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(54) **INTERLOCKABLE WALL REINFORCEMENT PANEL, WALL REINFORCEMENT ASSEMBLY AND METHOD FOR WALL REINFORCEMENT**

(57) The invention relates to an interlockable wall panel having a wall panel surface extending in a plane defined by a first and a second direction and having side edges, at least one thereof comprising:

- indentations extending in the plane and inwardly from the side edge and configured to receive an associated projection of a further interlockable wall panel in a mating and interlocking connection configured to prevent in plane-movement; and/or

- projections extending in the plane and outwardly from the side edge and configured to be inserted into an associated indentation of the second or further interlockable wall panel in a mating and interlocking connection configured to prevent in plane-movement;

the projections and/or indentations are configured to be connectable to a further interlocking wall panel in a third direction.

The invention further relates to wall panel assembly, reinforced wall, method for reinforcing a damaged wall and timber frame construction.

INTERLOCKABLE WALL REINFORCEMENT PANEL, WALL REINFORCEMENT ASSEMBLY AND METHOD FOR WALL REINFORCEMENT

5 The invention relates to an interlockable wall reinforcement panel, a wall reinforcement assembly and a method for wall reinforcement.

It is known from practice that buildings with damaged walls, such as buildings with damage due to seismic events, need to be reinforced or, alternatively, broken down to ensure the safety of its inhabitants or users.

10 Damaged walls, especially when caused by seismic events, may show one or more different types of damage. A first type of damage is in-plane damage of the wall, which occurs when parts of the wall are displaced with regard to the other parts. This is often visible as cracks or fissures and can occur in brick walls, concrete walls and, in some cases, even in wooden structures such as timber frame constructions.

15 A second type of damage is the out-of-plane damage, in which parts of the wall structure are displaced transversely to the side surface of the wall. This occurs most often in brick or concrete walls. It is noted that in some cases both types of damage may occur simultaneously in a single wall.

20 In practice, reinforcement of damaged walls comes down to stabilizing the wall structure in-plane, out-of-plane or both by applying a (rigid) timber frame construction against a side, often the building inner side, of the wall. The timber frame is subsequently covered with wooden boards for support and plaster wall boards to provide a straight inner wall.

25 Such a timber frame construction for wall reinforcement has several disadvantages. First of all, a timber frame construction has a relatively high thickness due to the posts that constitute the timber frame. As a result, the inner space of the building is decreased after the timber frame has been placed. In addition, many alterations are required to fit window and/or door posts, (plug)sockets and gas pipes to the new situation, which significantly increases costs.

30 Secondly, the transfer of forces within the stabilizing structure of the wall takes place by transfer from a wall board to a timber frame post and subsequently to the next, adjacent wall board. This results in a high amount of force on the connection means between the different components and requires expensive connections means to withstand these forces.

35 The invention is aimed at obviating or at least reducing the abovementioned disadvantages.

To that end, the invention provides an interlockable wall panel for reinforcing walls, the panel having a wall panel surface extending in a plane defined by a first and a second direction, the wall surface having a number of side edges, wherein at least one of the number of side edges comprises:

- 5 – one or more indentations that extend in the plane and inwardly from the side edge, wherein the one or more indentations are configured to receive an associated projection of a second or further interlockable wall panel in a mating and interlocking connection that is configured to substantially prevent in plane-movement; and/or
- 10 – one or more projections that extend in the plane and outwardly from the side edge, wherein the one or more projections are configured to be inserted into an associated indentation of the second or further interlockable wall panel in a mating and interlocking connection that is configured to substantially prevent in plane-movement; wherein the one or more projections and/or indentations are configured to be connectable to a second or further interlocking wall panel in a third direction.

15 It is noted that the third direction is substantially perpendicular to the plane and/or to the first and second directions.

It is noted that, in this application, the wording interlockable wall panel for wall reinforcement is used interchangeably with other similar wording, such as interlockable wall reinforcement panel, interlockable wall panel, wall panel and interlockable panel, and
20 in general is directed to the same subject unless specifically noted otherwise.

It is furthermore noted that the words 'reinforcement' and 'reinforcing' are used interchangeably with the words 'stability' and 'stabilizing'. In this application, these words may be considered to relate to a change in the structural integrity of a wall.

It is also noted that the word 'indentation' is used interchangeably with the word
25 'recess' in this application and these words are considered to have a similar meaning for the purpose of this application.

Similarly, the wording wall panel assembly may also be used interchangeably with the wording interlockable wall panel assembly, interlockable wall reinforcement panel assembly, wall assembly and panel assembly and in general is directed to the same
30 subject unless specifically noted otherwise.

An advantage of the interlockable wall panel according to the invention is that it has a relatively low thickness, when viewed in the third direction (i.e. perpendicular to the wall), thus leading to a relatively small increase in wall thickness after applying the wall panel. As a result, the cost for adapting window and/or door posts and/or (plug)socket
35 connections to the (only slightly) increased wall thickness is significantly less than for existing solutions.

Another advantage of the interlockable wall panel according to the invention is that, due to the fact that the wall panel is connectable in the third direction, the wall panel (especially when connected with second and/or further wall panels) provides excellent stability both in-plane (parallel to the wall) and out-of-plane (perpendicular to the wall). As a result, an improved stability (or reinforcement) is achieved compared to known solutions.

Another advantage of the interlockable wall panel according to the invention is that, due to the fact that the interlockable wall reinforcement panel according to the invention is connectable to a second or further wall panel in the third direction, the connection is not subjected to tension, stress or deformations during connecting. Although it would in theory be possible to provide a connection that is established in-plane, this would incur at least some stress and/or deformation in the material and would therewith reduce effectiveness of the wall panel. Because deformation does not occur when connecting the wall panel with a second or further wall panel in the third direction, a connection with improved safety is achieved.

Yet another advantage of the interlockable wall panel according to the invention is that, due to the fact that the interlockable wall reinforcement panel is connectable in the third direction, it provides a seamless fit of the projections and/or indentations between the wall panel and second or further wall panels.

Another advantage of the interlockable wall panel according to the invention is that the wall panel is easy to connect to the wall that is to be reinforced.

Yet another advantage of the interlockable wall panel according to the invention is that the wall panel according to the invention can be manufactured at relatively low cost, and may, for example, be manufactured at a central manufacturing plant.

An even further advantage of the interlockable wall panel according to the invention is that the wall panel can be provided in standardized form, yet may also be provided in custom sizes for specific situations. As a result, the interlockable wall panel provides a flexible device for reinforcement of damaged walls and can be applied in most buildings.

In some cases, the interlockable wall panel according to the invention may be manufactured based on a 3D-scan of the walls or walls to be reinforced and may be combined with a number of standardized components, which increases production and delivery speed and reduces costs.

Yet another advantage of the interlockable wall panel according to the invention is that the wall panel may alternatively also be applied to reinforce ceilings and/or floors. To that end, the interlockable wall reinforcement panel may be combined with other

interlockable wall reinforcement panels to construct a 'box' of panels that may reinforce both wall(s) and ceiling and/or floor.

In an embodiment of the interlockable wall panel according to the invention, the interlockable wall panel is not connectable in-plane, yet only connectable in the third direction, and thus not connectable in the first and/or the second direction.

In an embodiment of the interlockable wall panel according to the invention, the interlockable wall panels are connectable to the wall that is to be reinforced using connections means, which for example may comprise screws, bolt-and-nut connectors or other suitable connection means.

Due to the low thickness of the interlockable wall panels (seen in the third direction), the wall panels can easily be connected to the wall that is to be reinforced. This may for example be provided with screws or bolt-and-nut connections, which provide a reliable and strong connection. Due to the fact that the interlockable wall panel is, in use, situated directly adjacent the wall, the connection means may in principle be applied at any location of the wall panel. This provides a significant improvement over the prior art solutions, which necessitates a connection to the timber frame.

In an embodiment of the interlockable wall panel according to the invention, the one or more projections and/or one or more indentations extend, when measured in a third direction that is perpendicular to the plane, over an entire thickness of the interlockable wall panel.

An advantage of providing the projections and/or indentations of the entire thickness of the interlockable wall panel is that it is easy to connect to adjacent wall panels. Another advantage is that it is easier to manufacture, and therefore more cost-effective.

In an embodiment of the interlockable wall panel according to the invention, the interlockable wall panel may only connectable to the second or further interlockable wall panel in the third direction.

An advantage of providing the connectability only in the third direction, that is, only in a direction substantially transverse to the plane formed by the first and second direction, in-plane movement of the connected interlockable wall panels is substantially prevented. This provides a strong resistance against in-plane movement of the wall that is to be reinforced. Surprisingly, it also provides a strong resistance against out-of-plane movement of the wall to be reinforced.

In an embodiment of the interlockable wall panel according to the invention, the interlockable wall panel may comprise a single layer, or may comprise multiple layers.

An advantage of the interlocking wall panel according to the invention is that it can be provided as a single layer or in multiple layers. In most cases, a single layer in itself already provides sufficient support to a damaged wall without substantially increasing the thickness of said wall.

5 In some exemplary cases, an even stronger reinforcement needs to be applied to reinforce the damaged wall. In that case, an interlocking wall panel with an increased thickness or multiple layers, often two layers, of interlocking wall panels are applied. This is especially interesting in case the different layers of wall panels are provided with different sizes of interlockable wall panels, which results in the interlocking projections
10 and/or indentations being positioned at different places in the wall after placement.

In an embodiment of the interlockable wall panel according to the invention, the interlockable wall panel may be manufactured from wood, metal, plastic or a combination of one or more thereof, and preferably may be manufactured from wood, wherein the wood preferably comprises multiplex, oriented strand board (OSB), cross-laminated
15 timber (CLT) or glued laminated timber (GLT).

An advantage of providing the abovementioned materials, and especially wood, is that they can easily be manufactured to the required specifications at a central location, such as a manufacturing plant.

In addition, the panels, especially when manufactured of wood, can be
20 manufactured with a high precision with regard to the specifications.

In an embodiment of the interlockable wall panel according to the invention, a thickness of the interlockable wall panel, when measured in the third direction, may be in the range of 6 – 30 mm, preferably may be in the range 8 – 24 mm, and more preferably may be in the range of 12 – 18 mm.

25 It has been found that panels, especially wood panels, having a thickness that is at any point in the range between 6 – 30 mm is usable to reinforce a wall. It has also been found that wall panels, especially when made of wood or plastic, having a thickness in the range of 12 – 18 mm provide an excellent trade-off between the required reinforcement strength for the wall and the reduction of inner space of the building due to the increase in
30 overall wall thickness.

In addition, in case of wood, it is noted that wood panels for building purposes are often manufactured in standard thicknesses, which include for example 12 mm and 18 mm.

In an embodiment of the interlockable wall panel according to the invention, the
35 connection may be a slidable connection.

In this embodiment, the projection or indentation of the wall panel may be configured to be slidably inserted into an associated indentation or projection of a second or further wall panel. An advantage of sliding the (projections/indentations of the) wall panels together is that it provides a snug fit of the projection in an indentation of a second or further wall panel (or conversely), while at the same time the projections and/or indentations are relatively easy to manufacture.

In an embodiment of the interlockable wall panel according to the invention, the at least one side edge may be provided with a plurality of indentations and projections that are alternately positioned along the side edge.

An advantage of providing a side edge (or multiple side edges) with alternately positioned projections and indentations is that a (semi-)continuous series of projections and indentations is formed that provides a high in-plane and out-of-plane strength to the wall to be reinforced.

Another advantage is that, due to the alternating pattern of projections and indentations, the wall panels can easily be positioned in the correct position with respect to each other before connection them to each other.

In an embodiment of the interlockable wall panel according to the invention, at least two side edges, preferably opposing side edges, of the interlockable wall panel may be provided with one or more indentations and/or one or more projections.

An advantage of providing multiple edges of an interlockable wall panel with one or more projections and/or indentations is that the wall panel can be connected to multiple adjacent wall panels, which provides a completely interlocked series of wall panels that may cover substantially the entire wall. This increased wall stability and improves the reinforcement.

In an embodiment of the interlockable wall panel according to the invention, the interlockable wall panel may substantially be rectangular-shaped or may be substantially square-shaped. Preferably each side edge of the interlockable wall panel may be provided with a plurality of projections and a plurality of indentations that are alternately spaced along the side edge.

Although the interlockable wall panel according to the invention may be provided in substantially any shape, it is preferred to provide it as a rectangular or a square shape.

An advantage of these shapes is that they often match the shape of the wall to be reinforced. In addition, an interlockable wall panel having such abovementioned shape can easily be connected with a mating connection of a second or further panel due to the similar shape.

Another advantage is that rectangular or square interlockable wall panels are easy to transport from a manufacturing site to the place of use.

5 In an embodiment of the interlockable wall panel according to the invention, the one or more projections may have a T-shaped profile, preferably in which the bottom of the T-shaped projection is connected to the side edge of the interlockable wall panel and extends therefrom.

10 An advantage of the abovementioned shape is that allows a seamless fit with a corresponding (but oppositely shaped) indentation of a second or further wall panel (according to the invention). As a result of this seamless fit, in-plane movement, that is movement in the first and/or second direction, is substantially prevented and an improved wall stabilization is achieved. Surprisingly, it has been found that this shape also provides an increase of out-of-plane stability to the wall to be reinforced and increases resistance against (further) out-of-plane damage to the wall.

15 In an embodiment of the interlockable wall panel according to the invention, the indentations have a T-shaped profile, preferably in which the T-shape extends inwardly from the side edge of the interlockable wall panel.

20 An advantage of the abovementioned shape is that allows a seamless fit with a corresponding (but oppositely shaped) projection of a second or further wall panel (according to the invention). As a result of this seamless fit, in-plane movement, that is movement in the first and/or second direction, is substantially prevented and an improved wall stabilization is achieved. Surprisingly, it has been found that this shape also provides an increase of out-of-plane stability to the wall to be reinforced and increases resistance against (further) out-of-plane damage to the wall.

25 In an embodiment of the interlockable wall panel according to the invention, the indentations may have a trapezium-shaped profile, preferably in which the small base of the trapezium-shape is positioned at the side edge of the interlockable wall panel and the large base is positioned inwardly from the side edge, and more preferably wherein the trapezium-shape is a isosceles trapezium shape.

30 An advantage of the abovementioned shape is that allows a seamless fit with a corresponding (but oppositely shaped) projection of a second or further wall panel (according to the invention). As a result of this seamless fit, in-plane movement, that is movement in the first and/or second direction, is substantially prevented and an improved wall stabilization is achieved. Surprisingly, it has been found that this shape also provides an increase of out-of-plane stability to the wall to be reinforced and increases resistance
35 against (further) out-of-plane damage to the wall.

In an embodiment of the interlockable wall panel according to the invention, the projections may have a trapezium-shaped profile, preferably in which the small base of the trapezium-shape is positioned at the side edge of the interlockable wall panel and the projections extends outwardly from the side edge, such that the wide base is located at a distance from the side edge, and more preferably wherein the trapezium-shape is a isosceles trapezium shape.

An advantage of the abovementioned shape is that allows a seamless fit with a corresponding (but oppositely shaped) indentation of a second or further wall panel (according to the invention). As a result of this seamless fit, in-plane movement, that is movement in the first and/or second direction, is substantially prevented and an improved wall stabilization is achieved. Surprisingly, it has been found that this shape also provides an increase of out-of-plane stability to the wall to be reinforced and increases resistance against (further) out-of-plane damage to the wall.

The invention also relates to a wall panel assembly comprising a plurality of interlockable wall panels according to the invention.

The wall panel assembly according to the invention provides similar effects and advantages as the interlockable wall panel according to the invention. The embodiments disclosed above with respect to the interlockable wall panel according to the invention may freely and individually each be combined with the wall panel assembly according to the invention.

In an embodiment of the wall panel assembly according to the invention, the wall panel assembly is configured to cover an entire wall to be reinforced.

It is preferred that the interlockable wall panel assembly covers substantially the entire wall to provide optimal stability.

In an embodiment of the wall panel assembly according to the invention, the interlockable wall panels may be configured to be placed against a single side of a wall that is to be reinforced.

An advantage of connecting the wall panels of the wall panel assembly a single side of the wall that is to be reinforced, is that it provides good wall stabilization, while simultaneously reducing the costs for stabilizing the wall.

In an embodiment of the wall panel assembly according to the invention, the wall panel assembly comprises a first subset of interlockable wall panels that is configured to be connected with a first side wall of a wall that is to be reinforced, and a second subset of interlockable wall panels that is configured to be connected with a second side wall of a wall that is to be reinforced that is opposite the first side wall, such that the first and second subset enclose the wall to be reinforced to form a sandwich structure.

In some cases, a wall may be reinforced by providing a sandwich structure by providing two subsets of interlockable wall panels that are connected to opposite sides of the wall. This provides an even further improved stabilization of the wall to be reinforced/stabilized.

5 In an embodiment of the wall panel assembly according to the invention, the interlockable wall panels that, in use of the assembly, are connected to each other, are substantially immovable with respect to each other in the first and/or the second direction.

An advantage of the wall panel assembly according to the invention is that it provides a rigid structure that prevents movement in the first and the second direction and therewith obviates (further) in-plane damage of the wall. In addition, the rigidity of the wall
10 panel assembly also prevents out-of-plane movement of the wall, therewith (also) obviating further out-of-plane damage to the wall.

In an embodiment of the wall panel assembly according to the invention, the assembly comprises a support subset of interlockable wall panels that is configured to be
15 connected to a ceiling or floor that is to be reinforced, wherein the interlockable wall panels of the support subset have a side edge comprising one or more indentations and/or projections that are shaped to providing a mating and interlocking connection with an interlockable wall panel that extends substantially perpendicular to the plane of an interlockable wall panel of the support subset, wherein the mating and interlocking
20 connection is configured to substantially prevent in plane-movement with respect to the substantially perpendicularly extending wall panel.

An advantage of additionally providing a support subset is that a 'box-like' structure can be created that stabilizes walls and ceilings and/or floors of a building. The use of a box-like structure provides an even higher stabilization to the building (including
25 walls, ceiling and/or floor) due to the increased rigidity of the entire assembly.

Another advantage is that a seamless transition of forces is achieved between the walls on the one hand and the ceiling and/or floor on the other hand.

The invention also relates to a reinforced wall of a building comprising:

- a wall of a building, preferably a damaged wall, having two substantially planar side
30 surfaces and a thickness that is measured between the planar side surfaces; and
- a plurality of interlockable wall panels according to the invention, that is connected to a planar side surface of the wall, and is interlocked with each other, wherein each of the plurality of interlockable wall panels is interlocked with at least one adjacent interlockable wall panel of the plurality of interlockable wall panels.

35 It is noted that the wall thickness is measured between side surfaces and generally is less than a length and/or width of the planar side surfaces.

It is further noted that the reinforced wall may also comprise a wall panel assembly according to the invention (instead of a plurality of wall panels according to the invention).

The reinforced or stabilized wall according to the invention provides all effects and advantages as mentioned for the interlockable wall panel and/or the wall panel assembly according to the invention. The reinforced or stabilized wall according to the invention may therefore freely be combined with embodiments, together or individually, as described for the interlockable wall panel according to the invention.

An advantage of the reinforced wall according to the invention is that, due to the fact that the plurality of wall panels is connected to each other in an interlocking manner and connected to the wall of the building, the wall is provided with an improved stability and therewith has an increased resistance against future (seismic) damage.

In an embodiment of the reinforced wall according to the invention, the plurality of interlockable wall panels may cover substantially the entire planar side surface of the wall to be reinforced.

It is preferred that the interlockable wall panels cover substantially the entire wall to provide optimal stability.

In an embodiment of the reinforced wall according to the invention, the plurality of interlockable wall panels may comprise a first set of interlockable wall panels that is connected to a first planar side surface of the wall, and a second set of interlockable panels that is connected to a second planar side surface of the wall that is opposite the first planar side surface.

It is preferred in this embodiment that both the first and the second set cover substantially the entire planar side surface of the wall to be reinforced.

By providing the wall with two subsets of interlockable wall panels on adjacent side surfaces, an even higher stability of the wall is achieved.

The invention also relates to a method for reinforcing a damaged wall, the method comprising:

- providing a plurality of interlockable wall panels according to one of the clauses 1 – 9, or a wall panel assembly according to any one of the clauses 10 – 14;
- connecting the plurality of interlockable wall panels to the wall to be reinforced and to each other.

The method according to the invention provides similar effects and advantages as the interlockable wall panel, the wall panel assembly and the reinforced wall according to the invention. The embodiments disclosed above with respect to the interlockable wall panel according to the invention may freely and individually each be combined with the method according to the invention.

In an embodiment of the method according to the invention, the step of connecting the plurality of interlockable wall panels to the wall to be reinforced and to each other, comprises:

- placing the plurality of interlockable wall panels against the wall to be reinforced;
- 5 – during placing, interlocking adjacent interlockable wall panels to each other; and
- fixating the plurality of interlockable wall panels to the wall using connection means.

An advantage of positioning, placing and interlocking the interlockable wall panels with respect to each other before fixating them to the wall is that the step of interlocking can be performed in the third direction (i.e. perpendicular to the wall).

10 The invention also relates to a reinforcement construction kit for reinforcing a damaged wall, the construction kit comprising:

- a plurality of wall panels according to the invention, or an assembly according to the invention; and
- connection means adapted for fixating the interlockable wall panels to a wall.

15 The reinforcement construction kit according to the invention provides similar effects and advantages as the interlockable wall panel, the wall panel assembly, the reinforced wall and the method according to the invention. The embodiments disclosed above with respect to the interlockable wall panel according to the invention may freely and individually each be combined with the method according to the invention.

20 It is noted that the interlockable wall panel according to the invention can, in addition to reinforcing or stabilizing, also be used in the construction of new (undamaged) buildings with timber frame construction.

The invention therefore also relates to a timber frame construction comprising:

- a timber frame;
- 25 – a plurality of interlockable wall panels according to the invention that are connected to the timber frame; and
- optionally, plaster boards that are connected to the interlockable wall panels at a side that is opposite from the side to which the timber frame is connected.

30 An advantage of the timber frame construction according to the invention is that it provides increased stiffness compared to traditional timber frame constructions due to the interlockable wall panels according to the invention.

As a result, a timber frame construction according to the invention has an increased resistance against both in-plane and out-of-plane forces acting on the construction. This is, in part, due to the fact that the forces are not only transferred via the
35 connection means that connect the panels to the timber frame, but also via the connection

between the interlocking, mating parts of the interlockable wall panels according to the invention.

The timber frame construction according to the invention provides similar effects and advantages as the interlockable wall panel and the wall panel assembly according to the invention. The embodiments disclosed above with respect to the interlockable wall panel according to the invention may freely and individually each be combined with the timber frame construction according to the invention.

In an embodiment of the timber frame construction according to the invention, the timber frame construction may additionally comprises one or more of: isolation material that is positioned between posts of the timber frame, an isolation layer that is positioned on a side of the interlockable wall panels that is opposite the side that is connected to the timber frame, or a moisture reduction layer.

Further advantages, features and details of the invention are elucidated on the basis of preferred embodiments thereof, wherein reference is made to the accompanying drawings, in which:

Figure 1 shows an example of an interlockable wall panel according to the invention;

Figures 2a and 2b show detailed views of examples of projections and/or indentations of an interlockable wall panel according to the invention;

Figure 3 shows an example of a wall panel assembly according to the invention;

Figure 4 shows a schematic cross-section of a wall that is reinforced using a wall panel assembly according to the invention; and

Figure 5 shows a schematic side view of figure 4.

In an example, interlockable wall panel 2 is a wood board, such as an OSB-board, that extends in a plane defined by first direction x and second direction y. Each side edge 4, 6, 8, 10 of interlockable wall panel 2 is provided with an alternating pattern P of projections 12 and indentations 14. It is noted that the presence of either projections 12 or indentations 14 on side edge 4, 6, 8, 10 automatically incurs the presence of the other of projections 12 and indentations 14.

In more detail (see figures 2a, 2b), it is shown that projections 112, 212 and indentations 114, 214 can have different shapes to achieve the interlocking effect between interlockable wall panel 102 and second or further interlockable wall panels (not shown).

In a first example, projection 112 has a T-shape, with bottom end 112b of the T being connected side edge 104 of interlockable wall panel 102 and upper end 112a projecting from side edge 104. Due to the shape of projection 112, indentation 114 is

automatically provided with an inverted T-shape, in which bottom end 114b points upward in the second direction y and bottom end 114a is positioned at side edge 104. This alternating pattern allows interlockable wall panel 102 to be connected to a second or further interlockable wall panel in the third direction z (not shown) and substantially prevents any movement in the plane formed by first direction x and second direction y.

In a second example (see figure 2b), projection 212 has a trapezium shape in which small base 212b is located at side edge 204 and is connected therewith. Large or wide base 212a is located at some distance outwardly from side edge 204. Indentation 214 has a mirrored position compared to projection 212. This means that small base 214b in this example is located upwardly from side edge 204, whereas wide or large base 214a is formed at side edge 204.

In an example of wall panel assembly 250 (see figure 3), wall panel assembly 250 comprises a plurality of interlockable wall panels 2, 102 that are interlocked with each other. Also shown are wall panel 254, having two 'flat' side edges and two side edges comprising an alternating pattern of projections and indentations, and wall panel 252, which is provided with one 'flat' side edge and three side edges comprising an alternating pattern of projections and indentations. Wall panel assembly 252 can easily be connected to a (not shown) wall to stabilize that wall.

In an example of reinforced wall W (see figures 4 and 5), wall W is reinforced or stabilized using (a plurality of) interlockable wall panels 302 that in this example are positioned on opposite sides W1, W2 of wall W. Interlockable wall panels 302 are in this example connected to wall W using connection means 356, which may for example be a bolt and nut connection. Similarly, ceiling C in this example is stabilized using interlockable wall panels 302'. The connection between interlockable wall panels 302 and interlockable wall panels 302' is in this case enhanced using connection beam 358. This connection beam 358 is however not necessary to achieve the stabilization.

The present invention is by no means limited to the above described preferred embodiments thereof. The rights sought are defined by the following claims within the scope of which many modifications can be envisaged.

CLAUSES

1. Interlockable wall panel for reinforcing walls, the panel having a wall panel surface extending in a plane defined by a first and a second direction, the wall panel surface having a number of side edges, wherein at least one of the number of side edges comprises:

- one or more indentations that extend in the plane and inwardly from the side edge, wherein the one or more indentations are configured to receive an associated projection of a second or further interlockable wall panel in a mating and interlocking connection that is configured to substantially prevent in plane-movement; and/or
 - one or more projections that extend in the plane and outwardly from the side edge, wherein the one or more projections are configured to be inserted into an associated indentation of the second or further interlockable wall panel in a mating and interlocking connection that is configured to substantially prevent in plane-movement;
- wherein the one or more projections and/or indentations are configured to be connectable to a second or further interlocking wall panel in a third direction.

2. Interlockable wall panel according to clause 1, wherein the interlockable wall panel is preferably only connectable to the second or further interlockable wall panel in the third direction.

3. Interlockable wall panel according to one of the preceding clauses, wherein the interlockable wall panel comprises a single layer, or wherein the interlockable wall panel comprises multiple layers.

4. Interlockable wall panel according to one of the preceding clauses, wherein the interlockable wall panel is manufactured from wood, metal, plastic or a combination of one or more thereof, and preferably is manufactured from wood, wherein the wood preferably comprises multiplex, oriented strand board (OSB), cross-laminated timber (CLT) or glued laminated timber (GLT).

5. Interlockable wall panel according to one of the preceding clauses, wherein a thickness of the interlockable wall panel, when measured in the third direction, is in the range of 6 – 30 mm, preferably is in the range 8 – 24 mm, and more preferably is in the range of 12 – 18 mm.

6. Interlockable wall panel according to one of the preceding clauses, wherein the connection is a slidable connection.

7. Interlockable wall panel according to one of the preceding clauses, wherein at least one side edge is provided with a plurality of indentations and projections that are alternately positioned along the side edge.

8. Interlockable wall panel according to one of the preceding clauses, wherein at least two side edges, preferably opposing side edges, of the interlockable wall panel are provided with one or more indentations and/or one or more projections.

9. Interlockable wall panel according to one of the preceding clauses, wherein the interlockable wall panel is substantially rectangular-shaped or substantially square-shaped, and wherein preferably each side edge of the interlockable wall panel is provided with a plurality of projections and a plurality of indentations that are alternately spaced along the side edge.

10. Wall panel assembly comprising a plurality of interlockable wall panels according to any one of the preceding clauses.

11. Wall panel assembly according to clause 10, wherein the interlockable wall panels configured to be placed against a single side of a wall that is to be reinforced.

12. Wall panel assembly according to clause 10, wherein the wall panel assembly comprises:

- a first subset of interlockable wall panels that is configured to be connected with a first side wall of a wall that is to be reinforced; and
- a second subset of interlockable wall panels that is configured to be connected with a second side wall of a wall that is to be reinforced that is opposite the first side wall; such that the first and second subset enclose the wall to be reinforced to form a sandwich structure.

13. Wall panel assembly according to one of the clauses 10 – 12, wherein, in use of the assembly, interlockable wall panels that are connected to each other, are substantially immovable with respect to each other in the first and/or the second direction.

14. Wall panel assembly according to one of the clauses 10 – 13, wherein the assembly comprises a support subset of interlockable wall panels that is configured to be connected to a ceiling or floor that is to be reinforced, wherein the interlockable wall panels of the support subset have a side edge comprising one or more indentations and/or projections that are shaped to providing a mating and interlocking connection with an interlockable wall panel that extends substantially perpendicular to the plane of an interlockable wall panel of the support subset, wherein the mating and interlocking connection is configured to substantially prevent in plane-movement with respect to the substantially perpendicularly extending wall panel.

15. Reinforced wall of a building comprising:

- a wall of a building, preferably a damaged wall, having two substantially planar side surfaces and a thickness that is measured between the planar side surfaces; and
- a plurality of interlockable wall panels according to any one of the clauses 1 – 9 that is connected to a planar side surface of the wall, and is interlocked with each other, wherein each of the plurality of interlockable wall panels is interlocked which at least one adjacent interlockable wall panel of the plurality of interlockable wall panels.

16. Reinforced wall according to claim 15, wherein the plurality of interlockable wall panels comprise:

- a first set of interlockable wall panels that is connected to a first planar side surface of the wall; and
- a second set of interlockable panels that is connected to a second planar side surface of the wall that is opposite the first planar side surface.

17. Method for reinforcing a damaged wall, the method comprising:

- providing a plurality of interlockable wall panels according to one of the clauses 1 – 9, or a wall panel assembly according to any one of the clauses 10 – 14;
- connecting the plurality of interlockable wall panels to the wall to be reinforced and to each other.

18. Method for reinforcing a damaged wall according to clause 17, wherein the step of connecting the plurality of interlockable wall panels to the wall to be reinforced and to each other, comprises:

- placing the plurality of interlockable wall panels against the wall to be reinforced;
- during placing, interlocking adjacent interlockable wall panels to each other; and

- fixating the plurality of interlockable wall panels to the wall using connection means.

19. Reinforcement construction kit for reinforcing a damaged wall, the construction kit comprising:

- 5 – a plurality of wall panels according to one of the clauses 1 – 9, or an assembly according to any one of the clauses 10 – 14;
- connection means adapted for fixating the interlockable wall panels to a wall.

20. Timber frame construction for a building, comprising:

- 10 – a timber frame;
- a plurality of interlockable wall panels according to any one of the clauses 1 – 9, or an assembly according to any one of the clauses 10 – 14, that are connected to the timber frame; and
- optionally, plaster boards that are connected to the interlockable wall panels at a side
- 15 that is opposite from the side to which the timber frame is connected.

CONCLUSIES

1. Aaneenkoppelbaar muurpaneel voor het stabiliseren van muren, waarbij het paneel is voorzien van een muurpaneeloppervlak dat zich uitstrekt in een vlak dat is
5 gedefinieerd door een eerste en een tweede richting, waarbij het muurpaneeloppervlak een aantal zijranden heeft, waarbij ten minste één van het aantal zijranden omvat:

– één of meer insparingen die zich in het vlak en inwaarts van de zijrand uitstrekken, waarbij de één of meer insparingen zijn ingericht voor het ontvangen van een geassocieerde projectie van een tweede of verder aaneenkoppelbaar muurpaneel in
10 een passende en aaneengekoppelde verbinding die is ingericht voor het in hoofdzaak voorkomen van in-vlak beweging; en/of

– één of meer projecties die zich in het vlak en uitwaarts van de zijrand uitstrekken, waarbij de één of meer projecties zijn ingericht om invoegbaar te zijn in een geassocieerde insparing van een tweede of verder aaneenkoppelbaar muurpaneel in
15 een passende and aaneengekoppelde verbinding die is ingericht voor het in hoofdzaak voorkomen van in-vlak beweging;

waarbij de één of meer projecties en/of insparingen zijn ingericht om verbindbaar te zijn met een tweede of verder aaneenkoppelbaar muurpaneel in een derde richting.

20 2. Aaneenkoppelbaar muurpaneel volgens conclusie 1, waarbij het aaneenkoppelbaar muurpaneel bij voorkeur slechts verbindbaar is aan het tweede of verdere aaneenkoppelbaar muurpaneel in de derde richting.

3. Aaneenkoppelbaar muurpaneel volgens één der voorgaande conclusies, waarbij
25 het aaneenkoppelbare muurpaneel een enkele laag omvat, of waarbij het aaneenkoppelbare muurpaneel meerdere lagen omvat.

4. Aaneenkoppelbaar muurpaneel volgens één der voorgaande conclusies, waarbij het aaneenkoppelbare muurpaneel is vervaardigd uit hout, metaal, kunststof of een
30 combinatie van één of meer daarvan, en bij voorkeur is vervaardigd uit hout, waarbij het hout bij voorkeur multiplex, georiënteerd vezelboard (OSB), kruisverlijmd hout (CLT) of gelamineerd verlijmd hout (GLT) omvat.

5. Aaneenkoppelbaar muurpaneel volgens één der voorgaande conclusies, waarbij
35 een dikte van het aaneenkoppelbare muurpaneel, gemeten in de derde richting, in het

bereik van 6 – 30 mm, bij voorkeur in het bereik van 8 – 24 mm, en meer bij voorkeur in het bereik 12 – 18 mm.

6. Aaneenkoppelbaar muurpaneel volgens één der voorgaande conclusies, waarbij de verbinding een schuifverbinding.

7. Aaneenkoppelbaar muurpaneel volgens één der voorgaande conclusies, waarbij de ten minste één zijrand is voorzien van een veelvoud aan insparingen en projecties die afwisselend gepositioneerd zijn langs de zijrand.

8. Aaneenkoppelbaar muurpaneel volgens één der voorgaande conclusies, waarbij ten minste zijranden, bij voorkeur tegenoverliggende zijranden, van het aaneenkoppelbaar muurpaneel zijn voorzien van één of meer insparingen en/of één of meer projecties.

9. Aaneenkoppelbaar muurpaneel volgens één der voorgaande conclusies, waarbij het aaneenkoppelbaar muurpaneel in hoofdzaak rechthoekig of vierkant gevormd is, en waarbij bij voorkeur elke zijrand van het aaneenkoppelbaar muurpaneel is voorzien van een veelvoud aan projecties en een veelvoud aan insparingen die afwisselend geplaatst zijn langs de zijrand.

10. Muurpaneelsamenstel omvattende een veelvoud aan aaneenkoppelbare muurpanelen volgens één der voorgaande conclusies.

11. Muurpaneelsamenstel volgens conclusie 10, waarbij de aaneenkoppelbare muurpanelen zijn ingericht om tegen een enkele zijde van een te stabiliseren muur geplaatst te worden.

12. Muurpaneelsamenstel volgens conclusie 10, waarbij het muurpaneelsamenstel omvat:

- een eerste subreeks van aaneenkoppelbare muurpanelen die is ingericht om verbonden te worden met een eerste zijkant van een te stabiliseren muur; en
- een tweede subreeks van aaneenkoppelbare muurpanelen die is ingericht om verbonden te worden met een tweede zijkant van een te stabiliseren muur die tegenover de eerste zijkant is gelegen;

zodanig dat de eerste en de tweede subreeks de te stabiliseren muur omsluiten voor het vormen van een sandwich-structuur.

13. Muurpaneelsamenstel volgens één der conclusies 10 – 12, waarbij, in gebruik van het muurpaneelsamenstel, de aaneenkoppelbare muurpanelen die met elkaar verbonden zijn, ten opzichte van elkaar in de eerste en tweede richting in hoofdzaak onbeweegbaar zijn.

14. Muurpaneelsamenstel volgens één der conclusies 10 – 13, waarbij het samenstel een ondersteuningsreeks van aaneenkoppelbare muurpanelen omvat die is ingericht om verbonden te worden met een te stabiliseren plafond of vloer, waarbij de aaneenkoppelbare muurpanelen van de ondersteuningsreeks een zijrand hebben die één of meer insparingen en/of projecties omvat die zijn gevormd om een passende en aaneengekoppelde verbinding te verschaffen met een aaneenkoppelbaar muurpaneel dat zich in hoofdzaak loodrecht op het vlak van een aaneenkoppelbaar muurpaneel van de ondersteuningsreeks uitstrekt, waarbij de passende en aaneengekoppelde verbinding is ingericht voor het in hoofdzaak voorkomen van in-vlak beweging ten opzichte van het zich in hoofdzaak loodrecht uitstreckende muurpaneel.

15. Gestabiliseerde muur van een gebouw, omvattende:”

- een muur van een gebouw, bij voorkeur een beschadigde muur, voorzien van twee in hoofdzaak vlakvormige zijoppervlakken en een dikte die wordt gemeten tussen de beide vlakvormige zijoppervlakken; en
- een veelvoud aan aaneenkoppelbare muurpanelen volgens één der conclusies 1 – 9 die is verbonden met een zijoppervlak van de muur, en waarvan de muurpanelen aaneengekoppeld zijn met elkaar, waarbij elk van het veelvoud aan aaneenkoppelbare muurpanelen aaneengekoppeld is met ten minste één naastgelegen aaneenkoppelbaar muurpaneel van het veelvoud aan aaneenkoppelbare muurpanelen.

16. Gestabiliseerde muur volgens conclusie 15, waarbij het veelvoud aan aaneenkoppelbare muurpanelen omvat:

- een eerste subreeks van aaneenkoppelbare muurpanelen die is verbonden met een eerste vlakvormig zijoppervlak van de muur; en

- een tweede subreeks van aaneenkoppelbare muurpanelen die is verbonden met een tweede vlakvormig zijoppervlak van de muur dat tegenover het eerste vlakvormig oppervlak is gelegen.

5 17. Werkwijze voor het stabiliseren van een beschadigde muur, de werkwijze omvattende:

- het verschaffen van een veelvoud aan aaneenkoppelbare muurpanelen volgens één der conclusies 1 – 9, of van een muurpaneelsamenstel volgens één der conclusies 10 – 14;
- 10 – het aan de te stabiliseren muur en aan elkaar verbinden van het veelvoud aan aaneenkoppelbare muurpanelen.

18. Werkwijze volgens conclusie 17, waarbij de stap van het aan de te stabiliseren muur en aan elkaar verbinden van het veelvoud aan aaneenkoppelbare muurpanelen

15 omvat:

- het plaatsen van het veelvoud aan aaneenkoppelbare muurpanelen tegen de te stabiliseren muur;
- het, tijdens het plaatsen, aan elkaar aaneenkoppelen van de aaneenkoppelbare muurpanelen; en
- 20 – het met gebruik van verbindingsmiddelen aan de muur fixeren van het veelvoud aan aaneenkoppelbare muurpanelen.

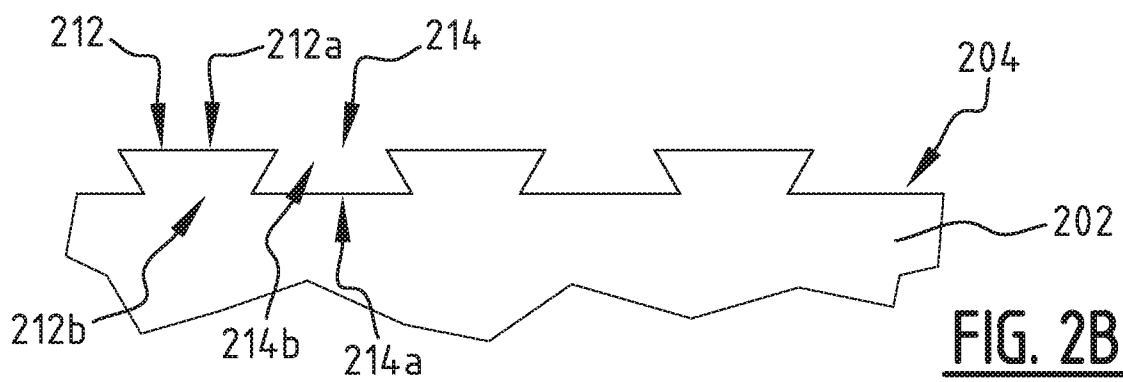
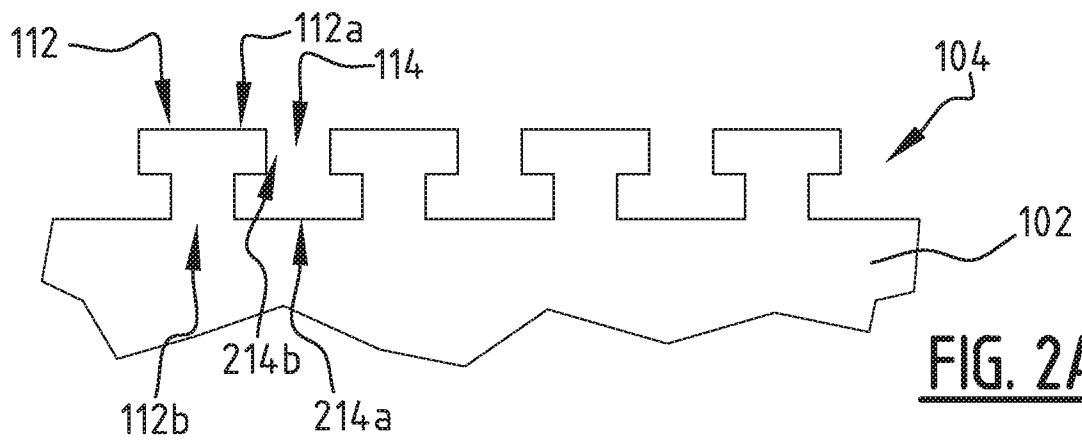
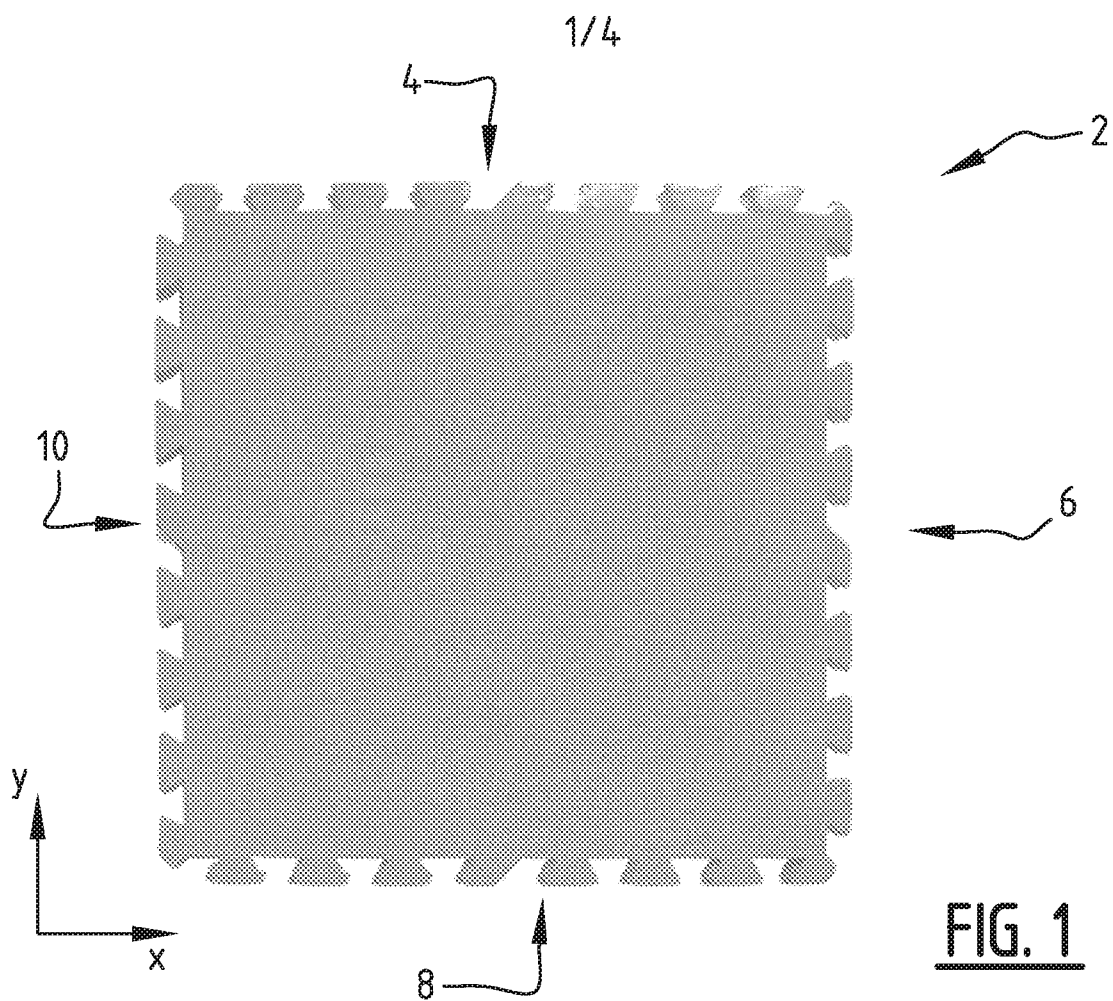
19. Stabilisatiepakket voor het stabiliseren van een beschadigde muur, het stabilisatiepakket omvattende:

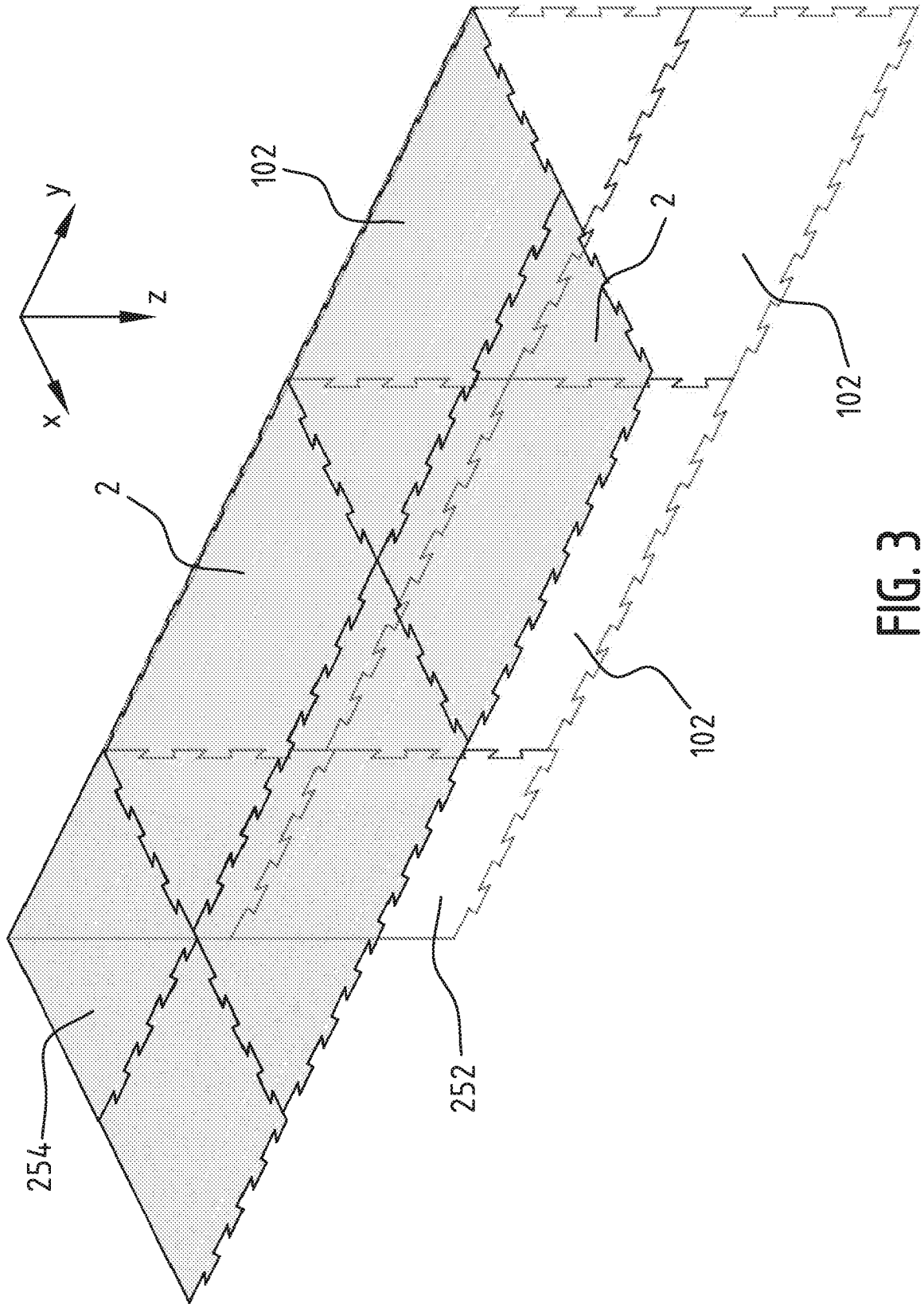
- 25 – een veelvoud aan aaneenkoppelbare muurpanelen volgens één der conclusies 1 – 9, of een samenstel volgens één der conclusies 10 – 14;
- verbindingsmiddelen die zijn ingericht voor het fixeren van de aaneenkoppelbare muurpanelen aan een muur.

30 20. Houtskeletconstructie voor een gebouw, omvattende:

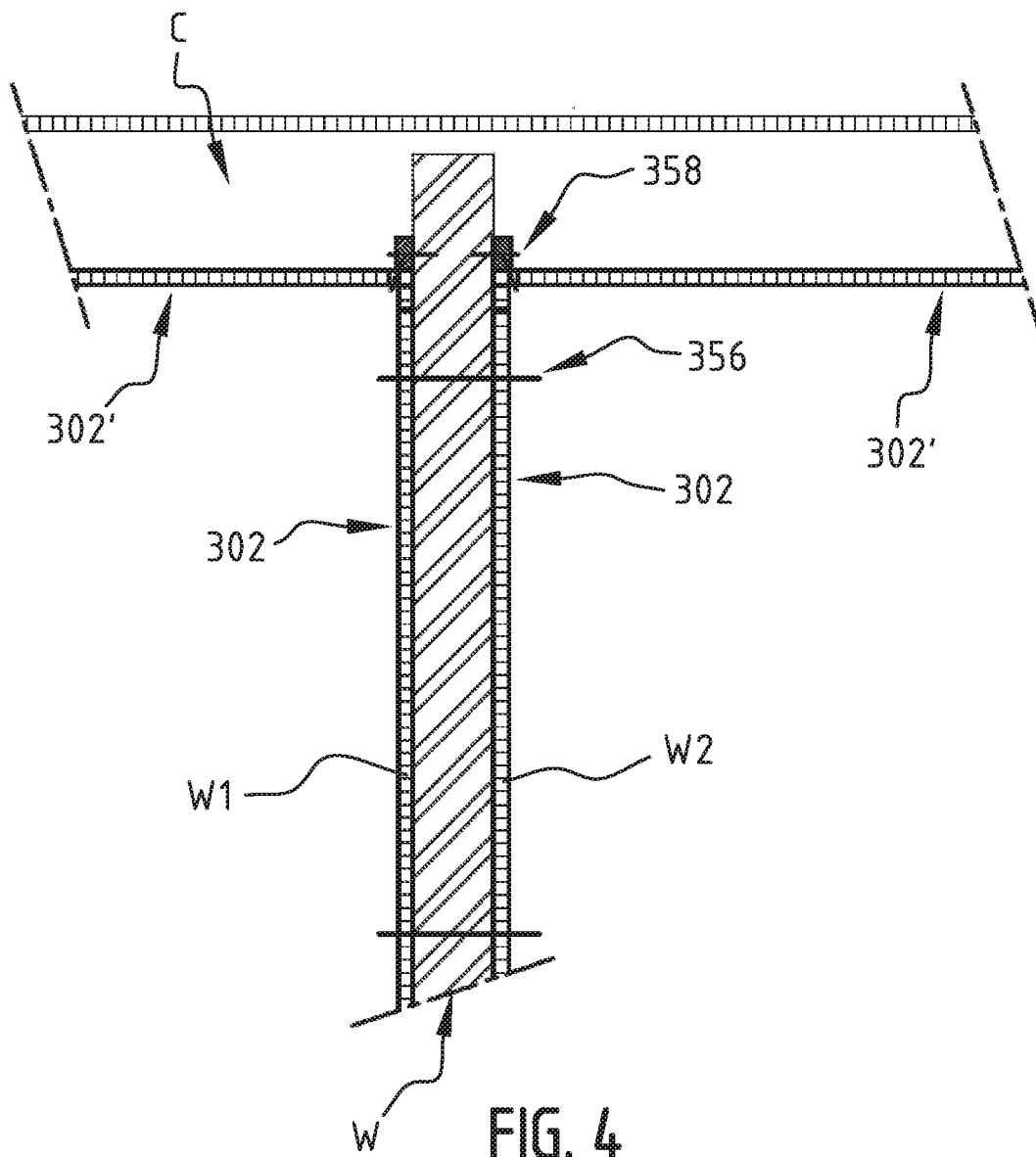
- een houtskelet;
- een veelvoud aan aaneenkoppelbare muurpanelen volgens één der conclusies 1 – 9, of een muurpaneelsamenstel volgens één der conclusies 10 – 14, die zijn verbonden met het houtskelet; en

- optioneel, gipsplaten die zijn verbonden met de aaneenkoppelbare muurpanelen aan een zijde die is gelegen tegenover de zijde waaraan het houtskelet is verbonden.



**FIG. 3**

3/4



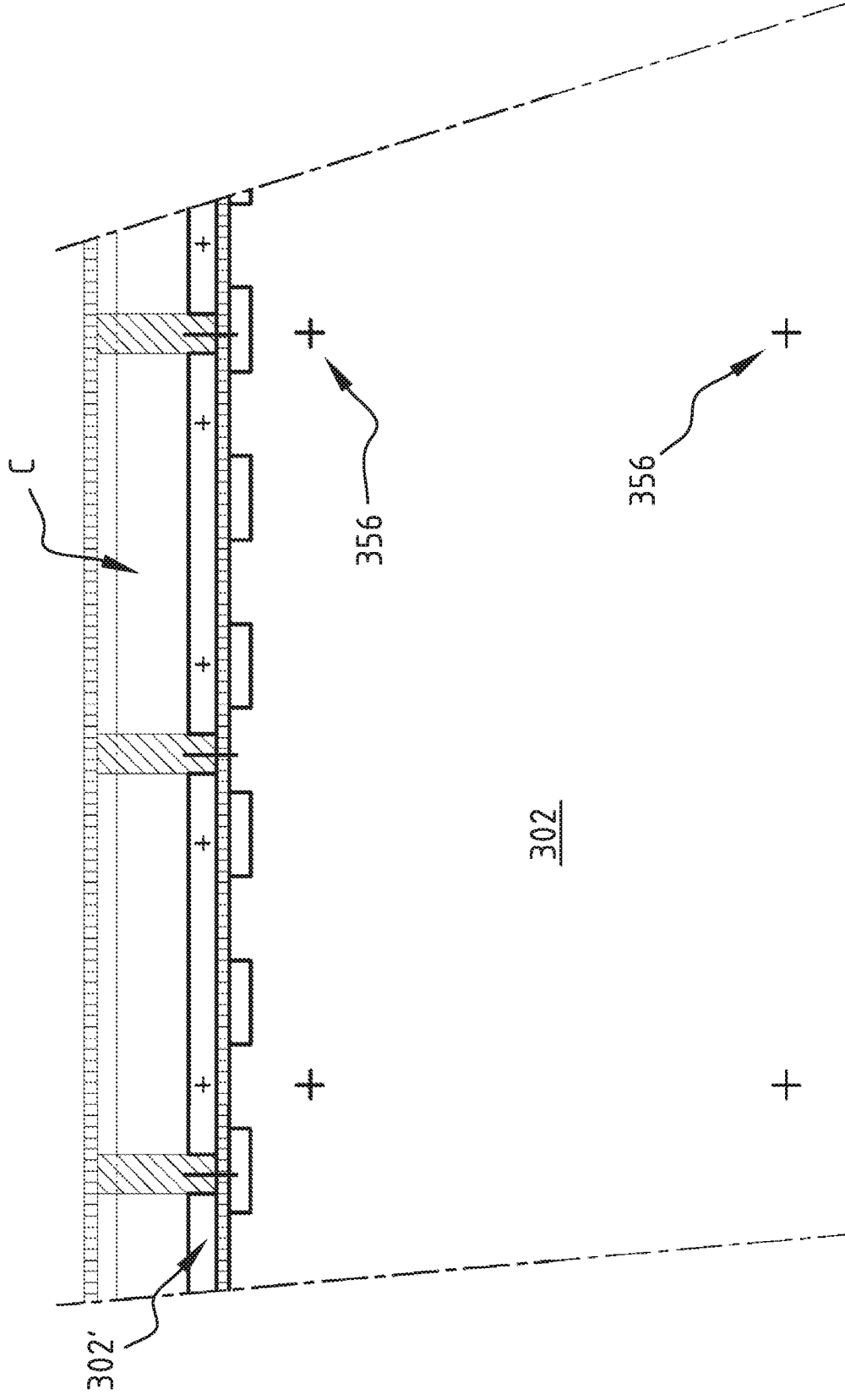


FIG. 5

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE		KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE	
Nederlands aanvraag nr. 2028247		Indieningsdatum 19-05-2021	
		Ingeroepen voorrangsdatum	
Aanvrager (Naam) J. van Klinken Holding B.V., et al			
Datum van het verzoek voor een onderzoek van internationaal type 09-10-2021		Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. SN79742	
I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)			
Volgens de internationale classificatie (IPC) Zie onderzoeksrapport			
II. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK			
Onderzochte minimumdocumentatie			
Classificatiesysteem	Classificatiesymbolen		
IPC	Zie onderzoeksrapport		
Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen			
III.	GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES		(opmerkingen op aanvullingsblad)
IV.	GEBREK AAN EENHEID VAN UITVINDING		(opmerkingen op aanvullingsblad)

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar
de stand van de techniek

NL 2028247

A. CLASSIFICATIE VAN HET ONDERWERP

INV. E04G23/02 F16B3/00 F16B5/07
ADD.

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.

B. ONDERZOCHETE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen)

E04G F16B E04B

Onderzochte andere documentatie dan de minimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)

EPO-Internal

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	JP 5 239190 B2 (KAJIMA CORP) 17 juli 2013 (2013-07-17) * alinea [0020] - alinea [0028]; figuren 1-11 *	1-20

X	US 2021/123252 A1 (GREEN ADAM) 29 april 2021 (2021-04-29) * alinea [0030]; figuren 1-24 *	1-3, 5-20

X	JP 2006 125069 A (FUSHIMI TETSUO) 18 mei 2006 (2006-05-18) * alinea [0014]; figuren 1-7 *	1-20

X	GB 1 431 766 A (BPB INDUSTRIES LTD) 14 april 1976 (1976-04-14) * figuren 1-10 *	1-14
A		15-20

	-/--	



Verdere documenten worden vermeld in het vervolg van vak C.



Leden van dezelfde octrooifamilie zijn vermeld in een bijlage

° Speciale categorieën van aangehaalde documenten

"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

"D" in de octrooiaanvraag vermeld

"E" eerdere octrooi(aanvraag), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

"L" om andere redenen vermelde literatuur

"O" niet-schriftelijke stand van de techniek

"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvraag, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding

"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

"&" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid

20 januari 2022

Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type

Naam en adres van de instantie

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
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De bevoegde ambtenaar

Baumgärtel, Tim

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar
de stand van de techniek

NL 2028247

C.(Vervolg). VAN BELANG GEACHTE DOCUMENTEN		
Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	EP 2 722 466 B1 (HERING BAU GMBH & CO KG [DE]) 29 november 2017 (2017-11-29) * figuren 1-12 * -----	1-20

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar
de stand van de techniek

NL 2028247

In het rapport genoemd octrooigescrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
JP 5239190	B2	17-07-2013	JP 5239190 B2
			17-07-2013
		JP 2008240427 A	09-10-2008

US 2021123252	A1	29-04-2021	EP 3775436 A1
			17-02-2021
			GB 2572999 A
			23-10-2019
			US 2021123252 A1
			29-04-2021
			WO 2019202335 A1
			24-10-2019

JP 2006125069	A	18-05-2006	GEEN

GB 1431766	A	14-04-1976	GB 1431766 A
			14-04-1976
			ZA 732596 B
			24-04-1974

EP 2722466	B1	29-11-2017	DE 102012109950 A1
			08-05-2014
			EP 2722466 A1
			23-04-2014
			TR 201802538 T4
			21-03-2018

WRITTEN OPINION

File No. SN79742	Filing date (<i>day/month/year</i>) 19.05.2021	Priority date (<i>day/month/year</i>)	Application No. NL2028247
International Patent Classification (IPC) INV. E04G23/02 F16B3/00 F16B5/07			
Applicant J. van Klinken Holding B.V., et al			

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the application
- ☒ Box No. VIII Certain observations on the application

	Examiner Baumgärtel, Tim
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WRITTEN OPINION

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the application as filed.
 - ☐ filed together with the application in electronic form.
 - ☐ furnished subsequently for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes: Claims	
	No: Claims	1-20
Inventive step	Yes: Claims	
	No: Claims	1-20
Industrial applicability	Yes: Claims	1-20
	No: Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION

Application number
NL2028247

Box No. VIII Certain observations on the application

see separate sheet

1 **Re Item V**

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1.1 Reference is made to the following documents:

- D1 JP 5 239190 B2 (KAJIMA CORP) 17 juli 2013 (2013-07-17)
- D2 US 2021/123252 A1 (GREEN ADAM) 29 april 2021 (2021-04-29)
- D3 JP 2006 125069 A (FUSHIMI TETSUO) 18 mei 2006 (2006-05-18)
- D4 GB 1 431 766 A (BPB INDUSTRIES LTD) 14 april 1976 (1976-04-14)
- D5 EP 2 722 466 B1 (HERING BAU GMBH & CO KG [DE]) 29 november 2017 (2017-11-29)

1.2 The present application does not meet the criteria of patentability, because the subject-matter of claims 1 and 17 is not new.

1.2.1 D1 (see fig.1-11) discloses a

Aaneenkoppelbaar muurpaneel (2) voor het stabiliseren van muren, waarbij het paneel is voorzien van een muurpaneeloppervlak dat zich uitstrekt in een vlak dat is gedefinieerd door een eerste en een tweede richting (as illustrated), waarbij het muurpaneeloppervlak een aantal zijranden heeft (as illustrated), waarbij ten minste één van het aantal zijranden omvat:

- één of meer insparingen die zich in het vlak en inwaarts van de zijrand uitstrekken (see fig.2a or 2b), waarbij de één of meer insparingen zijn ingericht voor het ontvangen van een geassocieerde projectie van een tweede of verder aaneenkoppelbaar muurpaneel in een passende en aaneengekoppelde verbinding die is ingericht voor het in hoofdzaak voorkomen van in-vlak beweging (see fig. 1a or 2b); en/of

- één of meer projecties die zich in het vlak en uitwaarts van de zijrand uitstrekken (see fig.2a or 2b), waarbij de één of meer projecties zijn ingericht om invoegbaar te zijn in een geassocieerde insparing van een tweede of verder aaneenkoppelbaar muurpaneel

in een passende and aaneengekoppelde verbinding die is ingericht voor het in hoofdzaak voorkomen van in-vlak beweging (see fig.2a or 2b),;

waarbij de één of meer projecties en/of insparingen zijn ingericht om verbindbaar te zijn met een tweede of verder aaneenkoppelbaar muurpaneel in een derde richting (the "projecties" and "insparingen" in fig. 2a or 2b (2a) are perfectly suitable to be used for a connection of another element in a third direction, especially in a direction which is perpendicular to the panel 2 as shown in the figures).

1.2.2 D1 discloses also the method of claim 17 as follows:

Werkwijze voor het stabiliseren van een beschadigde muur (§20, see figures), de werkwijze omvattende:

- het verschaffen van een veelvoud aan aaneenkoppelbare muurpanelen (2) volgens éénder conclusies 1 - 9 (see above), of van een muurpaneelsamenstel volgens één der conclusies 10-14 (see below, D1 discloses a plurality of panels 2);*
- het aan de te stabiliseren muur en aan elkaar verbinden van het veelvoud aanaaneenkoppelbare muurpanelen (see e.g. fig.1).*

1.2.3 The following documents also disclose the subject matter of claim 1 and/or claim 17:

a) D2 (see fig.1-24):

- > claim 1: Aaneenkoppelbaar muurpaneel (28,16) met insparingen en projecties (22,24,32,34) (adapted for the purpose as described)*
- > claim 17: see claim 1, 12 can be considered as a wall*

b) D3 (see fig.1-7):

- > claim 1: Aaneenkoppelbaar muurpaneel (1) met insparingen en projecties (1a) (adapted for the purpose as described)*
- > claim 17: see claim 1 and wall e.g. in fig.1*

c) D4 (see fig.1-10):

- > claim 1: Aaneenkoppelbaar muurpaneel (a single element 10, or a composition as shown in fig.8) met insparingen en projecties (as shown) (adapted for the purpose as described)*

1.3 The present application does not meet the criteria of patentability, because the subject-matter of claims 1 and 17 does not involve an inventive step.

1.3.1 D5 (see fig.1-12) is regarded as being the prior art closest to the subject-matter of claim 1, and discloses a "*Aaneenkoppelbaar muurpaneel*" (1-3) for reinforcing a wall 1.

D5 does not disclose the "*insparingen en of projecties*" as defined in claim 1.

The effects and advantages of such features are generally known in the art of building panels and also reinforcing panels (see D1-D4 above). The person skilled in the art would therefore apply the "*insparingen en of projecties*" to the panels of D5 in an obvious way.

1.3.2 For the same reasons, the subject matter of claim 17 is obvious. D1 already discloses the reinforcement of a wall 1.

1.4 Dependent claims 2-16 and 18-20 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of novelty and/or inventive step, the reasons being as follows:

1.4.1 D1 discloses already the subject matter of claims 2 (this defines only a suitability which depends on the features of the additional panel which does not form part of the subject matter of claim 2), 3 (first option, but second option is also commonly known in the art), 4 (§28, comprises at least "metaal", but other materials are just commonly known alternatives), 6 (fig.2a and 2b), 7-9 (fig.2a and 2b), 10 (plurality of panels 2, as shown), 11 (see fig.1), 12 (the plurality of panels 2 are suitable to be placed on either side of a wall, while the wall does not form part of the claimed subject matter), 13 (see fig.2a and 2b), 14 (further panels 2 are also suitable to be connected as described, especially the panel as shown in fig.2a and 2b), 15 (wall as shown, for example fig.1 with panels 2), 18 (+ elements 3) and 19 (see above).

The subject matter of claim 5 (thickness of the panel) is just a simple choice of a thickness, which the person skilled in the art would choose according to the circumstances. This subject matter can therefore not support an inventive step.

The subject matter of claim 16 is obvious when a wall is accessible from both sides.

The subject matter of claim 20 is considered a simple alternative choice for the panels of D1.

- 1.4.2 D2 discloses already the subject matter of claims 2, 3 (see above), 4 (§30, UHPC), 6-13 (as illustrated), 14 (suitable for), 15 (12 considered to a wall, which however would be obvious in either case), 16 (as illustrated) and 18-19 (e.g. 40).

The subject matter of claim 5 (thickness of the panel) is just a simple choice of a thickness, which the person skilled in the art would choose according to the circumstances. This subject matter can therefore not support an inventive step.

The subject matter of claim 20 is considered a simple alternative choice for the panels of D2.

- 1.4.3 D3 disclosed already the subject matter of claims 2-3 (as illustrated), 4-5 (§14), 6-14 (as illustrated), 15-16 (wall, part of the building), 18-19 (bolt 10) and 20 (the building is a "wooden building").

- 1.4.4 D4 discloses already the subject matter of claims 2-3 (as shown), 4 (wood or plastic) and 6-14 (as shown).

The subject matter of claim 5 (thickness of the panel) is just a simple choice of a thickness, which the person skilled in the art would choose according to the circumstances. This subject matter can therefore not support an inventive step.

- 1.4.5 Starting from D5 in combination with common knowledge or any of the documents above, the subject matter of claims 2-16 and 18-20 is also obvious (see reasons above).

2 Re Item VIII

Certain observations on the application

- 2.1 Claim 1 is not clear.

- 2.1.1 The expression "third direction" in the context of the application is a direction which is substantially perpendicular to the to the plane and/or to the first and second directions (see description page 2, I.15-16). This is not clear from claim 1. Claim 1 is thus broader than supported by the description, as it encompasses also other directions than substantially perpendicular to the plane and/or first and second directions.