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DESCRIPTION

Field of the Invention

[0001] The invention generally relates to the field of sets of panels for covering floors, ceilings or walls, in particular sets of panels comprising a plurality of panels to be joined at their adjacent edges.

Background of the Invention

[0002] Building panels and in particular floorings used in highly frequented and heavy load environments necessarily need strong locking to prevent opening of the locked edges between two adjacent panels. It is known for such floorings to provide a locking system comprising a locking profile provided to one of the panels along the adjacent edges, wherein said locking profile is manufactured in either plastic materials or a metal material such as aluminum.

[0003] To date and as disclosed in WO98/24994 and WO98/24995, such locking profiles and in particular the metallic locking profiles are manufactured starting from metal sheets punched into a desired shape that is subsequently fixed to a panel along an edge thereof.

[0004] A first drawback of the method and locking mechanism disclosed in the prior art is that mechanically fixing the locking profiles to panels is a very slow process slowing down the entire production process of the panels. Another drawback is that the punching of metal sheets is a slow process providing only very limited design options and requiring large capex for each variation in the design of the locking profiles. Further improvements of this locking system have therefore been rare.

[0005] WO2015/005860 and US2009/0151290 disclose other embodiments of locking profiles comprising non-continuous rims for fixation of the locking profile to the panels. Such locking profiles having the same drawbacks as the ones described supra. WO00/20706 and EP2492416 disclose sets of panels locked to one another by locking profiles having rims interacting with the panels over a larger extent of the panel length, however these locking profiles are manufactured in a (highly) flexible polymeric material that does not allow a high strength fixation of the panels to one another and hence are not suitable for eg. heavy duty flooring systems.

[0006] It is however an object of the present invention to further improve this locking system.

Summary of the Invention

[0007] In a first aspect, the present invention relates to a set of panels (1,2), each panel comprising:

- a top surface (5) and a bottom surface (4);
- a first edge (6) and a second edge (7) parallel to the first edge (6), said edges (6, 7) extending between said top and bottom surfaces (5, 4);
- a first groove (10) provided in the bottom surface (4) of each panel, said first groove (10) extending parallel to and along the first edge (6) of the panel;
- a second groove (11) provided in the bottom surface (4) of each panel, said second groove (11) extending parallel to the first groove (10) along the second edge (7) of the panel;

a locking profile (3) allowing locking a first panel (1) with its first edge (6) to the second edge (7) of a second panel (2), said locking profile (3) comprising a base (16) and at least three protruding rims (17, 18, 19) extending parallel to one another in the longitudinal direction of the locking profile (3), a first rim (17) pressed in the first groove (10) of a first panel (1) and a second rim (18) situated in between the first and third rims (17, 19) of each locking profile (3) and cooperating with a part of the first panel (1) such that a section (13) of the bottom surface (4) of the first panel (1) is permanently clamped between the first rim and the second rim (17, 18) of the locking profile (3), the third rim (19) configured to fit in the second groove (11) of a second panel (2) thereby locking the second panel (2) to the first panel (1), **characterised in that** at least the first rim (17) and the second rim (18) are continuous along the entire length of the locking profile (3) and in that the first groove (10) defines an abutment surface (12) for the first rim (17), which abutment surface (12) is angled in view of the bottom surface (4) such that the section (13) of the first panel (1) clamped between the first rim (17) and the second rim (18) of the locking profile (3) increases in width towards the bottom surface (4) of the panel (1).

[0008] In contrast to the general assumptions in the business of flooring (cf. WO94/26999) Applicant has now surprisingly discovered that by providing a continuous second rim, far greater control of the design of the locking profile and far greater freedom of design of the locking profile can be obtained allowing further improving the locking strength of the locked panels, while at the same time drastically improving production time of the locking profiles and the speed at which the locking profiles can be fixed to the panels.

[0009] In particular, the Applicant has discovered that by manufacturing the locking profile with a continuous second rim, the angles of the rims of the locking profile interacting with the panels can be designed such as to strongly increase the locking strength when compared to locking profiles made of punched metal sheets and that, apart from the increased strength, the locking between adjacent panels with the locking profile according to the invention provides an improved stability of the lock.

[0010] As illustrated in figure 1A, showing a partial view of the bottom side of two assembled panels with a locking profile according to the prior art and in figure 1B, showing a similar view with a locking profile according to the present invention, the present invention does not necessitate a partial damaging (punching) of the locking profile.

[0011] The preferred method of manufacturing the locking profile of the set of panels according to the present invention is by extrusion.

[0012] In a second aspect, the present invention relates to method of manufacturing a set of panels (1, 2), the method comprising:

1. a. providing a first panel (1) having:
 - a top surface (5) and a bottom surface (4);
 - a first edge (6) and a second edge (7) parallel to the first edge (6), said edges (6, 7) extending between said top and bottom surfaces (5, 4);
 - a first groove (10) provided in the bottom surface (4) of each panel (1, 2), said first groove (10) extending parallel to and along the first edge (6) of the panel;
 - a second groove (11) provided in the bottom surface (4) of each panel (1, 2), said second groove (11) extending parallel to the first groove (10) along the second edge (7) of the panel;
2. b. providing a locking profile (3) comprising a base (16) and at least three protruding rims (17, 18, 19) extending parallel to one another in the longitudinal direction of the locking profile (3), wherein at least a first rim (17) and a second rim (18) -situated between a first rim (17) and a third rim (19)- are continuous along the entire length of the locking profile (3);
3. c. positioning the second rim (18) of the locking profile (3) against an abutment surface (15) of the first panel (1);
4. d. pressing the first rim (17) of said locking profile (3) in the first groove (10) of the first panel (1), such that a section (13) of the panel is clamped between the first rim (17) and the second rim (18) of the locking profile (3);
5. e. permanently deforming the first rim (17) of the locking profile (3) by bending it in the direction of the second rim (18) after having pressed the first rim (17) in the first groove (10) of the first panel (1), whereby the first groove (10) defines an abutment surface (12) for the first rim (17), which abutment surface (12) is angled in view of the bottom surface (4) such that the section (13) of the first panel (1) clamped between the first rim (17) and the second rim (18) of the locking profile increases in width towards the bottom surface of the panel (1).

[0013] In a third aspect, the present invention relates to an assembly of panels comprising a set of panels (1, 2) as defined in any of claims 1-12.

Brief Description of the Drawings

[0014]

Figure 1A shows a picture of a partial view of the bottom side of two assembled panels with a

locking profile according to the prior art;

Figure 1B shows a picture of a partial view of the bottom side of two assembled panels with a locking profile according to the present invention;

Figure 2A schematically represents a first panel of the set of panels of the present invention and with

Figures 2A.1, 2A.2 and 2A.3 representing in more detail some specific parts of the first panel and locking profile provided on the first panel as represented in Figure 2A;

Figure 2B schematically shows a method of assembling a set of panels according to the present invention;

Figures 3A-C schematically represent a method of manufacturing a set of panels according to the present invention;

Figures 4, 5A and 6 show a cross-section of locking profiles according to alternative embodiments of the present invention;

Figure 5B shows the locking profile of Figure 5A when provided on a first panel and ready to cooperate with a second panel;

Figure 7A and 7B show an alternative embodiment of figures 2A and 2B respectively;

Figures 8 and 9 show a panel according to the present invention with two alternative configurations for clamping multiple locking profiles thereon.

Detailed Description

[0015] The present invention concerns a set of panels, typically for covering floors, ceilings or walls.

[0016] Figure 2A shows a panel (1) of such a set of panels, with a locking profile (3) clamped thereon. Each panel of the set of panels has a bottom surface (4), a top surface (5) - preferably finished with a decor and/or a wear layer, not shown in the figures - and a plurality of edges extending between the bottom and top surfaces.

[0017] In the embodiment represented in figure 2A, the panels are rectangular shaped with a pair of parallel longitudinal (long) edges (6-7) and a pair of parallel transversal (short) edges (8-9). Along each longitudinal edge (6, 7) a groove is provided in the bottom surface (4) of each panel, a first groove (10) extending parallel to and along the first edge (6) over the entire length of the panel and a second groove (11) extending parallel to and along the second edge (7).

[0018] At its side most proximate to the first edge (6) of the panel, the first groove (10) is partially delimited by a sidewall or abutment surface (12) that at least partially extends slanting in view of the direction normal to the bottom surface (4) such that this sidewall inclines towards the first edge of the panel in a direction from the bottom surface (4) towards the top surface (5) of the panel and as such defines a wedge shaped section (13) in the panel between this sidewall (12) and the first edge (6). In the embodiment represented in Figure 2B, this sidewall (12) comprises two wall parts, a first wall part (12.1), most proximate to the bottom surface (4) of the panel extending substantially parallel to the direction normal to the bottom surface (4) and a second wall part (12.2) slanting in view of the first wall part (12.1) to define the wedge shaped section (13) as described supra.

[0019] Preferably, the first panel (1) further comprises a recess (14) provided in the first edge (6) that in this case is delimited by a sidewall (15) comprising a first part (15.1), most proximate to the bottom surface (4) of the panel extending substantially parallel to the direction normal to the bottom surface (4) and a second wall part (15.2) slanting in view of the first wall part inclined towards the second edge (7) of the panel in a direction from the bottom surface (4) towards the top surface (5) of the panel and as such defines the wedge shaped section (13) in the panel between the first edge (6) and the first groove (10).

[0020] As shown in figure 2B, two panels of the set of panels are coupled to one another along their facing longitudinal edges (6, 7) by means of the locking profile (3). The locking profile (3) comprises a base (16) and at least three protruding rims (17, 18, 19) extending parallel to one another in the longitudinal direction of the locking profile (3). A first rim (17) is lodged in the first groove (10) along the first edge (6) of the first panel and a third rim (19) that, in an assembled state of the set of panels, is lodged in the second groove (11) along the second edge (7) of the second panel. The second rim (18), situated between the first and third rims of the locking profile (3), cooperates with a part of the first edge (6) of the first panel (1), such that a section of the first panel (1) is clamped between the first and second rims (17, 18) of the locking profile. In the embodiment represented in figure 2B, the second rim (18) is situated in the recess (14) provided in the first edge (6) of the first panel (1).

[0021] According to the present invention, both the first rim (17) and the second rim (18) are continuous and extends over the entire length of the locking profile (3). Preferably also the third rims (17, 19) is continuous and extends over the entire length of the locking profile (3).

[0022] As represented in figure 2B, the first rim (17) of the locking profile (3) preferably comprises two parts: a first part (17.1), most proximate to the base (16), extending in a direction substantially normal to the bottom surface (4) of the panel (1) when the locking profile (3) is clamped thereon; and a second part (17.2), most distant from the base (16) that is inclined in view of the first part (17.1) towards the second rim (18) over an angle α ranging between 50° and 90° , preferably between 60° and 70° . When the locking profile (3) is clamped on the first panel (1), the first and second parts (17.1 and 17.2) of the first rim (17) thereby cooperate with, respectively, the first wall part (12.1) and second wall part (12.2) of the first

groove (10). The second rim (18) of the locking profile (3) preferably comprises two parts: a first part (18.1), most proximate to the base (16), extending in a direction substantially normal to the bottom surface (4) of the panel when the locking profile (3) is clamped thereon; and a second part (18.2), most distant from the base (16) that is inclined in view of the first part (18.1) towards the first rim (17) over an angle β ranging between 60° and 80° , preferably between 65° and 75° . When the locking profile (3) is clamped on the first panel (1), the first and second parts (18.1 and 18.2) of the second rim (18) thereby cooperate with, respectively, the first wall part (15.1) and second wall part (15.2) of the recess (14). The above specific design of the first groove (10) and recess (14) of the first panel (1) and of the first and second rims (17, 18) of the locking profile (3) allows obtaining a strong and fail-proof clamping of the locking profile (3) on the first panel (1), whereby accidental release of the locking profile (3) is prevented.

[0023] The third rim (19) of the locking profile (3) preferably comprises two parts: a first part (19.1), most proximate to the base (16) of the locking profile (3); and a second part (19.2), most distant from the base (16). The first part (19.1) is inclined away from the second rim (18) over an angle γ with the base (16) of the locking profile (3) of at least 75° , preferably between 80° - 90° , most preferably between 80° - 86° .

[0024] Alternative to the two part designs of the first, second and third rims (17, 18, 19), any or all can be designed as a rim extending in a same direction over its entire height, in which case this direction is preferably inclined at angles α , β and γ respectively as described hereinabove.

[0025] Preferably, the locking profile (3) is an extruded profile manufactured in a plastic material (e.g. a glass-fiber reinforced plastic material, such as polystyrene) or preferably, in a metal material such as aluminum.

[0026] In order to assemble the set of panels (1, 2) and as represented in Figure 2B, the first panel (1) is positioned in place, with its bottom surface (4) and the base (16) of the locking profile (3) resting on a support surface (not shown). In this position, the part of the locking profile (3) between the second rim (18) and the third rim (19) is exposed and ready to receive an edge portion of the second panel (2). By positioning the second edge (7) of the second panel (2) against the first edge (6) of the first panel (1) and subsequently pressing the second panel (2) towards the support surface, the third rim (19) of the locking profile is pressed in the second groove (11) of the second panel (2) such that it firmly contacts a sidewall (20) of that second groove (11) most proximate to the second edge (7) of the second panel and thereby locks the second panel from moving in view of the first panel in a direction perpendicular to the first and second edges (6, 7) of the first and second panels (1, 2) in the plane of the bottom surfaces (4) of both panels (1, 2). Such locking is commonly addressed as a horizontal lock between the panels.

[0027] The strength of the horizontal lock, defined as the force needed to tear both panels apart in the direction perpendicular to the first and second edges (6, 7) of the first and second panels (1, 2) in the plane of the bottom surfaces (4) of both panels (1, 2), is apart from material

failure of the panels, dependent on the strength of the locking profile.

[0028] When manufacturing the locking profile in aluminum and with a base having a thickness of at least 0,4 mm, for example 0,6 mm, a locking strength F_{MAX} of at least 3 kN/m can be achieved when measured according to ISO24334 (2006), more preferably at least 4 kN/m.

[0029] The thickness of the base (16) and the rims (17, 18, 19) preferably ranges between 0,4 mm and 1,2 mm, preferably between 0,5 mm and 0,8 mm. In some embodiments of the locking profile as explained further, the first and/or second rim may deviate from these ranges.

[0030] In addition hereto it is mentioned that the thickness of the base (16) of the locking profile (3) may vary between a first section (16.1) extending between the first rim (17) and the second rim (18) and a second section (16.2) extending between the second rim (18) and third rim (19).

[0031] For the second section (16.2) the thickness is preferably chosen to allow elastic bending of the locking profile (3) as shown in figure 7B while yet providing sufficient stretch resistance, this to allow easy assembly of the set of panels (1,2) by inserting the second edge (7) of the second panel (2) between the second and third rims (17, 18) of the locking profile (3), whereas the thickness of the first section (16.1) is preferably chosen to provide a desired clamping of the locking profile (3) on the first panel (1).

[0032] As mentioned supra the locking profiles (3) are preferably manufactured by extrusion. Once extruded, the locking profiles (3) are cut to a desired length, whereafter the cutted profiles (3) are stacked by positioning a plurality of locking profiles in a first orientation parallel to one another to create a first layer of locking profiles (3) and subsequently positioning a plurality of locking profiles in a second orientation parallel to one another and perpendicular to the first orientation to create a second layer of locking profiles (3) on top of the first layer of locking profiles. A third layer of locking profiles (3) positioned in the first orientation can subsequently be placed on the second layer of locking profiles and so on, thereby obtaining a cross-stack (21) of locking profiles (3) shown in figure 3A.

[0033] As schematically represented in figure 3A, the locking profiles (3) are subsequently destacked and positioned parallel to one another and in a predetermined position on a conveyor for feeding the locking profiles (3) one by one to a panel-assembly apparatus. In the panel-assembly apparatus, as represented in Figure 3B, one locking profile (3) is first aligned with the first edge (6) of a first panel (1) by positioning the second rim (18) of the locking profile (3) against the first edge (6), preferably against sidewall (15) of the first edge (6), of the first panel (1). Subsequently and as shown in Figure 3C, the locking profile (3) is pressed against the bottom surface (4) of the panel (1), thereby pressing the first rim (17) of the locking profile (3) in the first groove (10) of the first panel (1). This pressing operation is preferably performed by guiding a first press-roll (22) over the locking profile (3).

[0034] Subsequently, as represented in figure 3D, the first rim (17) of the locking profile (3) is

at least partially bent by pressing the first rim (17) firmly against the abutment or sidewall surface (12) of the first groove (10) thereby ensuring that the wedge-shaped section (13) of the first panel (1) is adequately clamped between the first and second rim (17, 18) of the concerning locking profile (3). This pressing is preferably performed by a second press-roll assembly (23) which preferably presses a second part (17.2) of the first rim (17) firmly against or even partially into second wall part (12.2).

[0035] It is preferred that the first rim (17) of the locking profile (3), when extruded, is configured to allow bending the first rim (17) towards the second rim (18), for clamping said locking profile (3) on a panel (1), while still providing sufficient resistance against bending the first rim (17) backwards such that the tensile strength of the locking profile (3), measured in the plane of the base (16) of the locking profile (3) is at least 3 kN/m measured in accordance with ISO24334(2006), preferably at least 4 kN/m.

[0036] According to the present invention, the first rim (17) is permanently deformed by the bending operation. In case the locking profile is manufactured in a plastic material, heat may be applied to the first rim (17) just before, during or after bending the first rim (17) to make the deformation of the first rim permanent thereby ensuring clamping of the locking profile (3) on a panel (1).

[0037] Figures 4-6 represent alternative embodiments of a locking profile (3) of the set of panels according to the present invention.

[0038] The locking profile (3) shown in Figure 4, comprises a base (16) and three protruding rims (17, 18, 19) extending parallel to one another in the longitudinal direction of the locking profile (3). The first rim (17) configured to be lodged in the first groove (10) along the first edge (6) of the first panel (1), in this case comprises a protrusion (24) protruding from the first rim (17) in the direction of the second rim (18). This protrusion (24), positioned at a distance from the base (16) of the locking profile (3), facilitating clamping the locking profile (3) on the first panel (1) as the inclined second part (17.2) of the first rim (17) of the locking profile described with reference to figure 2A.

[0039] The locking profile shown in Figure 5, comprises a base (16) and three protruding rims (17, 18, 19) extending parallel to one another in the longitudinal direction of the locking profile (3). In this embodiment, the second rim (18) comprises a first wing (25) and a second wing (26).

[0040] The first wing (25) is inclined towards the first rim (17) of the locking profile (3) and has the same function of clamping the locking profile (3) on the first panel (1) as the inclined second part (18.2) of the second rim (18) of the locking profile described with reference to Figure 2A. The second wing (26) is inclined towards the third rim (19) and as such defines a groove (27) between the base (16) of the locking profile (3), the second rim (18) and the second wing (26). In this embodiment, the second edge (7) of each panel comprises a recess (28) configured to accommodate the second wing (26). This design of the locking profile (3)

and the second edge (7) of the panels prevents a movement between the first and second panels (1,2) in a direction normal to the bottom surfaces of the panels (commonly referred to as a vertical lock).

[0041] The locking profile (3) shown in Figure 6, comprises a base (16) and three protruding rims (17, 18, 19) extending parallel to one another in the longitudinal direction of the locking profile (3). In this case, the second rim (18) is designed as a composite rim having two or more parallel and spaced apart rims (181, 182) or else can be described as a rim (18) having a central void.

[0042] In this case both spaced apart rims (181 and 182) comprise a wing. The first spaced apart rim (181), situated most proximate to the first rim (17), comprises a wing (25) that is inclined towards the first rim (17) of the locking profile (3). This rim (181) has the same function as the second rim (18) of the locking profile described with reference to figure 2B. The second spaced apart rim (182) located most distant from the first rim (17) comprises a second wing (26), inclined towards the third rim (19) and as such defines a groove (27) between the base (16) of the locking profile (3), the second rim (18) and the second wing (26). Between both spaced apart rims (181) and (182) is a slot (30) comprising in this case a female snap-fit locking means (31), wherein a spacer (32) having a corresponding male snap-fit locking means (33) is disposed. The spacer is positioned between the facing edges (6, 7) of the first and second panels (1,2) locked by the locking profile. Clearly, the locking between spacer (32) and locking profile (3) can be executed in accordance with a multitude of alternatives without departing from the present invention as defined in the appended claims.

[0043] In Figure 7A and 7B an assembly of panels is shown that differs from the embodiment of Figure 2A in that the first and second edges (6, 7) of the panels (1, 2) are configured as a tongue and groove system allowing vertically locking both panels once assembled.

[0044] In the represented embodiment, the tongue is provided on the first edge (6) of the first panel (1), while the groove is provided in the second edge (7) of the second panel (2), yet clearly it is also possible to provide the tongue on the second edge (7) of the second panel (2) and to provide the groove in the first edge (6) of the first panel (1).

[0045] Further it is mentioned that the thickness of the base (16) of the locking profile may vary between a first section (16.1) extending between the first rim (17) and second rim (18) and a second section (16.2) extending between the second rim (18) and the third rim (19).

[0046] For the second section (16.2) the thickness is preferably chosen to allow elastic bending of the locking profile (3) as shown in figure 7B while yet providing sufficient stretch resistance, this to allow easy assembly of the set of panels (1, 2) by inserting the second edge (7) of the second panel (2) between the second and third rims (18, 19) of the locking profile (3), whereas the thickness of the first section (16.1) is preferably chosen to provide a desired clamping of the locking profile (3) on the first panel (1).

[0047] With respect to the detailed description of the invention here above, the facing edges of two adjacent panels have been addressed by the first and second edges (6 and 7), without limitation to the shape of the panels and without specifying, in case the panels are rectangular, whether the concerned first and second edges are longitudinal edges (long edges) or transversal edges (short edges). It is therefore clear that for the above description, no limitation to position or length of the pair of parallel edges was intended.

[0048] Now, in some cases it is desirable to provide locking profiles on more than one pair of facing edges of adjacent panels. As represented in figures 8 and 9, each panel comprises in addition to the above first and second edges (6, 7) and the corresponding locking profile (3):

- a third edge (8) and a fourth edge (9) parallel to the third edge (8), said edges extending between the top surface (5) and bottom surface (4) of the panel (1);
- a third groove (34) provided in the bottom surface (4) of each panel, said third groove (34) extending parallel to and along the third edge (8) of the panel (1);
- a fourth groove (35) provided in the bottom surface (4) of each panel, said fourth groove (35) extending parallel to the third groove (34) along the fourth edge (9) of the panel (1);
- a second locking profile (36) allowing locking a first panel (1) with its third edge (8) to the fourth edge (9) of a third panel, said second locking profile (36) comprising a base (16) and at least three protruding rims (17, 18, 19) extending parallel to one another in the longitudinal direction of the locking profile (36), a first rim (17) disposed in the third groove (34) of a first panel (1) and a second rim (18) situated in between the first and third rims (17, 19) of each second locking profile (36) and cooperating with a part of the first panel (1) such that a section (13) of the first panel (1) is clamped between the first rim (17) and the second rim (18) of the second locking profile (36), the third rim (18) configured to fit in the fourth groove (35) of a third panel thereby locking the third panel to the first panel (1), wherein at least the second rim (18) of the second locking profile (36) is continuous along the entire length of said second locking profile (36).

[0049] In such a configuration, overlapping locking profiles are to be prevented. Therefore it is preferred that the locking profile disposed at a long side of the panel is allowed to extend into the corner region defined by the first and third edges of the panel, whereas the locking profile disposed at the short edge of the panel does not extend into that corner portion or vice versa.

[0050] Further, according to the present invention there is no real limit on the minimum and maximum length of the locking profile disposed along a single side of a panel and lengths varying from 5 cm up to several meters can be envisaged. However, in order to obtain a rigid lock with sufficient F_{MAX} locking strength, it is preferred that in case the locking profile has a length that is a multitude smaller than the length of the side on which it is disposed, a plurality of locking profiles is disposed on that same edge of the panel, with the sum of the lengths of the locking profiles disposed on that edge being equal to or larger than at least 80% of the total length of the concerned side edge.

[0051] For all the above described embodiments, the panels can be made from many different materials or combinations of materials as long as it is feasible to make the retaining profiles as described hereinbefore, on their edges.

[0052] The panels may be wood-based (e.g. solid wood, a fiberboard (MDF, HDF), or a particle board). The panels may also be made of, or at least comprising a layer of, synthetic material. The term "synthetic material" as used in the context of the current invention can be a single polymer or a blend of two or more polymers. The synthetic material can be, for example, a thermoplastic polymer, a thermosetting polymer, a rubber (elastomer), or any combinations thereof. In one particular example, the polymeric material is a thermoplastic polymer that includes vinyl containing thermoplastics such as polyvinyl chloride, polyvinyl acetate, polyvinyl alcohol, and other vinyl and vinylidene resins and copolymers thereof; polyethylenes such as low density polyethylenes and high density polyethylenes and copolymers thereof; styrenes such as ABS, SAN, and polystyrenes and copolymers thereof, polypropylene and copolymers thereof; saturated and unsaturated polyesters; acrylics; polyamides such as nylon containing types; engineering plastics such as polycarbonate, polyimide, polysulfone, and polyphenylene oxide and sulfide resins and the like. The synthetic material compound used to form the panel or a layer thereof can be a PVC powder compound that has good impact strength, ease of processing, high extrusion rate, good surface properties, excellent dimensional stability, and indentation resistance.

[0053] The panels may also comprise composite materials, or one or more layers thereof, such as wood-plastic composites (WPC), referring to a composite structure comprising a wood-based material and a synthetic material. The panel may comprise multiple layers which can be identical or different with respect to composition and/or physical properties.

REFERENCES CITED IN THE DESCRIPTION

Cited references

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Patent documents cited in the description

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PATENTKRAV

1. Sæt af paneler (1,2), hvor hvert panel omfatter:

- en topflade (5) og en bundflade (4);
- en første kant (6) og en anden kant (7) parallelt med den første kant (6), hvilke kanter

(6, 7) strækker sig mellem top- og bundfladerne (5, 4);

- en første not (10) tilvejebragt i hvert panels bundflade (4), hvilken første not (10) strækker sig parallelt med og langs panelets første kant (6);

- en anden not (11) tilvejebragt i hvert panels bundflade (4), hvilken anden not (11) strækker sig parallelt med den første not (10) langs panelets anden kant (7);

- en låseprofil (3), der muliggør låsning af et første panel (1) med dets første kant (6) til et andet panels (2) anden kant (7), hvilken låseprofil (3) omfatter en bund (16) og mindst tre fremstående rande (17, 18, 19), der strækker sig parallelt med hinanden i låseprofilens (3) længderetning, en første rand (17), der er presset i et første panels (1) første not (10), og en anden rand (18), der er placeret mellem hver låseprofils (3) første og tredje rand (17, 19) og samvirker med en del af det første panel (1), således at en sektion (13) af det første panels (1) bundflade (4) er permanent fastspændt mellem låseprofilens (3) første rand og anden rand (17, 18), den tredje rand (19) er konfigureret til at passe i et andet panels (2) anden not (11), hvorved det andet panel (2) låses til det første panel (1), **kendetegnet ved, at** mindst den første rand (17) og den anden rand (18) er fortløbende langs låseprofilens (3) fulde længde, og **ved, at** den første not (10) definerer en anlægsflade (12) for den første rand (17), hvilken anlægsflade (12) er vinklet i forhold til bundfladen (4), således at sektionen (13) af det første panel (1), der er fastspændt mellem låseprofilens (3) første rand (17) og anden rand (18), tiltager i bredde mod bundfladen (4) af panelet (1).

2. Sæt af paneler (1, 2) ifølge krav 1, hvor låseprofilen (3) fremstilles ved ekstrudering.

3. Sæt af paneler (1, 2) ifølge krav 1 eller 2, hvor låseprofilen (3) fremstilles ud af et metalmateriale, fortrinsvis aluminium.

4. Sæt af paneler (1, 2) ifølge et hvilket som helst af de foregående krav, hvor hvert panel omfatter en indskæring (14) i dets første kant (6), hvilken indskæring (14) strækker sig i den første kants (6) længderetning, hvor indskæringen (14) mindst delvist rummer den pågældende låseprofils (3) anden rand (18).

5. Sæt af paneler (1, 2) ifølge et hvilket som helst af de foregående krav, hvor den anden rand (18) hælder mod låseprofilens (3) første rand (17).
6. Sæt af paneler (1, 2) ifølge et hvilket som helst af de foregående krav, hvor den anden rand (18) omfatter to vinger (25, 26) ved dens frie ende, hvor en første vinge (25) hælder mod låseprofilens (3) første rand (17) og strækker sig ind i indskæringen (14) i den første kant (6), og en anden vinge (26) hælder mod låseprofilens (3) tredje rand (19) og strækker sig ind i en indskæring (28), der er tilvejebragt langs et andet panels (2) anden kant (7).
7. Sæt af paneler (1, 2) ifølge krav 1-5, hvor låseprofilens (3) anden rand (18) er en sammensat rand med to eller flere parallelle og adskilte rande (181, 182), der fortrinsvis er konfigureret til at rumme et afstandsstykke (32) efter låsning af det andet panel (2) til det første panel (1) med en prædefineret afstand mellem begge paneler (1, 2).
8. Sæt af paneler (1, 2) ifølge et hvilket som helst af de foregående krav, hvor én eller flere låseprofiler tilvejebringes langs den første kant (6) af et første panel (1), hvor den ene eller flere låseprofiler har en samlet længde, der svarer til eller er større end 80 % af længden på den første kant (6).
9. Sæt af paneler (1, 2) ifølge et hvilket som helst af de foregående krav, hvilke paneler omfatter:
- en tredje kant (8) og en fjerde kant (9), der er parallelle med den tredje kant (8), hvilke kanter (8, 9) strækker sig mellem panelets (1) topflade (5) og bundflade (4);
 - en tredje not (34) tilvejebragt i bundfladen (4) af hvert panel, hvilken tredje not (34) strækker sig parallelt med og langs panelets (1) tredje kant (8);
 - en fjerde not (35) tilvejebragt i bundfladen (4) af hvert panel, hvilken fjerde not (35) strækker sig parallelt med den tredje not (34) langs panelets (1) fjerde kant (9);
 - en anden låseprofil (36), der muliggør låsning af et første panel (1) med dets tredje kant (8) til den fjerde kant (9) af et tredje panel, hvor den anden låseprofil (36) omfatter en bund (16) og mindst tre fremstående rande (17, 18, 19), der strækker sig parallelt med hinanden i låseprofilens (36) længderetning, en første rand (17) prespasset i et første panels (1) tredje not (34) og en anden rand (18), der er placeret mellem hver anden låseprofils (36) første og tredje rand (17, 19) og samvirker med en del af det første panel (1), således at en sektion af det første panels (1) bundflade (4) fastspændes mellem den anden låseprofils (36) første rand (17) og anden

rand (18), den tredje rand (19) konfigureret til at passe i et tredje panels fjerde not (35), hvorved det tredje panel låses til det første panel (1), hvor mindst den anden låseprofils (36) anden rand (18) er fortløbende langs den anden låseprofils (36) fulde længde.

5 **10.** Sæt af paneler ifølge et hvilket som helst af de foregående krav, hvor den første og anden kant (6, 7) er konfigureret til at definere et fer- og notsystem.

11. Fremgangsmåde til fremstilling af et sæt af paneler (1, 2), hvilken fremgangsmåde omfatter:

- 10 a. tilvejebringelse af et første panel (1) med:
- en topflade (5) og en bundflade (4);
 - en første kant (6) og en anden kant (7) parallel med den første kant (6), hvor kanterne (6, 7) strækker sig mellem top- og bundfladerne (5, 4);
 - en første not (10) tilvejebragt i bundfladen (4) af hvert panel (1, 2), hvilken første not
- 15 (10) strækker sig parallelt med og langs panelets første kant (6);
- en anden not (11) tilvejebragt i bundfladen (4) af hvert panel (1, 2), hvilken anden not (11) strækker sig parallelt med den første not (10) langs panelets anden kant (7);
- b. tilvejebringelse af en låseprofil (3), der omfatter en bund (16) og mindst tre fremstående rande (17, 18, 19), der strækker sig parallelt med hinanden i låseprofilens (3) længderetning, hvor mindst en første rand (17) og en anden rand (18) – placeret mellem den
- 20 første rand (17) og en tredje rand (19) – er fortløbende langs låseprofilens (3) fulde længde;
- c. positionering af låseprofilens (3) anden rand (18) mod en anlægsflade (15) af det første panel (1);
- d. presning af låseprofilens (3) første rand (17) i det første panels (1) første not (10),
- 25 således at en sektion (13) af panelet fastspændes mellem låseprofilens (3) første rand (17) og anden rand (18); og
- e. permanent deformering af låseprofilens (3) første rand (17) ved bøjning af den i retningen af den anden rand (18) efter at have presset den første rand (17) i det første panels (1) første not (10), hvorved den første not (10) definerer en anlægsflade (12) for den første rand (17),
- 30 hvilken anlægsflade (12) er vinklet i forhold til bundfladen (4), således at det første panels (1) sektion (13), der er fastspændt mellem låseprofilens første rand (17) og anden rand (18), tiltager i bredde mod panelets (1) bundflade.

12. Samling af paneler omfattende et sæt af paneler (1, 2) som defineret i et hvilket som helst

af kravene 1-10.

DRAWINGS

Fig. 1A

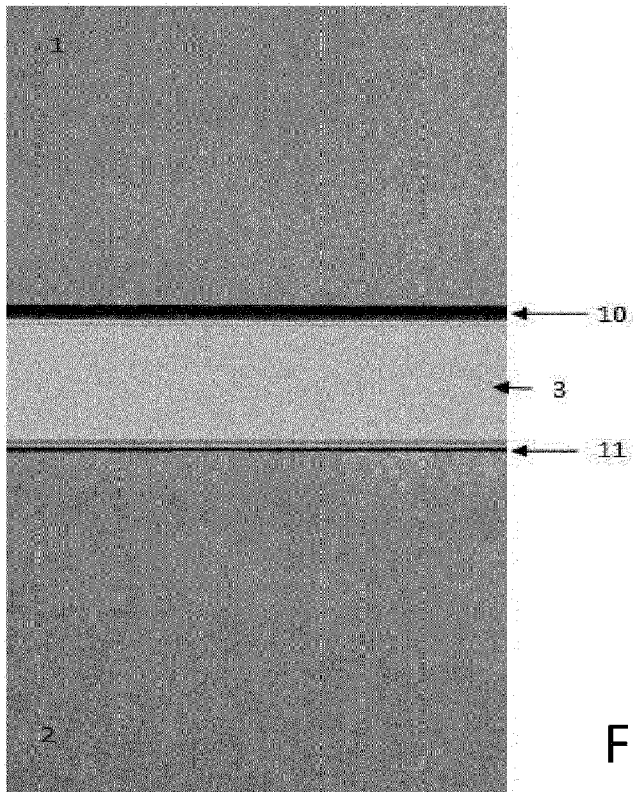
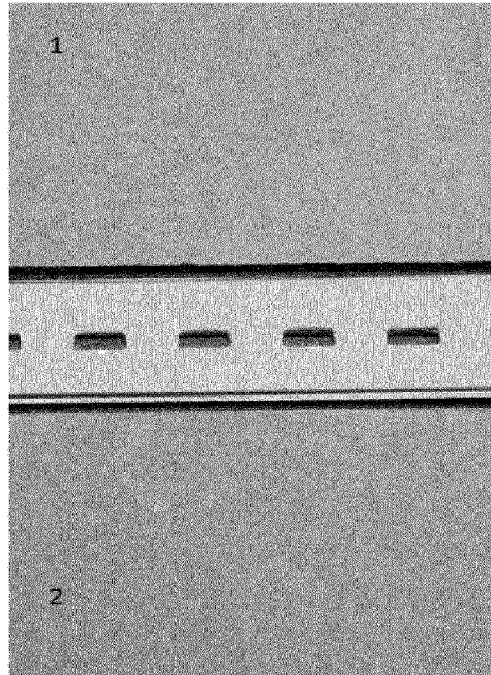


Fig. 1B

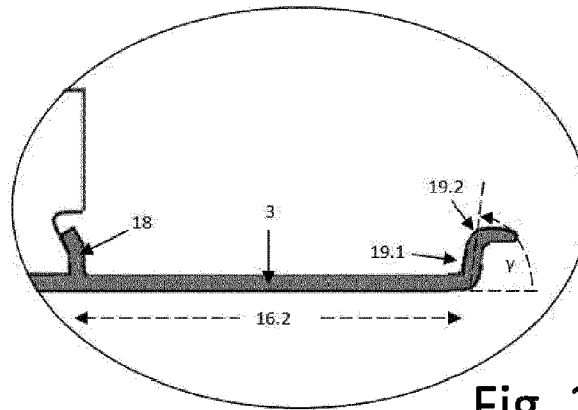


Fig. 2A.1

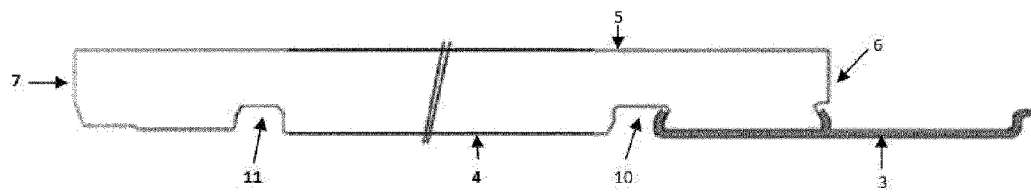


Fig. 2A

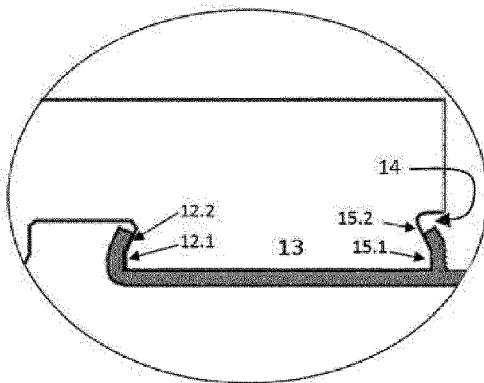


Fig. 2A.2

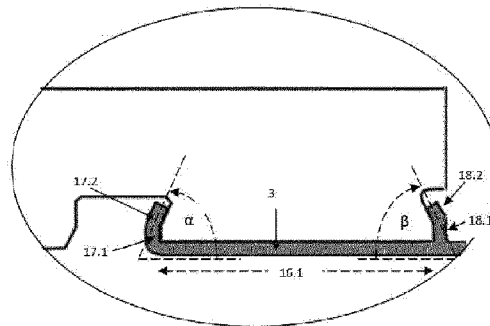


Fig. 2A.3

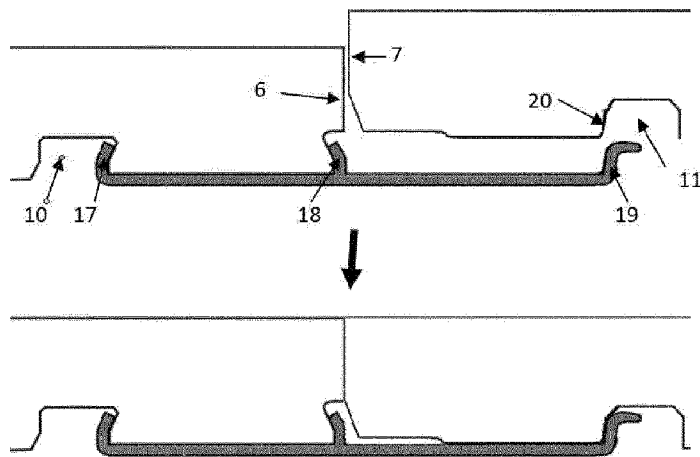


Fig. 2B

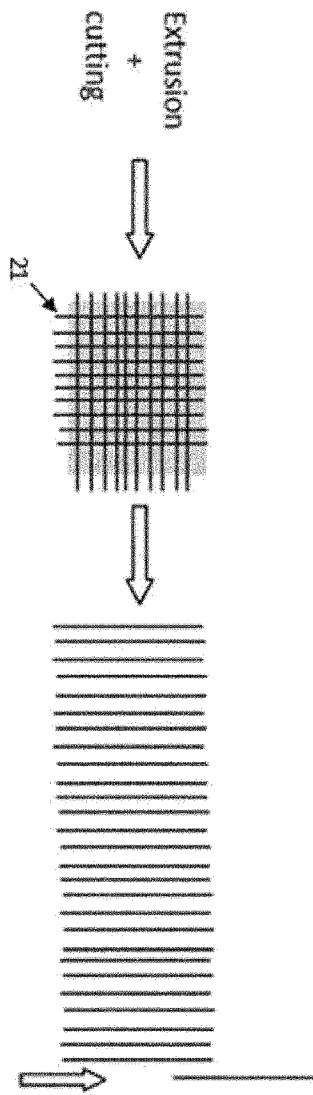
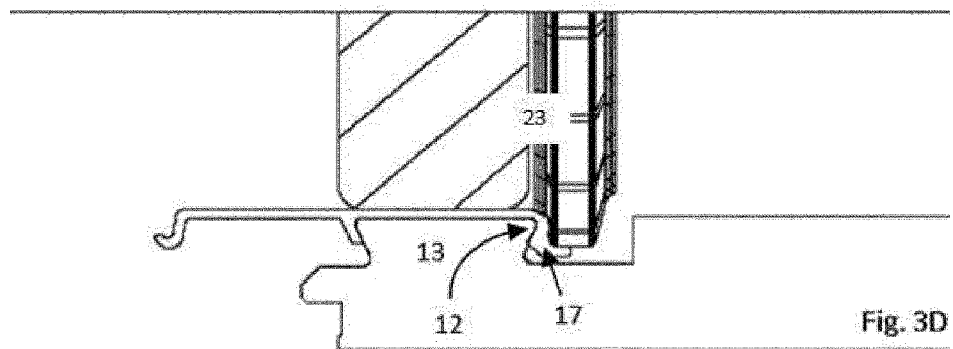
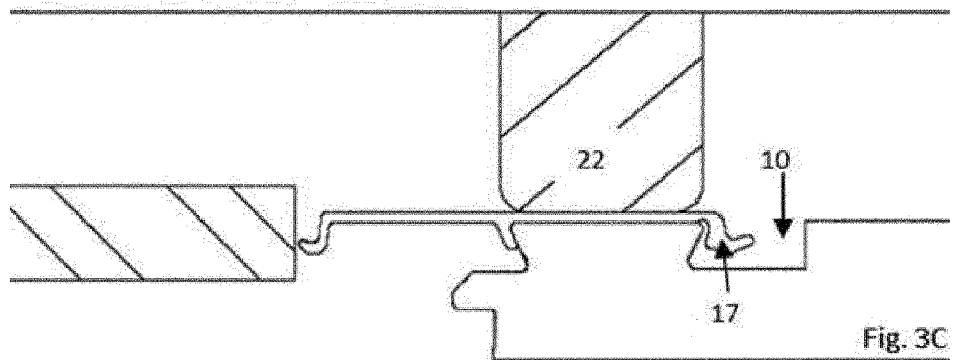
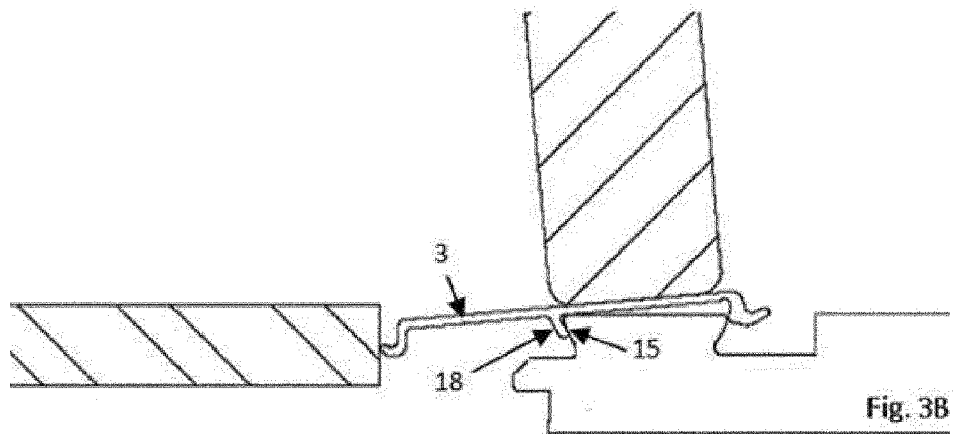


Fig. 3A



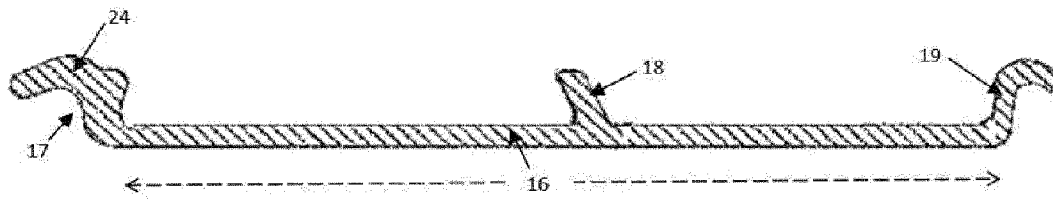


Fig. 4

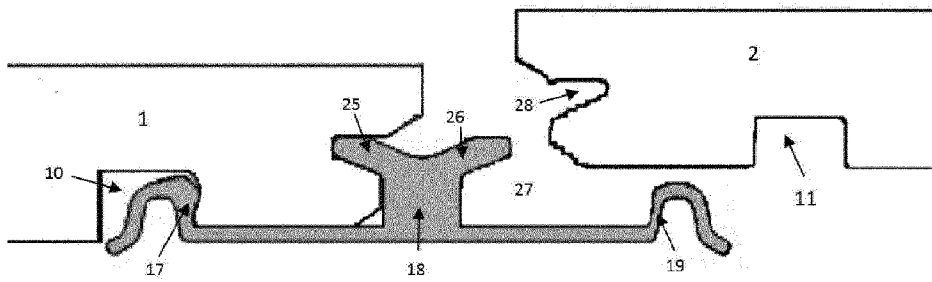


Fig. 5B

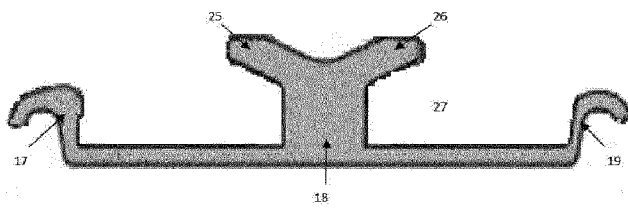


Fig. 5A

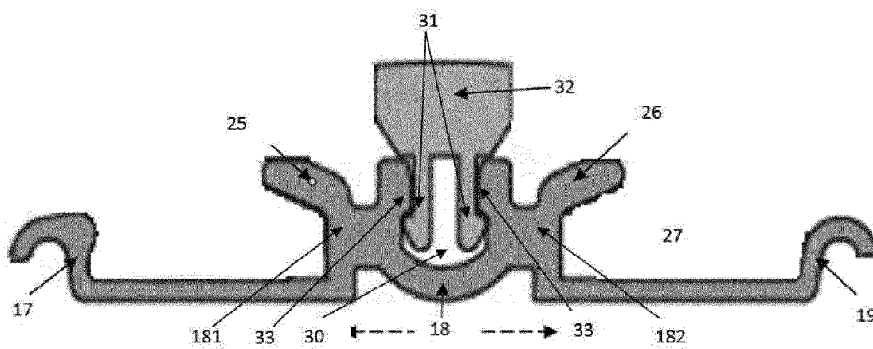


Fig. 6

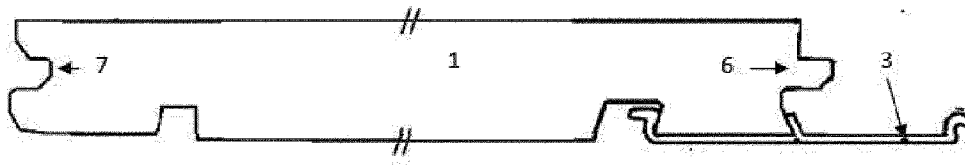


Fig. 7A

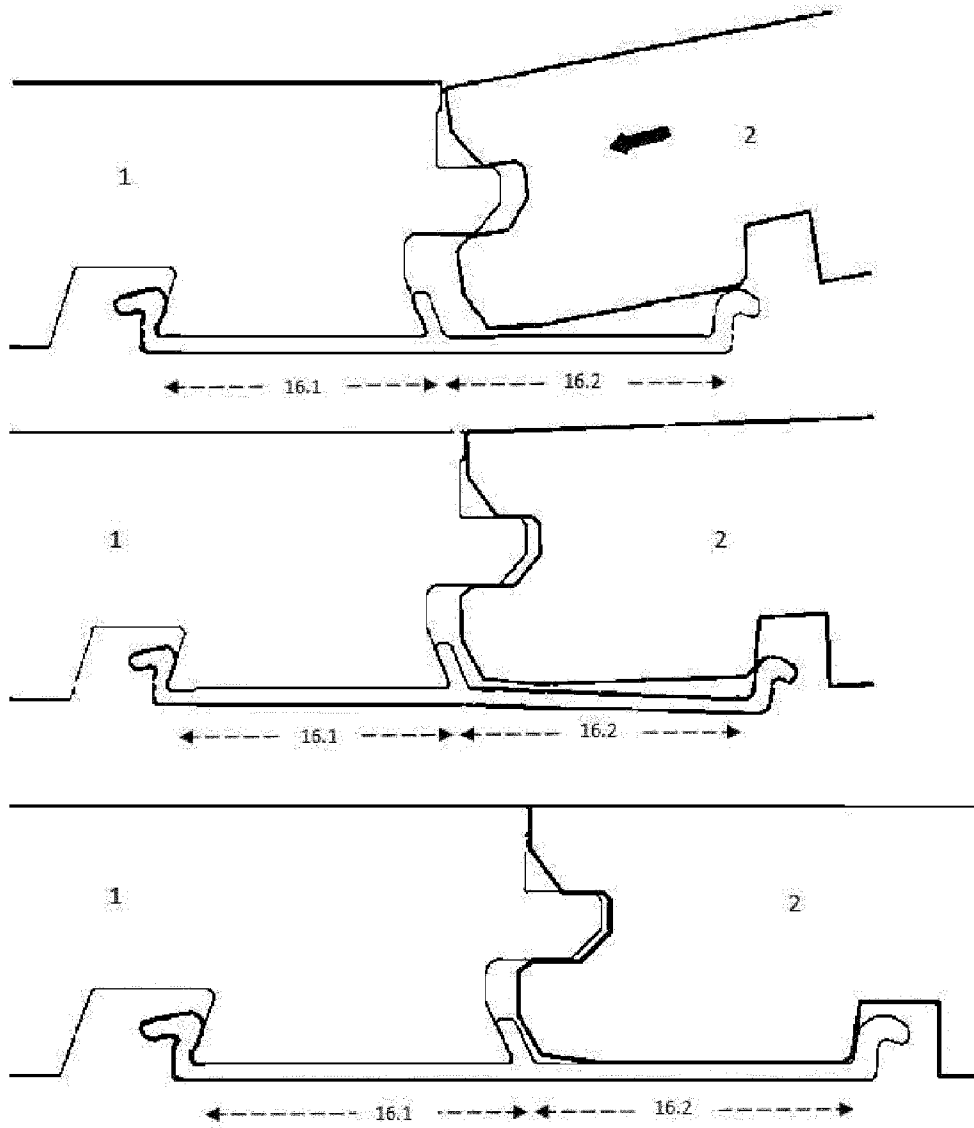


Fig. 7B

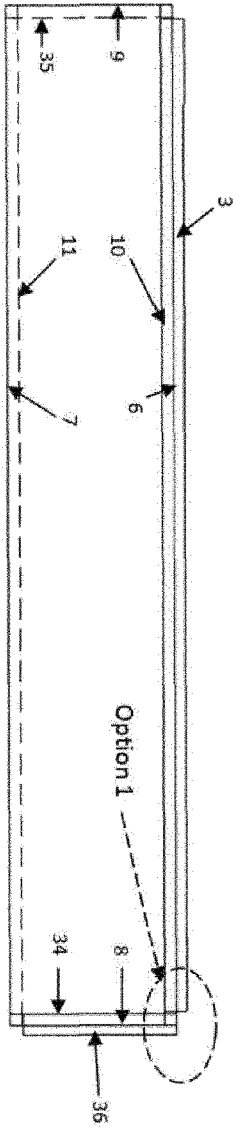


Fig. 8

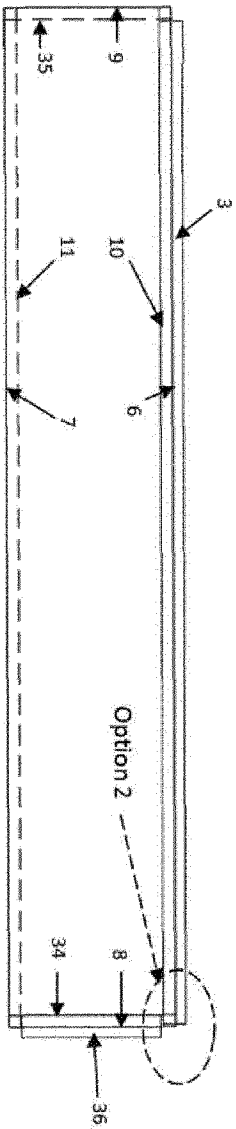


Fig. 9