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(54) **WALL CLADDING SYSTEM WITH QUICK-FIT MECHANISM**

(57) A wall cladding system is disclosed in which cladding planks are reversibly mounted on Ω -shaped support rails by slot-fit hooks providing gravitational retention. Each hook includes anti-rotation and locking features cooperating with the support rail to prevent involuntary disengagement under wind and vibration. The system allows controlled thermal expansion through elongated compensation openings and enables selective removal of individual planks through a defined sequence of sliding, rotation and withdrawal movements, preventing involuntary disengagement under wind and vibration. The system provides secure retention without rigid fastening while allowing easy installation and maintenance.

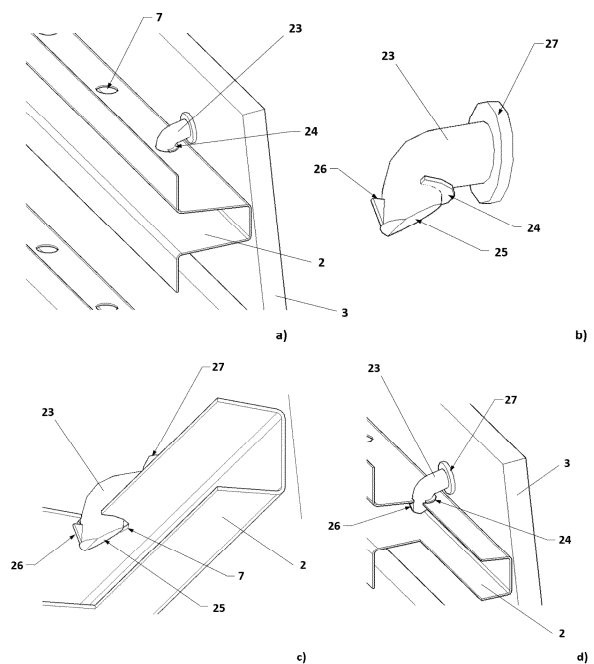


Fig. 7

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to wall cladding systems, and more particularly to a system and method for docking and undocking cladding planks on walls. The disclosed technology is directed to systems that facilitate efficient installation, secure attachment, and easy maintenance of wall cladding, ensuring durability and reliability in various architectural and construction applications, without the need for glues, screws, or nails, thereby streamlining the installation and replacement processes while minimizing labour requirements.

[0002] More specifically, the present disclosure relates to a reversible mounting system allowing selective assembly and disassembly of individual cladding elements, while providing compensation for thermal expansion and contraction and ensuring passive retention against wind loads, suction forces and vibrational effects.

BACKGROUND

[0003] The external cladding of walls serves both aesthetic and technical purposes. From the earliest stages of civilization, aesthetic considerations have played a significant role, as evidenced by the use of decorative elements and the deliberate selection of cladding materials, often as a means of displaying social status. From a technical perspective, exterior cladding is essential for protecting both the wall itself and the interior of the building. It provides waterproofing to prevent water infiltration, protects against corrosion that could damage the internal components of the wall, and safeguards against erosion by shielding the wall's core from the effects of erosive elements.

[0004] Historically, the choice of exterior wall cladding has often been influenced by the availability of raw materials near the construction site. For example, stone-clad walls are typically found near quarries, walls clad with ceramic tiles or bricks are common in regions close to ceramic production facilities, and wooden boards or planks are frequently used in areas with abundant forest resources.

[0005] Today, the market offers a wide range of materials and solutions for external wall cladding. Balancing aesthetics with technical requirements, and driven by the growing trend toward sustainable and eco-friendly construction practices, wood has become one of the most prominent materials for this purpose. For instance, modern cladding options include wood panels or derivatives such as "Viroc" panels and certain types of weather-resistant phenolic materials. Another common approach is the use of "scale" cladding systems, where wooden planks are nailed or screwed to a supporting structure affixed to the wall. Each plank is slightly inclined and partially overlaps the plank below while being overlapped by the plank above.

[0006] Although these cladding systems are widely accepted on the market and, in some cases, have already been commercialised and applied for many years, there are significant disadvantages related to their application.

For instance, exterior wall cladding systems using wood or wood-based panels typically require attachment to a support structure, which is often made of metal or wood. It is also common for these panels to be secured to the support using nails or screws. This requires carpenters or installers with some degree of specialisation to carry out the work, as well as the need for specific tools to carry out the nailing or screwing of the boards or of the planks. Due to the requirement for nails and screws, the installation time for this type of cladding is consequently extended.

For the existing external plank cladding systems, the need for nails or screws is once again a reality in the vast majority of them and, as such, the disadvantages encountered are identical to those experienced with board cladding systems.

[0007] There is therefore a need for a wall cladding system that is both simple and quick to install, with variations suitable for external wall cladding while also being adaptable for use on internal wall surfaces. The new cladding system must provide quick and easy fitting of the cladding planks or boards, making it possible to change the cladding easily and as often as desired and eliminating the need for specialised carpenters or installers.

[0008] The document US5370377A discloses a tool for use in the fixing of plank cladding where the tool includes a first member and a second member shorter than and spaced from the first member to provide the sides of a plank receiving slot which has a bottom, a hook on the second member faces away from the first member, a plank retainer extends through the first member and is biased by a spring to obstruct the slot. In use the tool hook is engaged with an already fixed support plank and the next plank to be fixed is supported on the retainer. When the next plank is part fixed the retainer is withdrawn from the plank slot to allow the part fixed plank to enter further into the slot as the tool is raised to unhook it from the support plank.

[0009] These facts are disclosed in order to illustrate the technical problem addressed by the present disclosure.

GENERAL DESCRIPTION

[0010] The present application describes a wall cladding system comprising cladding elements that can be easily and quickly attached to or detached from a support structure. The support is ensured by metal rails, such as "Omega" (or "hat") shaped metal rails, fixed to a rest wall, while the cladding elements are planks fitted with docking points on its rear face, using no nails, screws or solutions such as glue or bonding mortars. When installed on the support, the planks collectively create a seamless and layered coating for the wall.

[0011] The present disclosure advantageously overcomes the aforementioned disadvantages and shortcomings of the prior art. It consists of a system for cladding walls with planks that allows the planks to be fitted easily and quickly without the use of nails, screws or solutions such as glue or bonding mortars. This system has several possible embodiments, which materialise in different types of fitting systems, and is mainly intended for cladding the outside of exterior walls, although it can be used to clad interior walls too.

[0012] The disclosure described here is a wall cladding system in which the innovation lies in the way the cladding elements fit into the support. Unlike most wall cladding systems in which the cladding elements are screwed or nailed to a support against the wall to be clad, requiring specialised and expensive labour to do so, the present technology concentrates this labour only on the execution of the support structure, with the cladding elements fitting extremely easily, quickly and without the need for screws, glue, nails or adhesives to fix them.

[0013] Due to this ease of fitting, it is guaranteed that anyone not qualified in carpentry work can fit the cladding elements, without even needing the tools typically associated with fixing boards/planks. It is also guaranteed that in the event of damage to any cladding element, it can be easily replaced and that, due to the modularity of the system presented here, the final appearance of the clad wall can be changed whenever desired, simply by easily removing the cladding elements previously fitted and replacing them with new elements, with the same dimensions and form of fitting, and with the same or different appearance, which, by its turn, can be customised according to the client's wishes.

[0014] The disclosed technology provides several technical and functional advantages not achieved by conventional fixation systems. It enables effective compensation of thermal and hygroscopic expansion without warping, due to the fish-scale arrangement, compensation openings and absence of rigid blocking fasteners. Retention is ensured primarily by geometry and gravity, rather than by friction or tightening, improving long-term stability. Resistance to wind and vibration is achieved through the combined effect of drop retention, anti-release geometry, elastic friction and redundant locking. Noise and rattling are reduced by the elastic layer and elimination of rigid clearances. Loads are distributed progressively, reducing stress concentration and improving fatigue behaviour. Selective assembly and disassembly of individual panels are possible without full dismantling, reducing maintenance costs. The system is applicable to a wide range of materials without changing the operating principle and exhibits durable performance over time. The specific combination of fish-scale mounting, hook and Ω -shaped rail engagement, gravitational retention, redundant locking and expansion compensation constitutes a non-existing technical solution producing a synergistic effect. The system is easily manufactured using standard industrial processes and is suitable

for exterior façades, interior walls, roofs and modular cladding, fulfilling the requirements of industrial applicability.

[0015] In one of its embodiments, the disclosure is designed primarily for cladding the external side of exterior walls, making it possible to fit the cladding elements easily and quickly and to be carried out by people who are not skilled in this type of work. This embodiment of the disclosure comprises a support materialised by metal rails with an 'Omega' cross-section, perforated on the side faces of the 'Omega'. The rails are screwed to the supporting wall using screws and plugs and, due to their perforations, make it possible to receive the cladding elements.

[0016] The cladding elements, in this case, are planks of wood or of a derivative of wood waste that have a finished, pleasant-looking outer face and a back face where there are, near each end, hooks that fit into the holes placed in the 'omega' rails, ensuring that the lower part of the plank is fixed. In this particular cladding system, the planks are arranged in a fish scale way and, due to this arrangement, as soon as the 'Omega' rails of the support are properly spaced, the planks overlap, with the upper portion of the plank overlapping the lower portion of the plank above it, thus ensuring that the upper portion of each plank is locked in place. This embodiment of the cladding system makes it easy to change the cladding planks whenever required, for aesthetic reasons or to replace damaged planks.

[0017] To address the above technical problems, the disclosure discloses a modular cladding fixation system based on a controlled engagement between cladding elements and support rails, combining geometric retention, elastic preloading and redundant locking.

[0018] According to the disclosed technology, the cladding elements are arranged in a controlled overlapping configuration, preferably in a fish-scale arrangement, wherein each board or panel partially overlaps an adjacent element. This configuration allows each element to expand and contract substantially independently, without inducing global bending or warping stresses, since the support and overlap are distributed rather than rigidly constrained.

[0019] Each cladding element is provided with at least one integrated hook, formed either directly in the element or in an auxiliary profile attached thereto. The hook is configured to engage with a support rail having an Ω -shaped cross-section. The engagement geometry provides a sufficient drop depth such that the weight of the cladding element generates a retaining force by gravity, while the shape of the engagement prevents accidental release due to vibration or normal operational loads.

[0020] The support rail is preferably provided with compensation openings, advantageously of oval or oblong geometry, which allow controlled relative movement between the cladding element and the rail in the principal direction of thermal expansion. This movement is limited to functional degrees of freedom and does not enable

disengagement.

[0021] An elastic and friction-generating layer is arranged at the interface between the cladding element and the support structure. This layer, which may be made of cork or an equivalent elastic material, compensates for manufacturing tolerances, eliminates residual clearances and generates an elastic preload that stabilizes the assembly over time.

[0022] In addition, a locking mechanism is provided, preferably in the form of a locking ring, which may be rotatable, eccentric or provided with a tab or detent. The locking mechanism defines a locked state, in which the cladding element is secured against removal, and an unlocked state, which allows selective disassembly for maintenance. The combined effect of gravitational retention, geometric interlocking and redundant locking prevents involuntary disengagement under wind, vibration or thermal cycling, while preserving reversibility on a piece-by-piece basis.

[0023] An aspect of the present disclosure relates to a wall cladding system, for application to walls, comprising: a plurality of cladding planks (3, 10, 11, 17), each one of the plurality of cladding planks comprising a planar main body comprising a front face and a back face, and at least two slot-fit hooks (9, 16, 23) fixed to the back face of the planar main body of the cladding plank; a plurality of support rails (2) fixed to a wall or substructure, each support rail comprises an Ω -shaped cross-section and comprising engagement openings; wherein each slot-fit hook is configured to engage one of the engagement openings of a support rail with a defined drop depth such that the weight of the cladding plank generates a gravitational retaining force maintaining the hook in a seated position; wherein each slot-fit hook comprises an anti-rotation bracket configured to abut against a surface of the Ω -shaped support rail, and a locking tip configured to abut against an internal surface of the support rail, thereby preventing rotation and involuntary disengagement of the cladding plank under wind or vibration loads; wherein the system is configured such that removal of an individual cladding plank requires a sequential movement comprising an upward sliding movement sufficient to disengage the hook from the engagement opening, followed by a rotational movement about a defined rotation point, and a subsequent withdrawal movement substantially perpendicular to the back face of the cladding plank; wherein compensation openings are provided in the support rail and/or in an intermediate support element, said compensation openings being elongated in a direction, namely in a longitudinal direction of the cladding plank, corresponding to a principal thermal expansion direction of the cladding plank, thus allowing controlled relative movement without enabling disengagement.

[0024] A wall is to be understood as any vertical or substantially vertical building structure suitable for receiving a cladding system, including exterior walls, interior walls, façades, curtain walls, or supporting substructures fixed thereto.

[0025] A cladding plank is an elongated, substantially planar cladding element configured to be mounted to a wall in a generally horizontal or vertical orientation, the cladding plank comprising a front face visible in an installed state and an opposite back face facing the wall or substructure.

[0026] The planar main body of a cladding plank refers to the structural portion providing the primary mechanical rigidity and external appearance of the plank, wherein minor surface features such as grooves, channels, textures, coatings or drainage formations do not depart from the planar character of the main body.

[0027] A support rail is an elongated mounting element configured to be fixed to a wall or to a substructure and to mechanically support one or more cladding planks, each support rail extending predominantly in a longitudinal direction and being arranged to cooperate with hooks fixed to the cladding planks.

[0028] An Ω -shaped cross-section refers to a cross-sectional geometry comprising at least two opposing flanges connected by a web, thereby defining internal and external surfaces capable of receiving and retaining engagement elements, wherein minor geometric variations that preserve this functional geometry are included.

[0029] An engagement opening is an opening, slot, or aperture formed in a support rail and configured to receive and retain an engagement portion of a hook, the engagement opening being oriented so as to allow vertical seating of the hook under the weight of a cladding plank.

[0030] A hook is a fastening element fixed to the back face of a cladding plank and configured to engage a corresponding engagement opening of a support rail, the hook being formed as a single piece or as an assembly of multiple parts and extending orthogonally or obliquely from the back face of the cladding plank.

[0031] An engagement portion of a hook is the part of the hook configured to be inserted into and seated within an engagement opening of a support rail, the engagement portion being shaped such that, when seated, the weight of the cladding plank contributes to maintaining the hook in engagement with the support rail.

[0032] A predetermined vertical seating depth refers to a vertical distance by which the engagement portion of a hook is seated within an engagement opening in the mounted state, said depth being defined by the geometry of the hook and/or the engagement opening and determining the vertical travel required to disengage the hook.

[0033] An anti-rotation bracket is a structural portion of a hook configured to contact a surface of the support rail so as to limit or prevent rotational movement of the cladding plank about an axis parallel to the longitudinal direction of the support rail while the cladding plank is in the mounted state.

[0034] A locking tip refers to a portion of the hook configured to contact an internal surface of the support rail in the mounted state, thereby contributing to positional stability of the cladding plank and limiting unin-

tended movement.

[0035] A rotation point is a point or region about which a cladding plank rotates during removal or installation, said rotation point being defined by contact between the anti-rotation bracket of the hook and a surface of the support rail.

[0036] An upward sliding movement refers to a translational movement of a cladding plank in a direction substantially parallel to the plane of its back face and opposite to the direction of gravitational loading, said movement being sufficient to disengage the engagement portion of the hook from the engagement opening.

[0037] A withdrawal movement refers to a translational movement of a cladding plank in a direction substantially perpendicular to the plane of its back face, allowing the cladding plank to be separated from the wall cladding system.

[0038] A compensation opening is an elongated opening provided in a support rail or in an intermediate support element, the elongation allowing relative movement between the cladding plank and the support rail to accommodate dimensional changes caused by thermal expansion or contraction.

[0039] A principal thermal expansion direction of a cladding plank refers to the direction along which the cladding plank undergoes the greatest dimensional change due to temperature variation, typically corresponding to the longitudinal direction of the cladding plank.

[0040] In an embodiment the at least two slot-fit hooks are fixed at an inclined angle relative to the back face of each plank, and positioned near the side edges of the back face on an inferior and/or on a superior longitudinal half of said back face.

[0041] In an embodiment each support rail is fixed directly to a wall or guided into an intermediate support fixed to a wall.

[0042] In an embodiment the at least two slot-fit hooks are made of a metallic material.

[0043] In an embodiment each at least two slot-fit hooks comprises a circular-section base (18, 27) for fixing said slot-fit hook to the main body of each cladding plank.

[0044] In an embodiment, each slot-fit hooks comprises a locking ring (20) for holding the cladding plank in a fixed vertical position.

[0045] In an embodiment, each at least two slot-fit hooks comprises an anti-rotation bracket (24) and a locking tip (26) for preventing the cladding plank from rotating out of the support element; preferably wherein the at least two slot-fit hooks has a ramped surface (25) for facilitating docking and undocking of each cladding plank.

[0046] In an embodiment each cladding plank comprises an upper drainage channel (12) and/or a lower drainage channel (13).

[0047] In an embodiment the support rails have a thickness from 1.5 to 2 mm.

[0048] In an embodiment the cladding planks are made from wood or a wood derivative.

[0049] In an embodiment the cladding planks include an integrated thermal insulation layer.

5 **[0050]** In an embodiment the support rails include integrated guides for managing cabling or conduits within the wall.

10 **[0051]** Another aspect of the present disclosure relates to a method for undocking or docking a cladding plank, the method comprising: sliding the cladding plank (3, 10, 11, 17) upwards along the plane of its back face to disengage the at least two slot-fit hooks from the corresponding holes of the support elements; rotating the cladding plank about a rotation point (P) until the back face of the cladding plank forms an angle (α) with its original position; moving the cladding plank perpendicularly in relation its back face to clear a distance (s) required to displace the plank from its mounted position; and performing the inverse steps to dock a replacement cladding plank into the wall cladding system.

[0052] In another aspect, the present disclosure relates to the use of the wall cladding system in walls of buildings, such as residential, commercial, industrial, and prefabricated modular buildings.

25 **[0053]** In yet another aspect the present disclosure relates to the use of the wall cladding in internal walls, for providing decorative and aesthetic enhancement to interior spaces.

30 **[0054]** Other aspects and advantages of the present invention can be better understood by reading its detailed description which includes reference to the attached figures, which are intended to be analysed in conjunction with the textual descriptions.

35 **[0055]** The technology can, however, be embodied in many different ways and should not be understood as limited to the embodiments set out here; rather, these embodiments are provided only by way of illustration and not as a limitation.

40 **[0056]** The disclosed technology is defined by the co-operation between gravitational retention in an Ω -shaped rail, dual anti-rotation and locking features of the slot-fit hook, and a constrained docking and undocking kinematic sequence, which together prevent involuntary disengagement while allowing selective removal of individual cladding planks.

45 **[0057]** In an embodiment, the cladding plank and/or an intermediate support element associated with the cladding plank of the wall cladding system comprises elongated compensation openings of oval or oblong shape, said compensation openings being oriented in a direction corresponding to a principal thermal expansion direction of the cladding plank.

50 **[0058]** Comparing to the state of the art, the disclosed technology provides a set of technical and functional advantages that are not achieved by conventional fixation systems known in the prior art. In particular, the disclosed wall cladding system enables effective compensation of thermal and hygroscopic expansion without

inducing warping, buckling or cracking of the cladding elements. This effect is achieved through the controlled overlapping arrangement of the cladding elements, preferably in a fish-scale configuration, in combination with elongated compensation openings and the absence of rigid blocking fasteners. As a result, each panel or plank is allowed to move independently in a controlled manner, even when materials with different hygrometric and thermal behaviours, such as wood, metal and composite materials, are employed, preventing involuntary disengagement under wind and vibration.

[0059] Retention of the cladding elements is achieved primarily by passive means, namely by the geometry of the hook, the defined drop depth of engagement within the Ω -shaped support rail, and the self-weight of the cladding element. This gravitational and geometric retention does not rely exclusively on frictional forces or permanent mechanical tightening, thereby reducing performance degradation over time and improving long-term stability.

[0060] The now disclosed system further provides high resistance to wind loads, suction forces and structural vibration. This resistance results from the cooperative interaction between gravitational drop retention, anti-release rail geometry, an elastic friction-generating interface layer and a redundant locking mechanism. Together, these features prevent involuntary disengagement of the cladding elements under dynamic excitation, including wind-induced vibration and pressure fluctuations, even in severe exterior environments.

[0061] An additional advantage of the disclosed technology lies in the reduction of noise and rattling phenomena. The presence of an elastic compensation layer, combined with the elimination of rigid clearances, reduces tonal noise and vibration and prevents the characteristic rattling associated with rigid metallic fastening systems. This contributes to improved acoustic comfort, particularly in ventilated façade applications.

[0062] The geometry of the hook and the support rail further promote progressive distribution of mechanical loads over an extended contact area. This reduces stress concentrations and improves fatigue behaviour under cyclic loading, which is especially advantageous for composite materials and for installations subjected to prolonged environmental and mechanical stresses.

[0063] The disclosed system allows selective assembly and disassembly of individual cladding elements without requiring complete dismantling of the cladding surface and without causing permanent damage to the panels or to the supporting substructure. This capability significantly reduces maintenance costs and facilitates localized replacement or aesthetic modification of the cladding.

[0064] Another important advantage is the versatility of the system with respect to materials. The same functional principle can be applied to cladding elements made of wood, metal or composite materials without modification of the underlying engagement concept, thereby offering

high industrial flexibility and adaptability to different architectural markets and applications.

[0065] Long-term durability and dimensional stability are further enhanced by the absence of permanent rigid tightening, in combination with controlled expansion compensation, geometric retention and elastic damping. This configuration reduces degradation mechanisms such as creep, stress relaxation and fatigue, ensuring stable performance throughout the service life of the system.

[0066] The disclosed technology also constitutes a technical solution not previously available in the sector. The specific combination of a fish-scale mounting arrangement, a hook cooperating with an Ω -shaped support rail, gravitational retention, redundant locking and controlled compensation of thermal expansion goes beyond a mere aggregation of known features and produces a synergistic technical effect that cannot be derived from the prior art.

[0067] Finally, the disclosed technology exhibits broad industrial applicability. The components can be manufactured using conventional industrial processes such as extrusion, bending, machining or moulding, and the system is suitable for use in exterior façades, interior walls, roofs and modular cladding installations. Accordingly, the technology provides a technically robust and commercially advantageous solution.

BRIEF DESCRIPTION OF THE DRAWINGS

[0068] The following figures provide preferred embodiments for illustrating the disclosure and should not be seen as limiting the scope of the present disclosure. Repeated reference numerals indicate identical elements across the embodiments for clarity and conciseness. Moreover, previously described reference numerals are reused where applicable, while additional elements are introduced as needed.

Figure 1 shows the main components of a possible embodiment according to the present disclosure, namely an exterior wall cladding system composed of planks with an easy attachment system. In Figure 1 (a) a support rail is depicted, in (b) a cladding board or plank, and in (c) a representation of a wall cladding system. The following reference numerals correspond to:

- (1) Wall;
- (2) Ω -shaped cross-section rail;
- (3) Cladding plank;
- (4) Vertical fold (flange);
- (5) Horizontal fold (core);

(6) Front surface of the Ω -shaped cross-section rail;

(7) Fitting holes of the Ω -shaped cross-section rail;

(8) Back face of the cladding plank;

(9) Slot-fit hook;

Figure 2 shows perspective views from the back of two possible cladding planks: a) with hooks materialising the interlocking system and b) with slot-fit hooks materialising the interlocking system. The representation additionally shows the following reference numerals:

(10) Cladding plank with drainage channels and slot-fit hooks;

(12) Upper drainage channel;

(13) Lower drainage channel;

(14) Back face of the cladding plank with drainage channels and slot-fit hooks;

(15) Back face of the cladding plank with drainage channels and slot-fit hooks;

(16) Slot-fit deformable hook.

Figure 3 illustrates four different possible embodiments of the cladding system for outdoor exterior walls seen through 2D views of its cross-section. All the possibilities are complemented by detailed views of the connection between cladding planks and support rails. The representation additionally shows the following reference numeral:

(11) Cladding plank with drainage channels and slot-fit hooks

(17) Cladding plank without drainage channels and with slot-fit deformable hook.

Figure 4 illustrates two possible embodiments of the external wall cladding system through perspective views from the rear view of the system. Drawings a) and b) in this figure show two different types of fitting system.

Figure 5 illustrates in detail two different types of system for fitting the cladding planks to the support rail. The representation additionally shows the following reference numerals:

(18) Circular section fixing base for the slot-fit hook;

(19) Fixing base of the slot-fit deformable hook;

(20) Slot-fit hook locking ring.

Figure 6 shows the four main steps of a possible way to undock a possible embodiment of a cladding plank, through situations i); ii); iii) and iv), wherein the additional reference number refer to:

(21) Previous position of the back face of the cladding plank;

(22) Previous position of the front face of the cladding plank;

(d) Clear distance for the cladding plank to move upwards;

(h) Distance needed to disconnect the slot-fit hook;

(P) Rotation point for undocking the cladding plank;

(s) Clear distance for the cladding plank to move sideways;

(α) Rotation angle for undocking the cladding plank.

Figure 7 illustrates details from another possible embodiment for the present disclosure, that is a cladding plank fitted with slot-fit hooks with locking tips as means to dock the planks on the Ω -shaped cross-section rail support. In Figure 7 (a) a detail of a cladding plank with its fitting mechanism docked on the support is depicted, in (b) the fitting mechanism in the shape of a slot-fit hook with locking tip is unveiled, in (c) it is shown a detail of the slot-fit hook with locking tip anchored into the Ω -shaped cross-section rail support, and in (d) it is illustrated another perspective of the detail of the same docking shown in (c). The additional reference numerals are according to:

(23) Slot-fit hook with locking tip;

(24) Anti-rotation bracket;

(25) Ramped surface;

(26) Locking tip;

(27) Circular section fixing base for the slot-fit hook with locking tip.

Figure 8 shows a cross-section of a generic wall cladded with a slightly different embodiment than the

one shown in Figure 7 (situation i)) and the five main steps of a possible way to undock this possible embodiment of a cladding plank, through situations ii); iii); iv); v) and vi), wherein the additional reference numbers and letters refer to:

- (28) Initial position of the back face of the cladding plank;
- (29) Position assumed by the back face of the cladding plank in situation iii);
- (30) Sliding line;
- (31) Position assumed by the back face of the cladding plank in situation iv);
- (32) Position assumed by the back face of the cladding plank in situation v);
- (33) Pull direction;
- (θ) Rotation angle for undocking the cladding plank in situation iii);
- (β) Rotation angle for undocking the cladding plank in situation iv);
- (Q) Rotation point.

DETAILED DESCRIPTION

[0069] Referring to the figures, some of the embodiments are now described in more detail, as well as other aspects and advantages of the wall cladding system shown here. The models shown are merely examples and can be varied.

[0070] It should be noted that the dimensions presented here are only the preferred dimensions, although the present disclosure is not restricted to these dimensions.

[0071] The hook forming part of the fixation system is defined by geometric parameters including its width, thickness, engagement length and attack angle, preferably forming a ramped insertion surface. Transitions between surfaces are provided with minimum radii to reduce stress concentration and wear. The engagement length of the hook is selected to be greater than the effective drop depth of the support rail, such that disengagement by vibration is prevented under normal operating conditions, while manual insertion and removal remain possible without excessive force.

[0072] The compensation openings formed in the support rail or associated components are preferably oval and oriented in the principal direction of thermal expansion of the cladding element. The major axis of each opening is dimensioned to be at least equal to the diameter of the engaging element plus the expected thermal movement and a defined assembly clearance. Rounded end contours are provided to reduce crack initiation and fatigue.

[0073] The Ω -shaped support rail is defined by an internal usable width, an accommodation height and a drop depth, as well as retention shoulders and guide zones facilitating insertion. These dimensions are selected to permit reliable engagement of the hook while

limiting residual play. The drop depth is sufficient for the gravitational load of the cladding element to maintain the hook in its seated position. Chamfers or radiused guide surfaces are preferably provided at the entry regions to ensure repeatable and reliable assembly.

[0074] The dimensional relationship between hook, compensation opening and support rail is defined so as to avoid accumulation of tolerances. In particular, the engagement length of the hook is selected to exceed the drop depth of the rail by a defined factor, residual clearance after locking is minimized to prevent noise, and any free movement permitted by the compensation openings is oriented exclusively in the direction of thermal expansion and not in a release direction.

[0075] The locking mechanism may be implemented in several configurations, including eccentric locking rings, rings with tabs or notches, rings with short helical ramps generating axial preload, or rings with detent positions defining stable locked and unlocked states. The locking mechanism is designed to require a minimum release torque exceeding that generated by normal vibration, thereby preventing accidental unlocking.

[0076] The elastic layer arranged at the interface is dimensioned to deform under assembly load to absorb tolerances and generate elastic preload, while maintaining elastic recovery after repeated cycles and stable friction characteristics under exterior environmental conditions. Suitable materials include cork as well as elastomeric or polymeric alternatives such as Ethylene Propylene Diene Monomer (EPDM), Thermoplastic Polyurethane (TPU), Thermoplastic Elastomer (TPE), Nitrile Butadiene Rubber (NBR) or closed-cell foams.

[0077] The system geometry ensures that involuntary disengagement is prevented by the combined action of gravity, geometric retention and friction, with redundancy provided by the locking mechanism. The retention geometry and drop depth are selected such that typical vibrational excitation cannot generate sufficient displacement to overcome the engagement, and the locking mechanism blocks the remaining degree of freedom required for release.

[0078] One embodiment of the present disclosure is a wall cladding system suitable for cladding exterior walls from the outside, although it can be used for cladding internal walls or external walls from the inside. Figure 1 shows two primary elements of one of the possible embodiments that the rapid cladding system can take for cladding preferably external walls on its external side: the support element shown in perspective from its front face in drawing (a) and the cladding element shown in perspective from its rear face in drawing (b). The support element is embodied by an Ω -shaped cross-section rail (2) which is geometrically defined by the existence of two vertical folds - one upper (flange) (4) and one lower (flanges), two side surfaces - horizontal folds (core) (one positioned above (5) and one positioned below) and a front surface (6).

[0079] The horizontal folds (5), as side surfaces, have

fitting holes (7), that can be approximately rectangular with rounded corners, circular or of any other shape compatible with the fitting mechanism, which are designed to receive the elements for fitting the cladding elements. The holes are drilled into that sides of the rail at regular intervals, so that the cladding elements can be fitted in different positions along the length of the rail. These rails can have different thicknesses, although preferably they vary between 1.5 and 2.0mm, while the dimensions of the 'Omega' of their cross-section can be any, but always determined according to the dimensions of the cladding elements they are intended to receive. The material from which they are made is any metallic material that has been suitably treated so that it doesn't oxidise when exposed to the elements. They can preferably be made from recycled steel with the appropriate stainless-steel treatment (galvanised - treatment with zinc hydroxide or by means of a nickel or copper bath). They can be also made of any other material with appropriate resistance and durability.

[0080] The cladding element shown in drawing b), in turn, is a cladding plank (3) which appears as a rectangular parallelepiped of low height. This plank is geometrically described by a rectangular front face (not visible in b), a rectangular back face - back side of the cladding plank (8) - parallel to the front face and of equal dimensions, and four thin faces between the edges of the front and back faces. On the back face of the cladding plank there are, close to each side edge, two fitting mechanisms which are, in the case of this variant of the cladding element, two slot-fit hooks (9). These hooks are configured to fit into the holes in the 'Omega' rails.

[0081] Cladding planks can be made from a variety of materials, as long as they are rigid and dimensionally stable. They are preferably made from wood or a wood derivative that includes wood-cellulose waste from various industries, such as the biomass industry. These planks can be produced in any size that does not compromise their integrity.

[0082] Focusing now on drawing c) of the Figure 1, this represents a generic portion of a wall (1) with the embodiment of the cladding system intended for outdoor spaces, made up of the elements shown in drawings (a) and (b). In this drawing it can be seen that the "Omega" cross-section support rails (2) are fixed to the wall to be clad (1) - either by means of screws and plugs directly into the wall or by using an intermediate support - in a completely horizontal position and in parallel and equally spaced rows, and then the cladding planks (3) are fitted to them by fixing the hooks on the back face, to the holes found in the rails. The planks then tilt slightly and are fixed to the support rail at the bottom by the hooks and at the top through the contact between an upper portion of the front face of each plank and a lower portion of the back face of the plank positioned above.

[0083] Figure 2 illustrates two embodiments of the cladding plank, seen here in perspective from their rear faces. These variants broadly maintain the geometric

characteristics described for cladding plank (3) in Figure 1, although channels have been added that run along its rear and front faces. However, the cladding plank variants shown in Figure 2 differ from each other simply in the fitting mechanism they have on their rear face. As such, drawing (a) shows a cladding plank (10) with drainage channels (12 and 13) and slot-fit hooks (9). The slot-fit hooks (9) are positioned near each end of the board and are inclined in such a way as to force the plank into a slightly inclined position when placed on the support. The preferred material for these hooks is any metallic material as long as it has been properly treated against oxidation and corrosion phenomena. This board has an upper drainage channel (12) on its front face and a lower drainage channel (13) on its back face (14).

[0084] These drainage channels appear as an alternative feature for the system's cladding planks and their function is to collect and channel out of the plank any excess water that may occur in the cladding, due to rain, washing water or humidity phenomena in general. The plank illustrated in drawing (b) has a different fitting mechanism. It is a cladding plank (11) with drainage channels (12 and 13) and slot-fit deformable hooks (16), where the drainage channels have the same function as the drainage channels on plank (10) and where the slot-fit deformable hooks (16), positioned on the back face (15) of the plank, have the same position and similar function as the slot-fit hooks (9) on plank (10). These deformable hooks allow the plank to fit underneath the support rail and are made of deformable material with the capacity to recover elastically from the deformations suffered. The slot-fit deformable hooks (16) work in the same way as a bottle stopper, fitting into the holes in the 'Omega' rails and securing the board below. The hooks have a slight inclination, forcing the board into a slightly inclined position when placed in the support, just like the slot-fit hooks (9) on plank (10) force it.

[0085] Once fitted to the support, the cladding planks will have their upper and lower drainage channels aligned with the lower drainage channels of the board above and the upper drainage channels of the board positioned below, respectively, as can be seen in situations c) and d) in Figure 3.

[0086] Figure 3 shows cross-sectional representations of the cladding system for exterior walls with four possible variants of the cladding board. These variants are embodiments of the present disclosure and are schematically represented in a generic situation cladding a wall (1) and through a detail drawing to make it easier to understand their characteristics. Drawing (a) shows a wall clad with cladding planks without drainage channels and with slot-fit deformable hook (17). Detail i) shows that the slot-fit deformable hook (16) has an approximately spherical head with a diameter greater than the maximum size of the hole in the 'Omega' cross-section support rail (2). Due to the deformability of the material the hook is made of, it passes through the hole and, once fitted, elastically recovers from the deformations induced by passing

through the hole, expands and fixes the board below.

[0087] Drawing (b) illustrates a wall (1) clad with simple planks without drainage channels and with a clip-on mechanism (3). Detail drawing ii) shows the final inclined position of the cladding plank and the stepped appearance produced by the planks as a whole. It also shows that the slot-fit hook (9) is in a tight position to the hole in the Omega-shaped cross-section rail (2), securing the board at the bottom. As for drawings (c) and (d), these represent cladding planks with drainage channels and slot-fit deformable hooks (11) and cladding planks with drainage channels and slot-fit hooks (10). Detail drawings iii) and iv) are similar embodiments as per the detail drawings i) and ii) but wherein the planks have drainage channels.

[0088] Extending the analysis to Figure 4, it shows two drawings that represent in perspective, from the back faces, the set of Omega-shaped cross-section support rails and cladding planks as they are grouped together when cladding a wall. Drawing (a) shows, in detail, the Omega-shaped cross-section rails (2) with the fitting hole for the Omega-shaped cross-section rail (7) providing support and fitting for the slot-fit hooks (9) of the cladding planks in their variant (10). Also visible are the drainage channels that these planks have at the top (upper drainage channel - (12)) and bottom (lower drainage channel (13)) and the way they are grouped together to form a "single" channel that facilitates the drainage of any excess water that may occur in the cladding. This "single" channel is formed due to the scale-like arrangement of the cladding planks, in which a lower portion of a plank overlaps an upper portion of the plank below and so on, in such a way that the upper and lower channels of each plank line up. Drawing b), on the other hand, shows the detail of several cladding planks of variant (11) fitted into the fitting holes for the Omega-shaped cross-section rail (7), using their slot-fit deformable hooks (16) and reveals that the external appearance of the two embodiments is the same.

[0089] Figure 5 shows, in more detail, the fittings of the solutions shown in Figure 4. In drawing (a) it can be seen the slot-fit hook (9) of variant (10) of the cladding plank perfectly fitted and tight to one of the holes (7) in the "Omega"-shaped cross-section rail (2). This fitting are fixed to the back face of the plank by means of its Circular section fixing base for the slot-fit hook (18) and has a slot-fit hook locking ring (20) which "locks" the plank in the desired position and stabilizes it below the support. Drawing b), on the other hand, shows the slot-fit deformable hook (16) of variant 11 of the cladding plank, perfectly fitted into one of the holes (7) of the "Omega"-shaped cross-section support rail (2).

[0090] This hook is fixed to the back face of the plank via the fixing base of the slot-fit deformable hook (19). What both drawings also show is that, in addition to the scaled position of the cladding planks, there is an overlap between a lower portion of the top plank and an upper position of the fitted plank below. This overlap is such that it allows perfect alignment between the lower drainage

channel (13) of the plank positioned above and the upper drainage channel (12) of the plank positioned below, forming a "single" drainage channel, as already mentioned when analysing Figure 4.

[0091] Figure 6 illustrates the four main steps of a possible way to undock a possible embodiment of a cladding plank (3). Initially, as it can be seen by observing illustration i), the cladding plank (3) is docked in one of the Omega-shaped cross-section rails (2) that are fixed to a wall (1), by their slot-fit hooks (9). In this resting position, the cladding plank (3) keeps a clear distance for the cladding plank to move upwards (d), that is longer than the distance needed to disconnect the slot-fit hook (h), illustrated in illustration ii), if the plank slides on the plane where its back face is in. Sliding the plank upwards, in a similar way to what can be seen in illustration ii), will undock the slot-fit hooks (9).

[0092] Then, it is possible to rotate the cladding plank (3) around the rotation point for undocking the cladding plank (P), until the upper edge of the cladding plank's back face touches the wall (1) or one of the portions of the Omega-shaped cross-section rail (2) positioned above. In this position, illustrated through illustration iii), the back and frontal faces of the cladding plank (3) form an angle with the previous position of the back face of the cladding plank (21). That angle - rotation angle for undocking the cladding plank (α), tends to be greater, the greater is the distance of the horizontal fold (core) (5) of the Omega-shaped cross-section rail (2) and smallest, the greater is the inclination the cladding plank is initially positioned (when related to a vertical plane).

[0093] At last, as it is visible in illustration iv), once rotated, the cladding plank (3) can be moved sideways, moving in the clear distance for the cladding plank to move sideways (s), that corresponds to the distance between the previous position of the front face of the cladding plank (22) and the point where the plank's front face touches the lower edge of the back face of the cladding plank positioned above. At this point, the cladding plank (3) is completely displaced. The inverse movements can be done in order to fit a replacement cladding plank.

[0094] Figure 7 shows another possible embodiment of the present disclosure. In this embodiment, the fitting mechanism is a slot-fit hook that exhibits some differences when compared to previous embodiments. Figure 7 (a) shows a cladding plank (3) anchored to a Omega-shaped cross-section rail (2) through the mentioned fitting mechanism, that is a slot-fit hook with locking tip (23). The fitting mechanism is illustrated in detail in Figure 7 (b), which depicts a possible general design. Key components include: the circular-section fixing base (27) for the slot-fit hook with locking tip, which secures the fitting mechanism to the back face of the plank; the anti-rotation bracket (24), which prevents the plank from rotating out of the support; the locking tip (26), which provides additional rotational stability; and the ramped surface (25), which facilitates docking and undocking of the plank by posi-

tioning it within a specific range of angles.

[0095] Figures 7 (c) and (d) show details of the aforementioned fitting of the slot-fit hook with locking tip (23) in the holes (7) of the Ω -shaped cross-section rail (2). The provided details illustrate how the slot-fit hook with locking tip (23) engages with the fitting holes (7) of the Ω -shaped cross-section rail (2). The rail is depicted in cross-section to clearly demonstrate the fitting mechanism. In all four illustrations, the fitting holes (7) are depicted as oval; however, they can also be square, rounded-square, or other shapes. For this particular embodiment of the fitting mechanism, the holes should preferably be of square or oval shape with such dimensions that allow the anti-rotation bracket (24) and the locking tip (26) to contact with the surfaces of the Ω -shaped cross-section rail (2), while they must allow the ramped surface (25) of the hook to slide through the hole contours in such angles that make possible the undocking of the plank.

[0096] In fact, this particular embodiment of the cladding system, uses the interaction between the slot-fit hook with locking tip (23) and the Ω -shaped cross-section rail (2) to dock the plank into the support, in such a way that the anti-rotation bracket (24) prevents the rotation of the plank out of the support, by abutting against the upper surface of the horizontal fold (core) of the Ω -shaped cross-section rail (2), while the locking tip (26) prevents it by abutting against the inner surface of the horizontal fold (core) of the same Ω -shaped cross-section rail (2). Another important aspect of this embodiment, visible in Figure 7 (a), is that the slot-fit hooks with locking tip (23) are positioned in an upper position of the back face of the cladding planks, making it possible to lower the centre of mass of the plank below the height of the support, which avoids the rotation of the plank in the opposite direction, towards the cladded wall.

[0097] Finally, Figure 8 illustrates, through situation (i), the arrangement of the cladding planks (3) that clad a wall (1) in another one of its possible embodiments: the cladding planks (3) with slot-fit hooks with locking tip (23) docked in Ω -shaped cross-section rails (7) fixed to the wall (1). This particular embodiment shows a slightly different slot-fit hook with locking tip (23) than the one seen in Figure 7, as the ramped surface (25) of the hook is positioned directed to the wall and not to the back face of the plank. As it can be seen in this illustration, once again, the cladding planks are disposed in such a way that they form a "fish scale" or stepped configuration.

[0098] Figure 8 also depicts five main steps of a possible way to undock the represented possible embodiment of a cladding plank (3). At the beginning, as it can be seen by observing situation (ii), the cladding plank (3) is docked in one of the Ω -shaped cross-section rails (2) that are fixed to a wall (1), by their slot-fit hooks with locking tip (23). In this resting position, it is possible to see that the fitting mechanism provided by the slot-fit hooks with locking tip (23) is positioned in the upper portion of the cladding plank (3), on its back face, and it also can be seen in close detail, the slot-fit hook with locking tip (23)

docked through the touching of its anti-rotation bracket and its locking tip, in a similar way to the way described before.

[0099] Then, when it is necessary to undock the plank, a rotational movement of the plank can be done around the rotation point (Q), provided by the touching between the anti-rotation bracket and the surface of the rail, as it can be seen in situation (iii). At this point, the back face of the plank forms a rotation angle for undocking the cladding plank (θ) with the initial position of the back face of the cladding plank (28).

[0100] In the following situation (iv), the rotation of the cladding plank (3) is increased with a further rotation angle for undocking the cladding plank (β), which is defined as the angle between the back face of the cladding plank and its previous position in situation (iii) (29). This angle will be greater, the greater is the need for rotation until the flat bottom of the slot-fit hook with locking tip (23) can slide along the border of the fitting hole (7). During the process, it can be necessary to push the plank a bit towards the wall.

[0101] When the flat bottom of the slot-fit hook with locking tip (23) can slide along the border of the fitting hole (7), the plank can be pulled moving according to the pull direction (33) indicated through the arrow illustrated in situation (v), causing the plank to move along the sliding line (30) and moving the position assumed by the back face of the cladding plank in situation (iv) to a new position closer to parallel to this one.

[0102] At last, situation (vi) illustrates the moment when the plank is pulled until the point when the slot-fit hook with locking tip (23) is completely disengaged to the Ω -shaped cross-section rail (7), freeing the plank to be moved out of the wall. Meanwhile, the back face of the plank moved a little bit more to a close to parallel position to the position assumed by this back face in situation (v).

[0103] The inverse movements are valid in order to dock the aforementioned embodiment of the cladding planks (3) in a Ω -shaped cross-section rail (7).

[0104] In order to substantiate the technical effects achieved by the disclosed technology, a series of experimental tests and performance metrics are provided in the form of non-limiting examples. These tests are intended to demonstrate the functional behaviour, reliability and durability of the fixation system under representative mechanical, thermal and environmental conditions.

[0105] A first set of tests was carried out to evaluate the mechanical retention of the system. A single panel and a group of three to five panels arranged in a fish-scale configuration are mounted on the support structure. The extraction force required to remove the panel is measured both in an unlocked state and in a locked state. The tests demonstrate that the removal force in the locked state is significantly higher than in the unlocked state, and that no sudden release occurs when the system is subjected to cyclic loading.

[0106] Vibration tests were performed using both sinusoidal and random excitation over multiple cycles.

During these tests, involuntary rotation of the locking ring is monitored, as well as any increase in residual clearance, wear of the elastic liner and occurrence of hook disengagement. The results show that the locking mechanism remains stable, clearances do not increase significantly, and no unintended disengagement occurs.

[0107] Thermal cycling tests were carried out by subjecting the system to repeated temperature variations, for example between -10 °C and +60 °C, or within another applicable temperature range. During these cycles, displacement within the oval compensation holes is measured, together with the planarity and curvature of the panels. The tests confirm that the engagement remains intact without cracking, warping or loss of retention.

[0108] Wind load resistance is evaluated by applying differential pressure equivalent to wind pressure and suction, either through controlled airflow or equivalent loading equipment. The tests verify the absence of vertical displacement, the integrity of the locking mechanism and the absence of noise caused by panel movement or impact.

[0109] Repeated mounting and removal cycles are performed, typically between 500 and 2000 cycles per engagement point. The insertion and removal forces are monitored over time, together with degradation of the elastic liner and dimensional stability. The results show consistent performance and no significant degradation affecting functionality.

[0110] This section is structured as a test protocol combined with measurable metrics and acceptance criteria, illustrating the repeatability and robustness of the technical effect.

Examples of Implementation of the Technology

[0111] The following non-limiting examples illustrate implementations of the wall cladding system according to the described technology, demonstrating its applicability to different materials, including wood, metal and composite materials, without prejudice to the underlying technical principle.

[0112] In all described embodiments, the system comprises a fish-scale mounting configuration, a hook mechanically associated with a removable panel, an Ω -shaped rail fixed to a substructure, compensation openings for thermal expansion, an elastic compensation layer and a locking mechanism configured to prevent involuntary disengagement. Operation is based on gravitational retention, engagement geometry and the elimination of rigid constraints to expansion, thereby allowing selective mounting, dismounting and replacement of individual elements.

Example 1 - Application to Wooden Panels

[0113] In a first implementation, the system is applied to boards or panels made of natural wood or wood-based derivatives, used as exterior or interior façade cladding.

Wood exhibits significant dimensional variation due to humidity and temperature changes and is particularly susceptible to warping when rigidly fixed.

[0114] In this implementation, the panels are provided with oval openings oriented along the longitudinal direction of the board, allowing controlled relative displacement. The usable travel of the openings is dimensioned to accommodate foreseeable hygroscopic and thermal variations. The hook has an elongated geometry with sufficient engagement depth to ensure gravitational retention, and the Ω -shaped rail defines a drop depth preventing involuntary release.

[0115] An elastic layer based on technical cork is preferably arranged between the hook and the rail, compensating manufacturing tolerances, eliminating play, absorbing vibration and maintaining preload over time. Functional tests demonstrate that the fish-scale arrangement allows each board to expand or contract independently without inducing global warping, while maintaining stable engagement under wind action and humidity cycles.

[0116] Typical boards may have a length of approximately 1.8 m, a thickness of 20 mm and a width of 140 mm. The oval openings may be dimensioned for a base fastener diameter of 8 mm, with a usable travel of 3 to 6 mm and tolerances adapted to wood materials. A drop depth of approximately 12 to 16 mm and a hook engagement length of at least 1.5 times the drop depth are suitable, with a retention inclination not exceeding approximately 12°. The elastic cork layer may have a thickness of 3 to 5 mm and operate under 15 to 25% compression.

[0117] The technical conclusion of this example is that the system allows wood to undergo natural dimensional variation without compromising retention or aesthetic appearance.

Example 2 - Application to Metal Panels

[0118] In a second implementation, the system is applied to metal panels, such as aluminium or steel panels, used in ventilated façades or architectural cladding. Metals exhibit higher coefficients of thermal expansion, resulting in longitudinal displacements of several millimetres in large panels.

[0119] In this implementation, the metal panels include oval openings or elongated slots dimensioned according to the maximum expected thermal expansion. The hook is formed by bending, extrusion or an auxiliary profile rigidly associated with the panel, and the Ω -shaped rail is preferably metallic, produced by extrusion or folding.

[0120] The drop depth of the rail, combined with the weight of the panel, ensures passive retention against wind suction. An elastic layer, for example based on ethylene-propylene-diene-monomer (EPDM), thermoplastic polyurethane (TPU) or polyurethane, is interposed to compensate dimensional variation, avoid rigid metal-to-metal contact and reduce noise and vibration.

[0121] Pressure and suction tests simulating wind loads demonstrate that the panels remain engaged in the rail, with no disengagement and no residual displacement after thermal cycles. Typical panels may have a length of about 2.5 m, a thickness of 2 to 3 mm and a width of approximately 300 mm. Oval openings with a usable travel of at least 4 to 5 mm and tight tolerances suitable for metal are used. The drop depth may range from 10 to 14 mm, with hook engagement lengths of at least twice the drop depth and retention inclinations below approximately 10°.

[0122] The technical conclusion is that, even under significant thermal expansion, the system maintains retention and alignment without rigid fastening.

Example 3 - Application to Composite Material Panels

[0123] In a third implementation, the system is applied to composite material panels, such as wood-plastic composites (WPC), high-pressure laminates (HPL) or fibre-reinforced polymers (FRP), used in façades or modular cladding. These materials are typically stiff, anisotropic and sensitive to stress concentration and delamination when rigidly fixed.

[0124] In this implementation, the panels include compensation openings with rounded contours to reduce crack initiation. The hook and the Ω -shaped rail are dimensioned to distribute loads over an extended area, and the engagement depth is selected to ensure gravitational retention without rigid tightening. An elastic layer made of microcellular polyurethane or thermoplastic elastomer is preferably used, providing additional vibration damping.

[0125] Fatigue and vibration tests show that the system maintains the panel firmly engaged without delamination, noise or degradation of the locking mechanism, even after multiple mounting and dismounting cycles. Typical panels may have a length of about 2.0 m, a thickness of 8 to 12 mm and a width of 200 to 250 mm. Oval openings with rounded corners and a usable travel of 3 to 5 mm are suitable, with tolerances adapted to composite materials. Drop depths of 12 to 18 mm and hook engagement lengths of at least 1.5 times the drop depth are appropriate.

[0126] The technical conclusion is that the system adapts to rigid composite materials without introducing cracking or acoustic issues.

[0127] The above examples demonstrate that the same technical engagement principle is applicable to wood, metal and composite materials. Differences in hygroscopic, thermal and mechanical behaviour are compensated by the combination of compensation openings, hook geometry, Ω -shaped rail configuration and elastic layer. The system ensures gravitational retention, resistance to wind and vibration, and long-term stability without rigid fastening, while allowing individual replacement of elements. These examples confirm industrial applicability, material versatility and the non-obvious

technical effect achieved by the invention.

[0128] The described examples constitute preferred, non-limiting embodiments of the system defined in the claims and demonstrate the practical applicability and repeatability of the technical effect. The metal panel example illustrates adaptation to high thermal expansion and cooperation between hook, Ω -shaped rail and locking mechanism. The composite panel example demonstrates progressive load distribution, mitigation of stress concentration and long-term stability under fatigue. In all cases, only dimensional parameters, tolerances and materials are adapted, without altering the essential functioning defined in the claims.

[0129] Although the present disclosure has been described in considerable detail in the preceding paragraphs and in addition to various embodiments having been disclosed in the attached drawings, it is important to understand it as not limited to what has been written and represented in those same drawings. On the contrary, various other ways of realizing the present disclosure can exist and can occur to those experienced in the art to which this disclosure belongs. Consequently, the spirit and the scope of the appended claims should not be seen as limited to the embodiments, modalities and descriptions disclosed herein. Moreover, numerous modifications and versions of the embodiments shown throughout this document may be devised without departing from the spirit and scope of the present disclosure.

[0130] The term "comprising" whenever used in this document is intended to indicate the presence of stated features, integers, steps, components, but not to preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

[0131] The disclosure should not be seen in any way restricted to the embodiments described and a person with ordinary skill in the art will foresee many possibilities to modifications thereof. The above-described embodiments are combinable.

[0132] The following dependent claims further set out particular embodiments of the disclosure.

Claims

1. Wall cladding system, for application to walls, comprising:

a plurality of cladding planks (3, 10, 11, 17), each one of the plurality of cladding planks comprising

a planar main body comprising a front face and a opposite back face, and
at least two slot-fit hooks (9, 23) fixed to the back face of the planar main body;

a plurality of support rails (2) fixed to a wall or substructure,
each support rail comprises an Ω -shaped cross-

- section and comprising engagement openings; wherein each slot-fit hook is configured to engage one of the engagement openings of a support rail with a defined drop depth such that the weight of the cladding plank generates a gravitational retaining force maintaining the hook in a seated position, the defined drop depth and engagement geometry being selected such that disengagement of the slot-fit hook from the engagement opening is prevented under wind loads, vibrational excitation and ageing-related dimensional variation, while still allowing selective removal of the cladding plank by said sequential movement;
- wherein each slot-fit hook comprises an anti-rotation bracket configured to abut against a surface of the Ω -shaped support rail, and a locking tip configured to abut against an internal surface of the support rail;
- wherein the wall cladding system is configured such that removal of an individual cladding plank requires a sequential movement comprising an upward sliding movement sufficient to disengage the hook from the engagement opening, followed by a rotational movement about a defined rotation point formed by contact between the anti-rotation bracket and the support rail, and a subsequent withdrawal movement substantially perpendicular to the back face of the cladding plank;
- and wherein the elongated compensation openings are provided in at least one of the support rails or an intermediate support element fixed to the wall, said compensation openings being elongated in a direction corresponding to a principal thermal expansion direction of the cladding plank.
2. The wall cladding system according to the previous claim wherein the at least two slot-fit hooks are fixed at an inclined angle relative to the back face of each plank, and positioned near the side edges of the back face on an inferior and/or on a superior longitudinal half of said back face.
 3. The wall cladding system according to any of the previous claims, wherein each support rail is fixed directly to a wall or guided into an intermediate support fixed to a wall.
 4. The wall cladding system according to any of the claims 1-3, wherein the at least two slot-fit hooks are made of a metallic material.
 5. The wall cladding system according to any of the previous claims, wherein each at least two slot-fit hooks comprises a circular-section base (18, 27) for fixing said slot-fit hook to the main body of each cladding plank.
 6. The wall cladding system according to the previous claims wherein, each slot-fit hooks comprises a locking ring (20) for holding the cladding plank in a fixed vertical position.
 7. The wall cladding system according to any of the claims 1-6 wherein the at least two slot-fit hooks has a ramped surface (25) for facilitating docking and undocking of each cladding plank.
 8. The wall cladding system according to any of the previous claims, wherein each cladding plank comprises an upper drainage channel (12) and/or a lower drainage channel (13).
 9. The wall cladding system according to any of the previous claims, wherein the support rails have a thickness from 1.5 to 2 mm.
 10. The wall cladding system according to any of the previous claims, wherein the cladding planks are made from wood or a wood derivative.
 11. The wall cladding system according to any of the previous claims, wherein the cladding planks include an integrated thermal insulation layer.
 12. The wall cladding system according to any of the previous claims, wherein the support rails include integrated guides for managing cabling or conduits within the wall.
 13. The wall cladding system according to any of the previous claims, wherein the cladding plank and/or an intermediate support element associated with the cladding plank comprises elongated compensation openings of oval or oblong shape, said compensation openings being oriented in a direction corresponding to a principal thermal expansion direction of the cladding plank.
 14. A wall comprising the wall cladding system according to any of the previous claims.
 15. A method for docking or undocking a cladding plank according to the wall cladding system of the previous claims 1 to 13, the method comprising:
 - sliding the cladding plank (3, 10, 11, 17) upwards along the plane of its back face to disengage the at least two slot-fit hooks from the corresponding holes of the support elements;
 - rotating the cladding plank about a rotation point (P, Q, β) until the back face of the cladding plank forms an angle (α , θ) with its original position;
 - moving the cladding plank in an substantially

perpendicular direction in relation to its back face to clear a distance (s) required to displace the plank from its mounted position; and performing the inverse steps to dock a replacement cladding plank into the wall cladding system. 5

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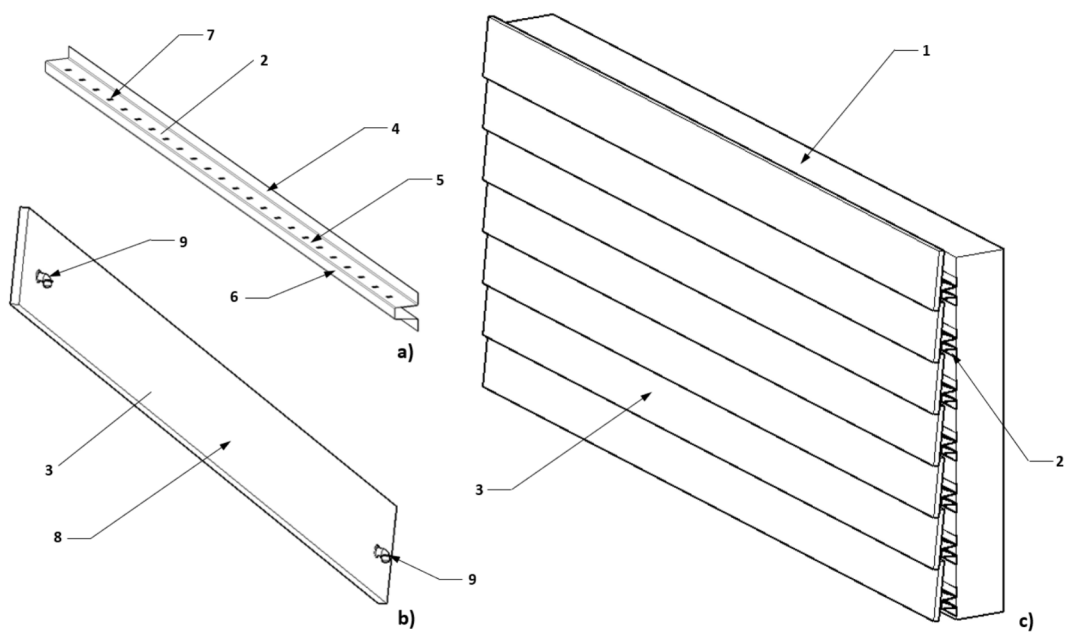


Fig. 1

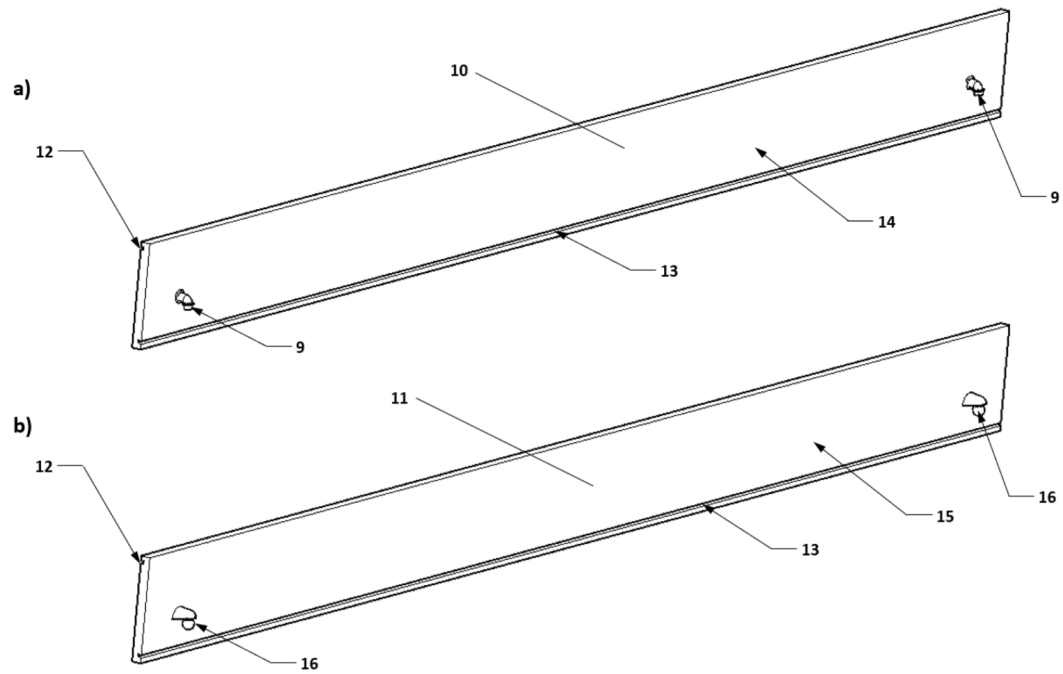


Fig. 2

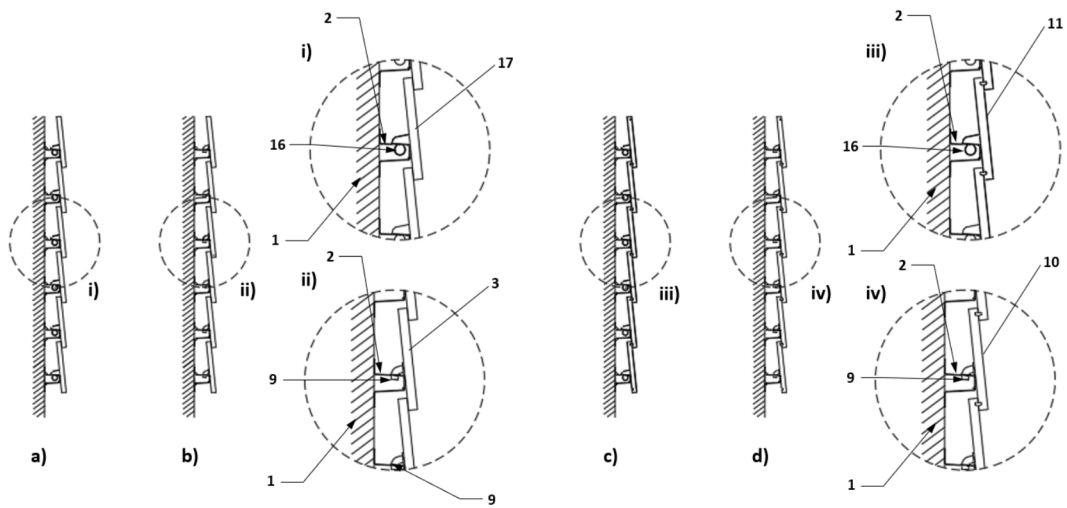


Fig. 3

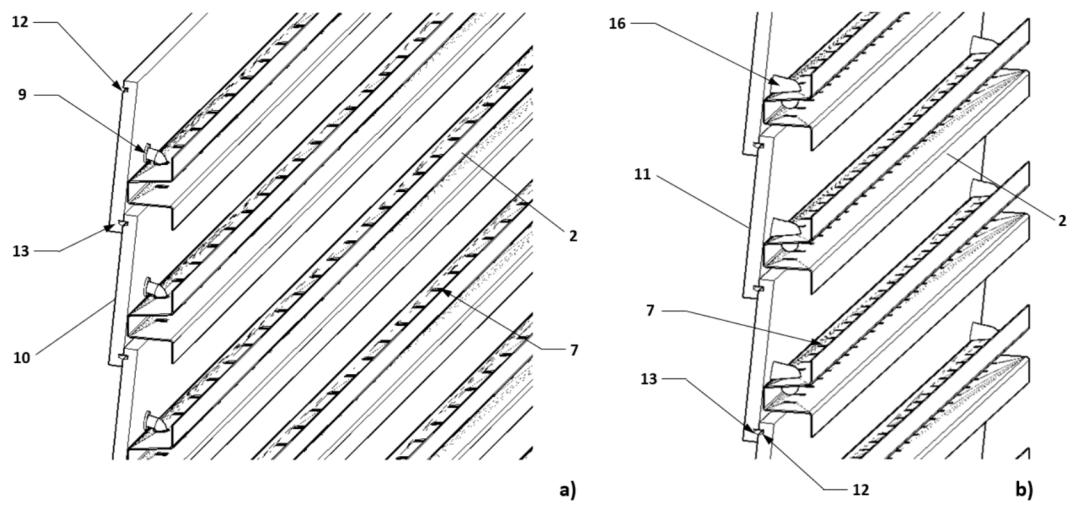


Fig. 4

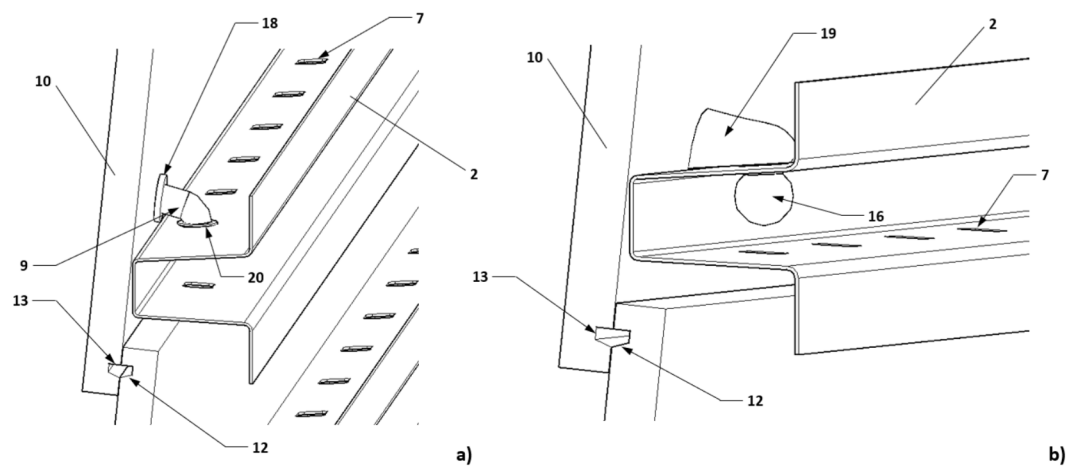


Fig. 5

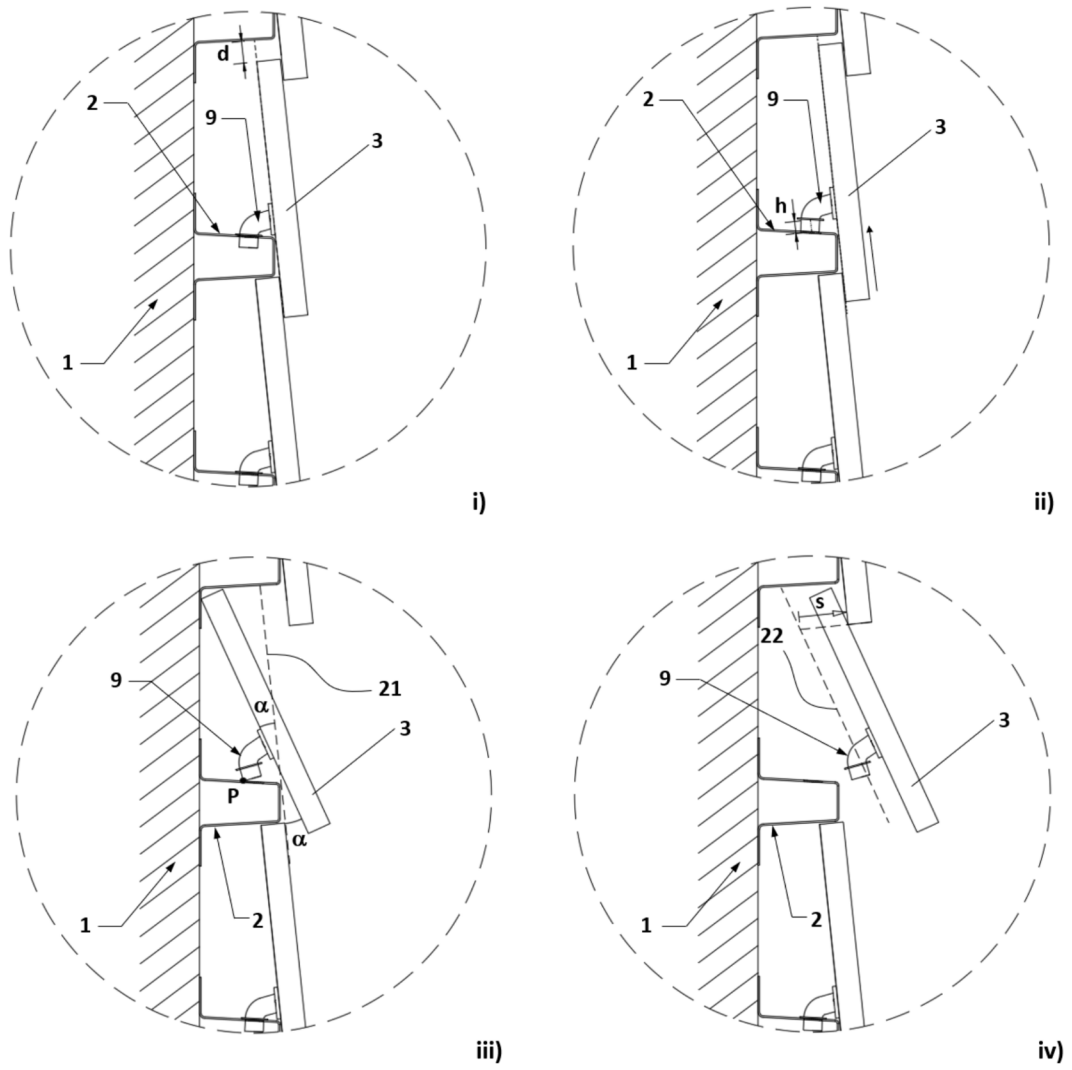


Fig. 6

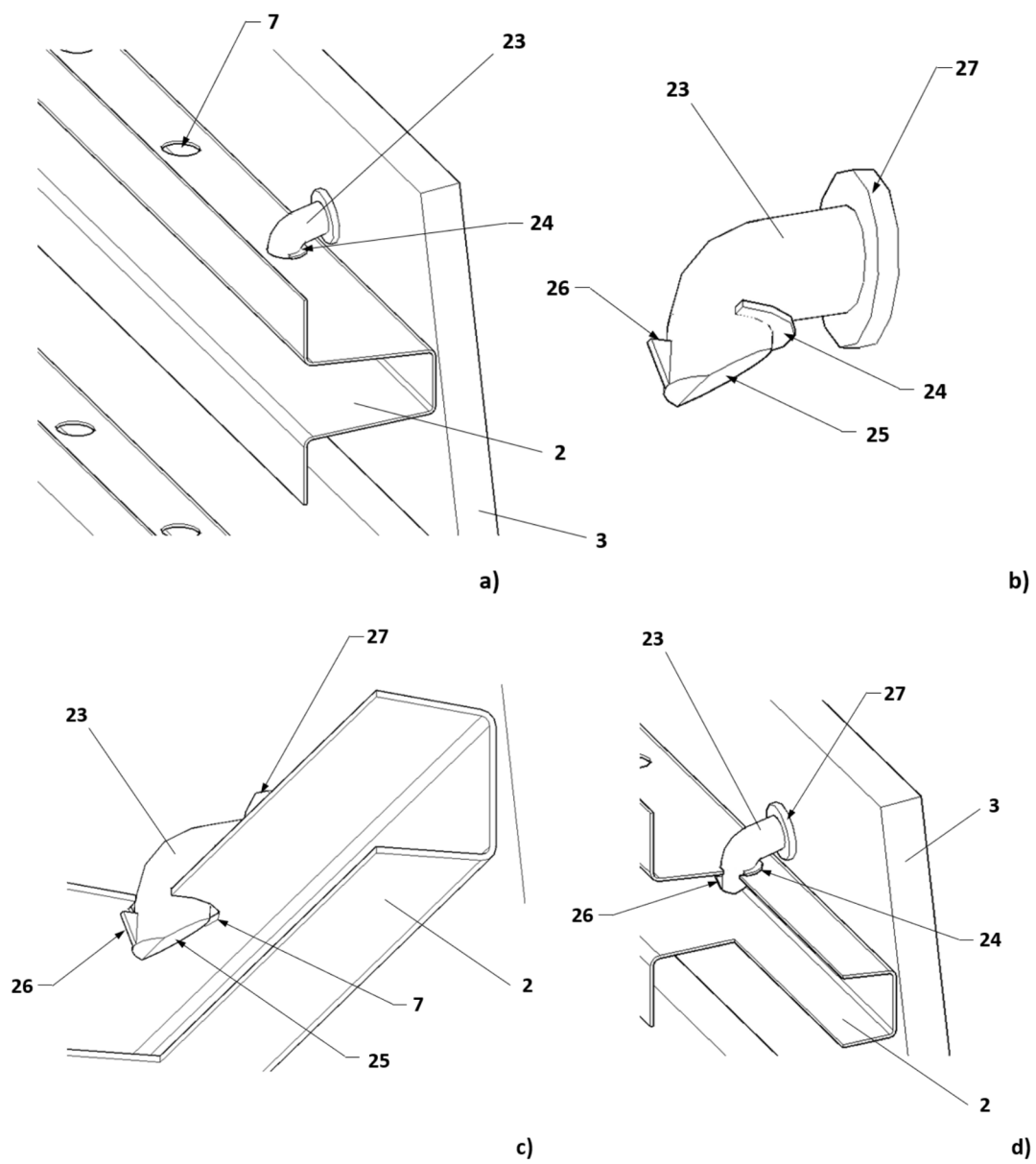


Fig. 7

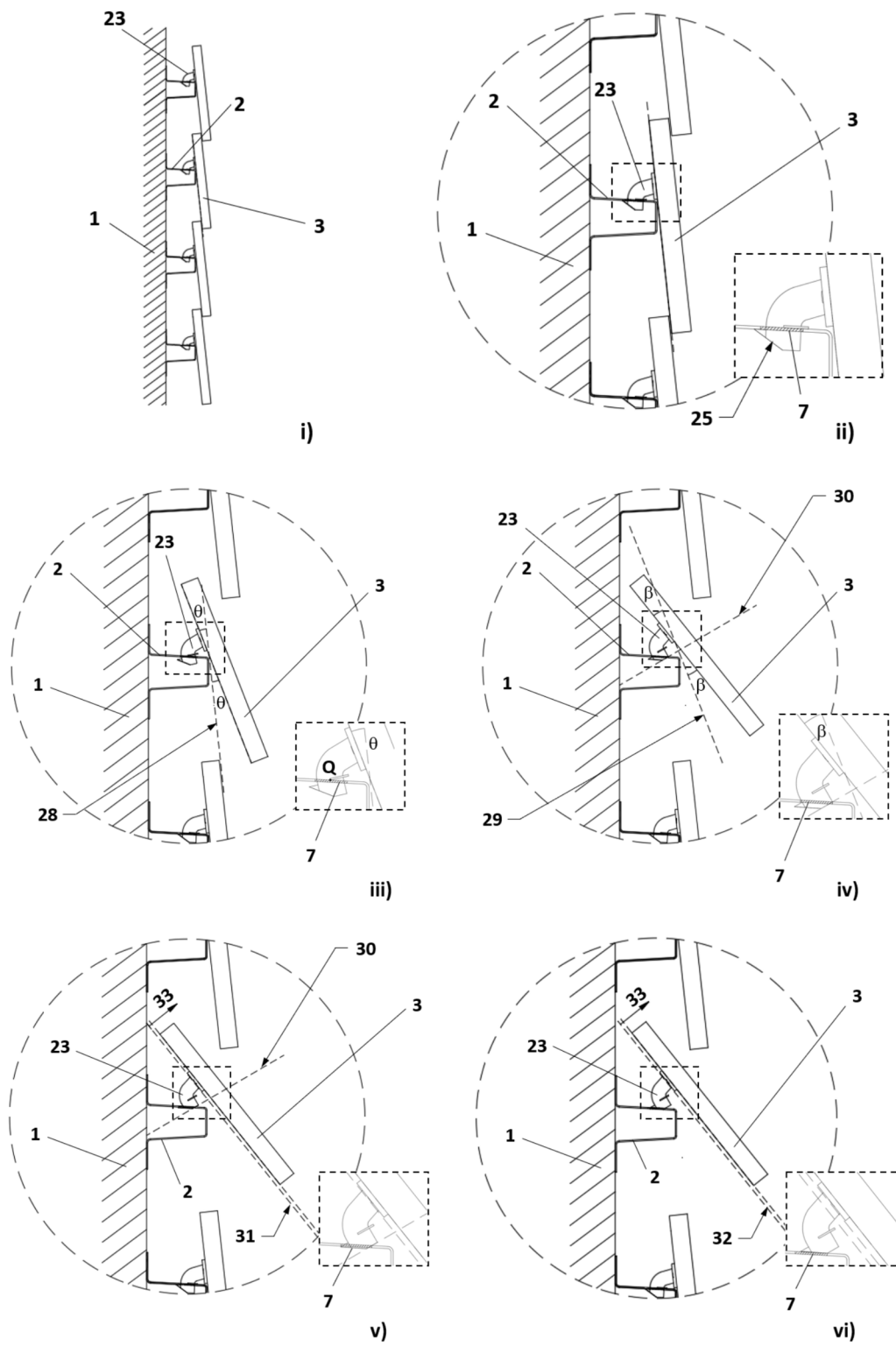


Fig. 8



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