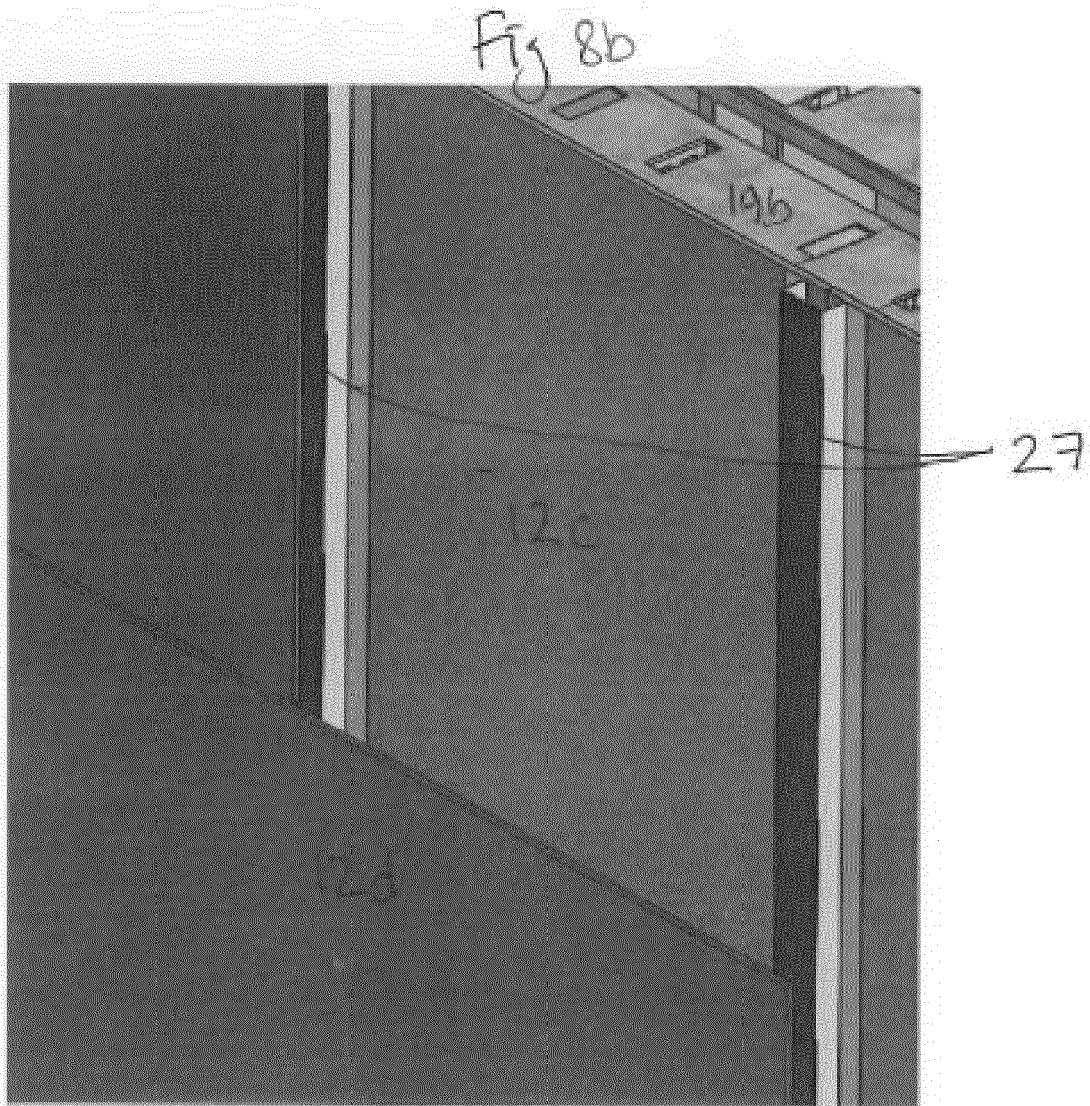


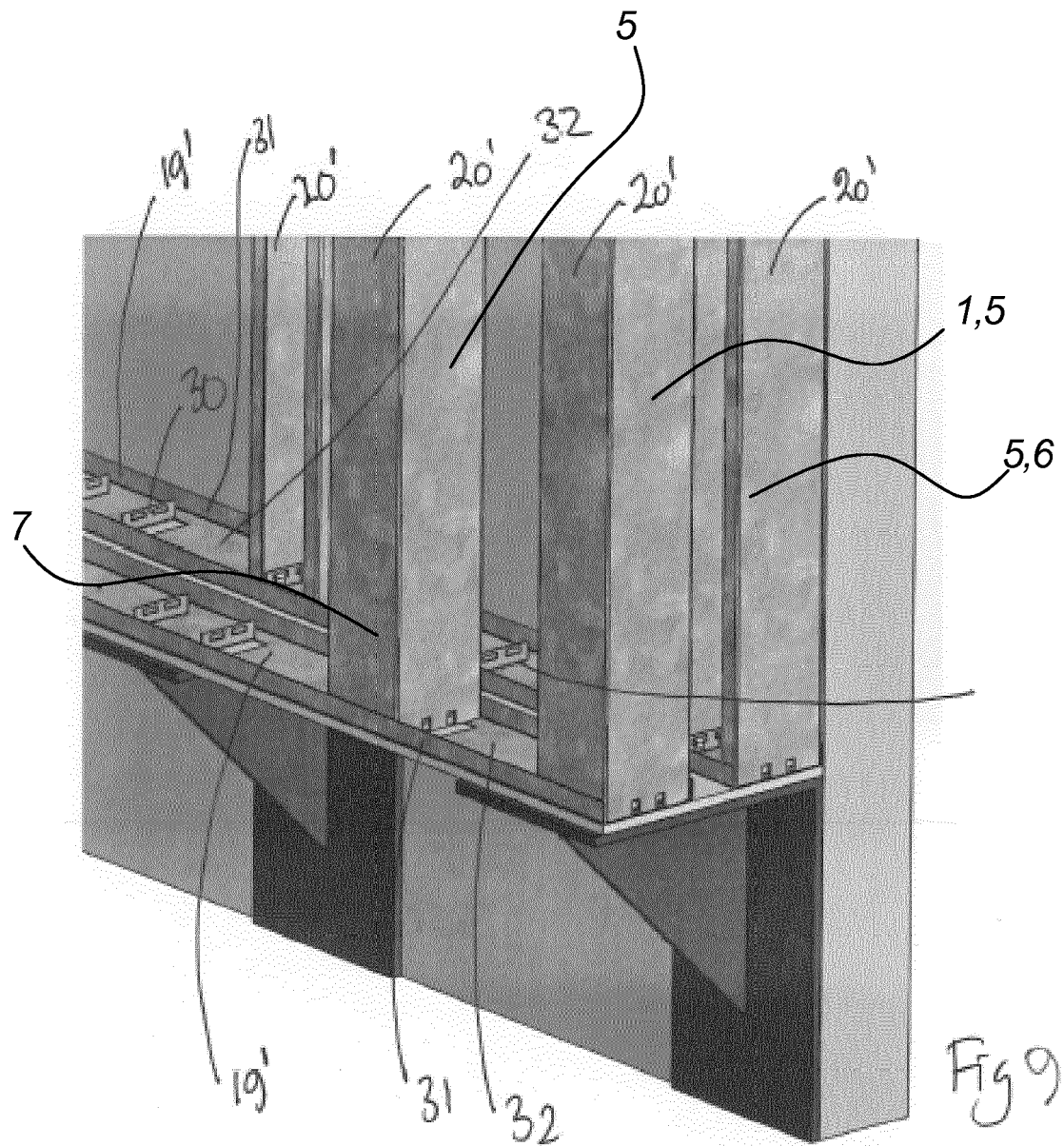
*Fig. 6b*

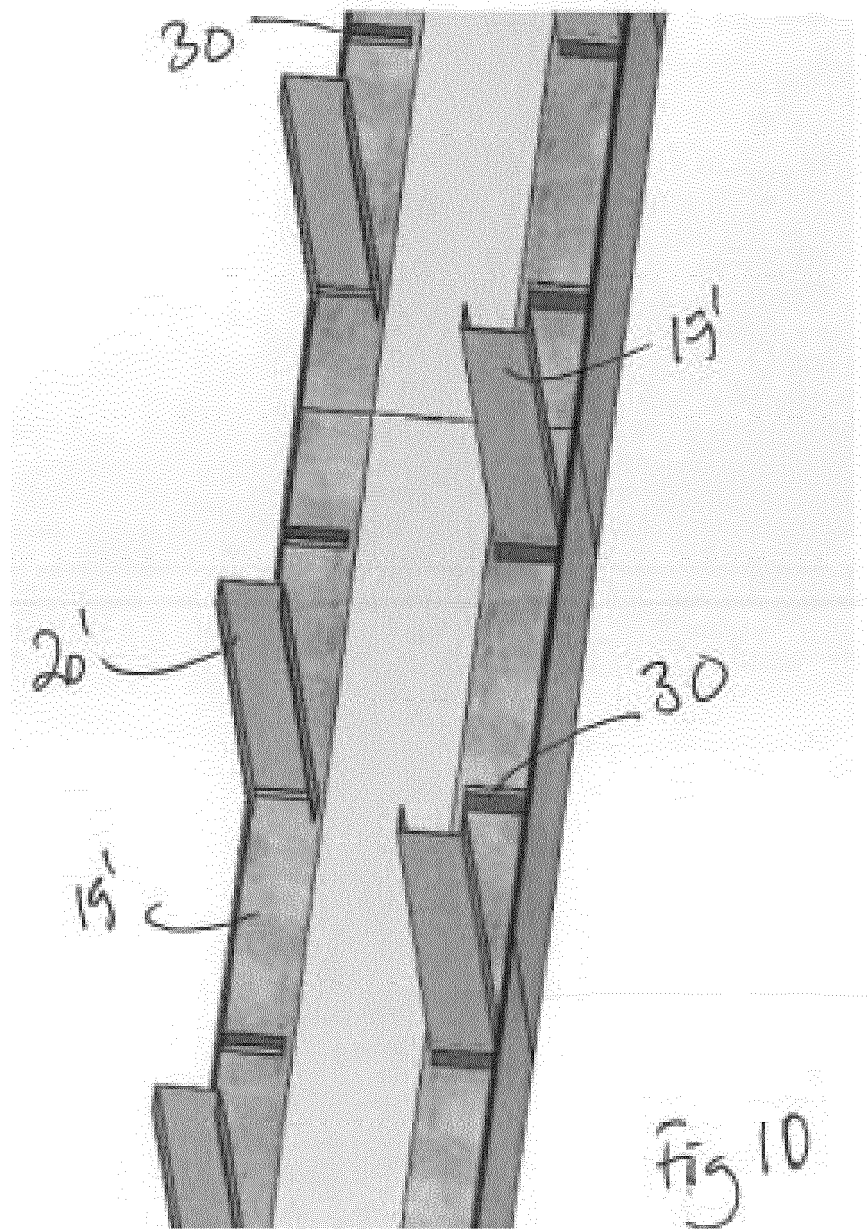












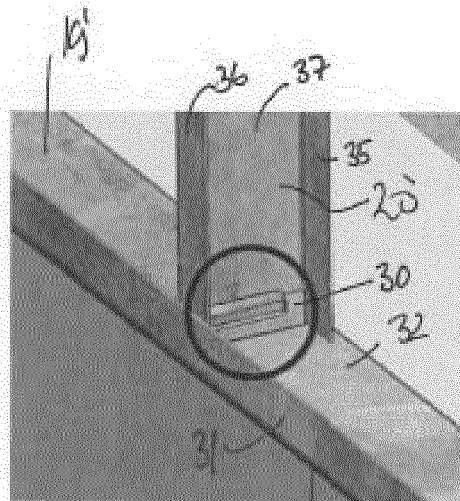


Fig 11a

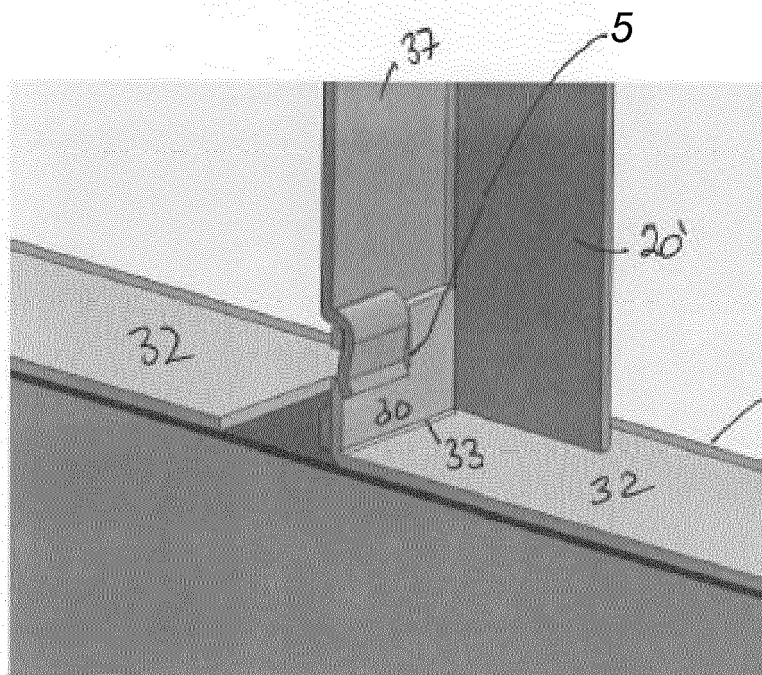
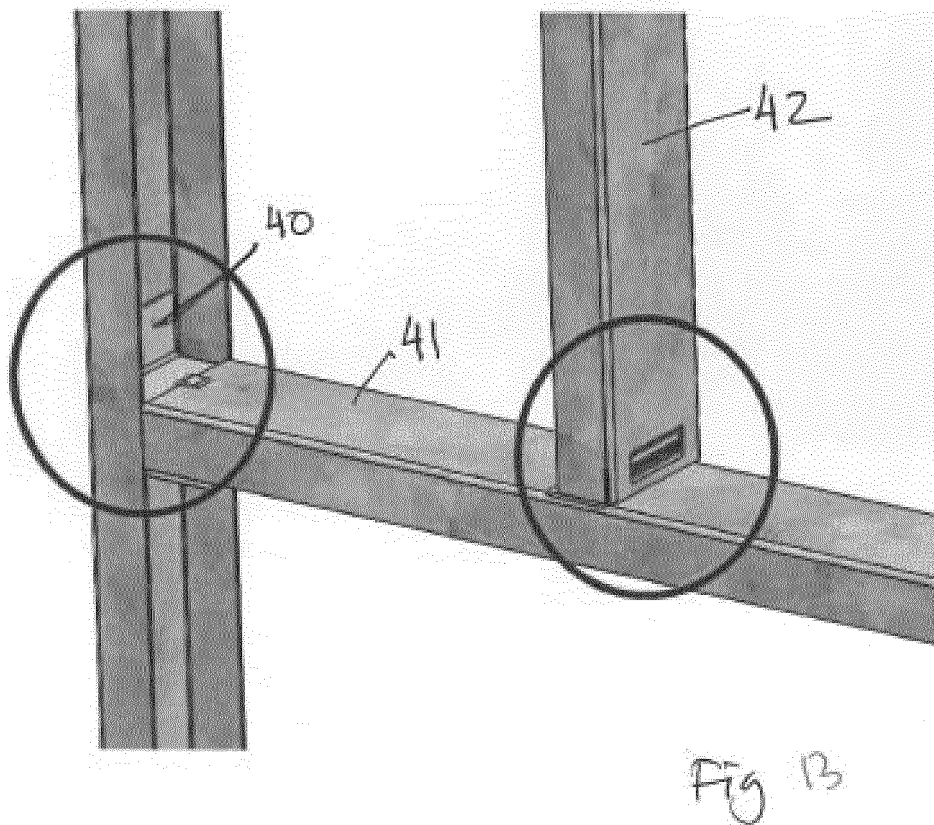
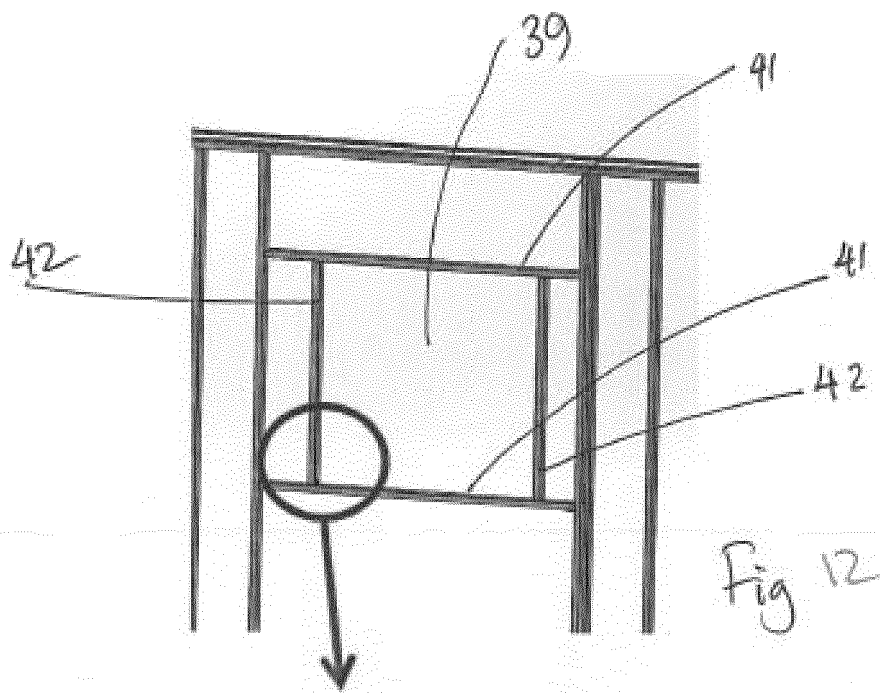


Fig 11b



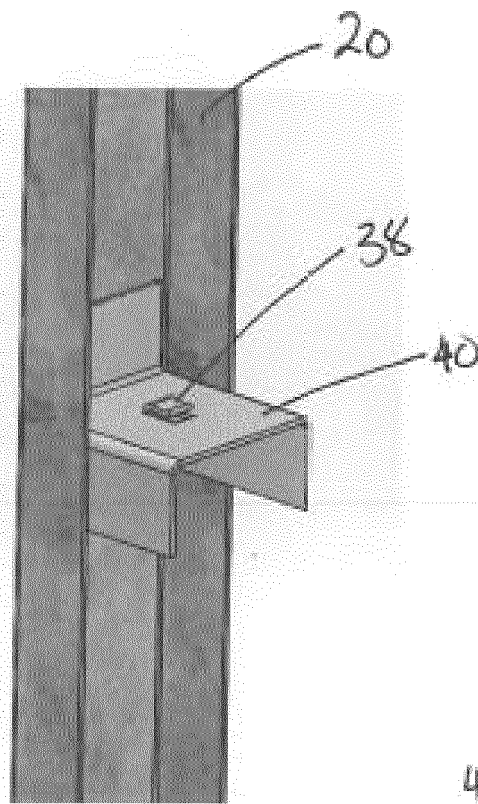


Fig 14

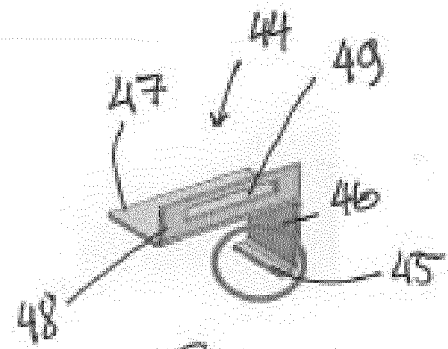


Fig 15

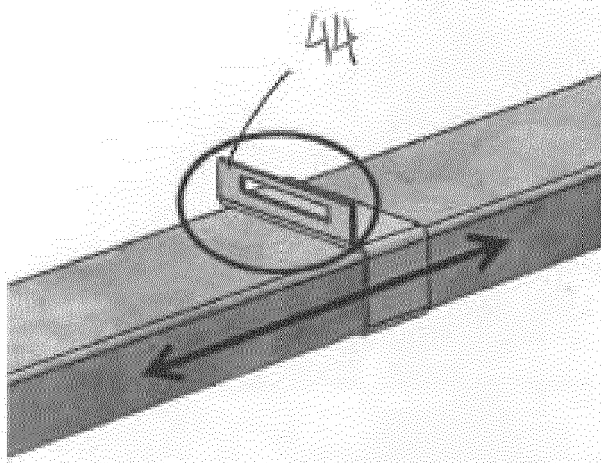
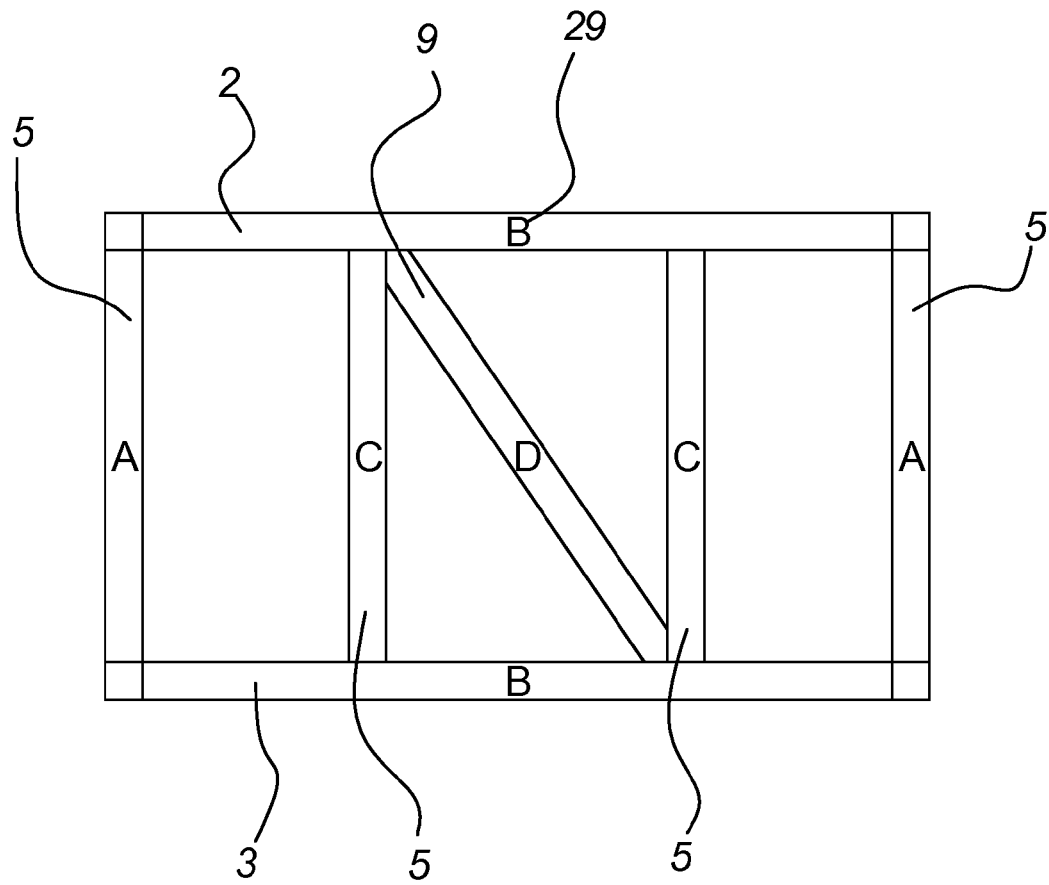


Fig. 16



*Fig. 17*