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(54) **COMPOSITE WALL PANEL**

(57) Composite four-sided wall panel comprising a pattern of full brick slips, which brick slips are glued in several rows to an insulating board, wherein both the pattern of the brick slips and the insulating board have the same corresponding shape and wherein at least two sides are rectilinear and the other two sides are stepped,

wherein the insulating board has a thickness of at least 2 times the thickness of a brick slip, and wherein the insulating board is provided with a groove which groove extends along the entire circumference of the insulating board. The invention also relates to a plurality of one or more wall panels. Wherein these can be offered in a kit.

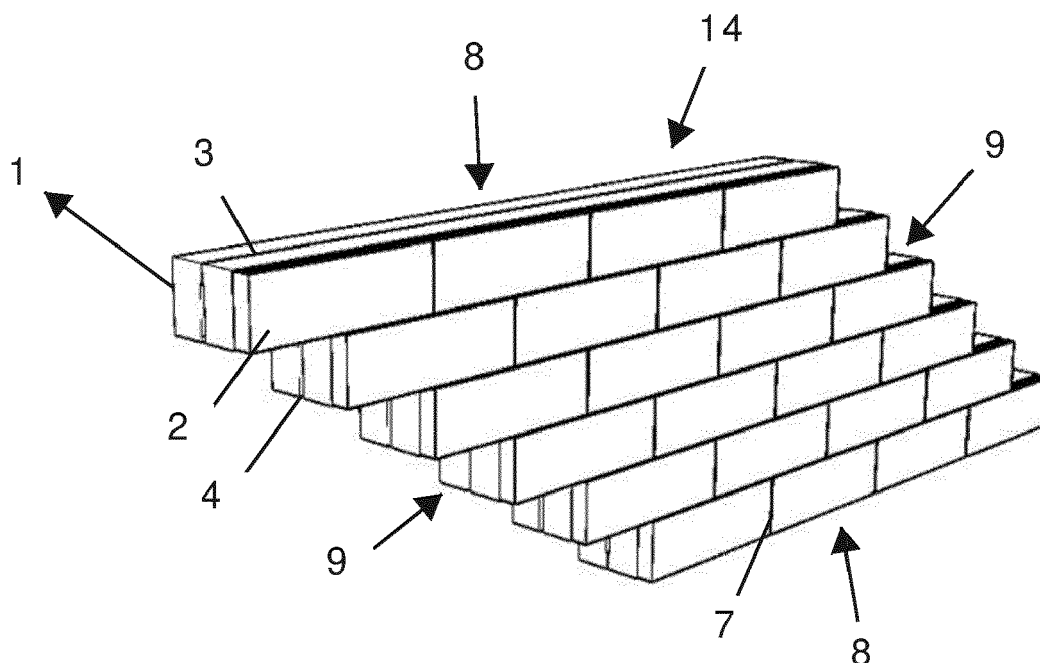


Fig. 1

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Description

TECHNICAL FIELD

[0001] The invention relates on the one hand to a composite four-sided wall panel comprising a pattern of full brick slips, which brick slips are glued in several rows to an insulating board.

[0002] The invention, on the other hand, relates to a plurality of such composite wall panels for forming a wall or structure.

PRIOR ART

[0003] Such a composite wall panel is known from BE 1012556, among others.

[0004] BE 1012556 further describes a composite wall panel comprising an intermediate layer of rigid insulating foam, fired building components on one side thereof and a rigid plate on the other side of the intermediate layer, said rigid plate being a metal plate and metal moldings foamed into the intermediate layer in the height direction.

[0005] The wall panel described in BE 1012556 has the disadvantage that these wall panels are bulky, heavy, and difficult to handle, wherein the wall panel must have a large bearing capacity. As a result, it is not easy to move these wall panels by manpower and they require additional lifting equipment.

[0006] Also known is a composite wall panel from EP 2 565 003 which relates to a method for fixing a wall panel to a supporting base. EP 2 565 003 also relates to a method of producing flat and corner wall panels suitable for attachment to a supporting base.

[0007] The wall panel described in EP 2 565 003 has the disadvantage that after positioning these panels, additional work is necessary for the fixing and the anchoring.

[0008] Known wall panels are described in GB2536036, GB1478863 and ES2190886, but they are difficult to connect precisely. Other wall elements are known from EP3282062 and BE1019705 but are not suitable to serve as insulating wall panel. The present invention aims at least to find a solution to some of the above-mentioned disadvantages. The aim of the invention is to provide a method which eliminates those disadvantages.

SUMMARY OF THE INVENTION

[0009] The invention relates to a composite wall panel according to claim 1. The main advantage of such a composite wall panel is that the stepped sides provide a better connection to the adjoining wall panels. A second advantage of using full brick slips is that no additional work has to be provided after the external wall has been erected. Because this is a composite panel and therefore combines the external wall with the insulation, there is therefore one less step required to erect the external wall. The wall panel has therefore been designed in such a way that, after the external wall has been erected, there is

practically no difference with traditional masonry. The insulating panel is provided with a groove around the circumference of the insulating panel. This groove allows for polyurethane foam to preferably be injected into the stepped side, at the connection with the adjacent groove of another composite wall panel to provide a firm, hard and watertight connection.

[0010] The brick slips are preferably provided according to claims 2 to 4, wherein the size of such composite wall panel remains limited. No additional lifting instruments need to be provided during the installation and the installation can be done completely by one person.

[0011] In a preferred embodiment, the insulating panel is provided with a groove around the circumference of the insulating panel according to claims 5 to 7.

[0012] Preferably, the composite wall panel is carried out according to claims 9-11, wherein it is possible, when combining these different composite wall panels, to build up a square external wall in an efficient manner because all versions of the wall panel connect correctly to each other. After erecting, no additional work is required to hide mounting holes. And finally, if necessary, adjusting wall panels to create a window and/or door opening, for example, is very easy thanks to guide markings. The panel can be easily reworked using a sawing tool.

[0013] The plurality of composite wall panels according to claims 12 to 14, wherein the panels are fixed to a supporting base with an anchoring hook and wherein the composite wall panels are interconnected by the use of a connecting slat in the grooves of the rectilinear sides. The panels in the stepped sides are fixed to each other by injecting the grooves between adjacent panels with polyurethane foam or applying a silicone adhesive to the stepped sides for a firm, hard and watertight connection. In this way no mounting openings are visible after installation.

DESCRIPTION OF THE FIGURES

[0014] The figures show a perspective view of some non-limiting preferred embodiments of the invention.

Figure 1 shows a view of a substantially parallelogram composite wall panel according to the invention with a view of the front side.

Figure 2 shows a representation of a substantially parallelogram composite wall panel from Figure 1 with a view of the rear.

Figure 3 shows a representation of an angular and partially pyramidal composite wall panel according to the invention with a view of the front side.

Figure 4 shows a representation of a substantially triangular composite wall panel according to the invention with a view of the front side.

Figure 5 shows a representation of an embodiment of an anchoring hook.

Figure 6 shows a representation of an embodiment of a connecting slat.

Figure 7 shows a representation of an angular and partially pyramidal composite wall panel according to the invention from another perspective.

Figure 8 shows a representation of 2 angular and partially pyramidal composite wall panels according to the invention, namely a left and a right pyramidal composite wall panel.

Figure 9 shows a view of a substantially parallelogram composite wall panel according to the invention in another preferred embodiment.

Figure 10 shows a view of a substantially parallelogram composite wall panel according to the invention in another preferred embodiment.

Figure 11 shows a view of a substantially parallelogram composite wall panel according to the invention in another preferred embodiment.

Figure 12 shows a view of a substantially parallelogram composite wall panel according to the invention in another preferred embodiment.

Figure 13 shows an assembly of two wall panels using a connecting slat and anchoring hook in the grooves of the rectilinear sides.

Figure 14 shows the stepped side of a composite wall panel according to the invention.

Figure 15 shows a plurality of wall panels in a particular manner.

Figure 16 shows a plurality of wall panels in a particular manner from another perspective.

Figure 17 shows a plurality of wall panels in a particular manner from another perspective.

Figure 18 shows a plurality of wall panels in a particular manner with a door opening.

DESCRIPTION OF THE FIGURES

[0015] The present invention is by no means limited to the embodiment described by way of example and shown in the figures.

[0016] Figures 1-4, 8-12 mainly show a representation of a composite four-sided wall panel comprising a pattern of brick slips (2), which brick slips (2) are glued together

in several rows on an insulating board (1) and wherein at least two sides are rectilinear (8) and the other two sides are stepped (9).

[0017] The brick slips (2) are glued in a pattern to the insulating board (1), wherein the joint (7) between the brick slips (2) has a thickness between 2 and 15 mm. The brick slips (2) are represented in the figures according to a preferred embodiment, each with an overlap according to 1/2.

[0018] The insulating board (1) has a groove (3, 4) which groove (3, 4) extends over the entire circumference of the insulating board (1). The groove (3, 4) comprises four sub-grooves (3, 4) with each groove (3, 4) overlapping each other. The grooves (4) on the stepped sides (9) are larger than the grooves (3) on the rectilinear sides (8). Guide markings (5) are provided on the back of the insulating board (1), which indicate where the wall panel can be adjusted when, for example, making a door opening (17).

[0019] In Figure 8, according to a preferred embodiment of the invention, two angular partially pyramidal composite wall panels are visible, namely a left and a right pyramidal wall panel. The left pyramidal wall panel has a base row of three and a half brick slips (2) on the left side of the corner and three brick slips (2) on the right side of the corner. The right pyramidal wall panel has a base row, on the left side of the corner, of three brick slips (2) and on the right side of the corner three and a half brick slips (2). The successive rows are staggered in steps (9) with a distance of half a brick slip (2) until a top is formed. The top of the left pyramidal wall panel has on the left side of the corner a full brick slip (2) and on the right side of the corner a half brick slip (2), while the right pyramidal wall panel has on the left side of the corner a half brick slip (2) and on the right side of the corner a full brick slip (2).

[0020] A plurality of wall panels according to the preferred embodiments of figures 1-4 can be found in Figures 15-18. This shows how these preferred embodiments fit together and how an external wall can be erected. Figure 18 shows a plurality of wall panels, in which a number of these wall panels have been adapted for making a door opening (17).

[0021] The wall panels are glued in the stepped sides (9) in each case to an adjoining wall panel using preferably polyurethane, more preferably with silicone glue. The alignment of the wall panels is done by placing a connecting slat (13) in the grooves of the rectilinear sides (8) where the adjoining (18) wall panels meet. Each wall panel can be anchored to a supporting base using an anchoring hook (19).

[0022] The connecting slat (13) is a rectangular, narrow, and rigid slat with a thickness slightly thicker than the thickness of the groove (3) in the insulating board (1). This ensures that the connecting slat (13) is clamped in the groove and can no longer slide by itself.

[0023] The anchoring hook (19) comprises a retractable part (10) and a fastening part (11, 12) on the load-

bearing wall. The fastening part (11, 12) has an L-shape, with a leg (12) of the fastening part comprising a hole (6), wherein for instance a plug can be placed in the hole (6) for anchoring to the load-bearing wall. Another leg (11) of the fastening part (11, 12) is designed to rest on the insulating panel in Figure 13, the length of this leg (11) being equal to about half the thickness of the insulating board (1). As a result, the leg (12) with the opening is flush with the back of the insulating board (1). The retractable part (10) is designed to be placed in the groove of the rectilinear side (3) and has the same height as that of the connecting slat (13).

DETAILED DESCRIPTION

[0024] Unless otherwise defined, all terms used in the description of the invention, including technical and scientific terms, have the meaning as commonly understood by a person skilled in the art to which the invention pertains. For a better understanding of the description of the invention, the following terms are explained explicitly.

[0025] In this document, "a" and "the" refer to both the singular and the plural, unless the context presupposes otherwise. For example, "a segment" means one or more segments.

[0026] The terms "comprise," "comprising," "provided with," "containing," "including," are synonyms and are inclusive or open terms that indicate the presence of what follows, and which do not exclude or prevent the presence of other components, characteristics, elements, members, steps, as known from or disclosed in the prior art.

[0027] Quoting numerical intervals by endpoints comprises all integers, fractions and/or real numbers between the endpoints, these endpoints included.

[0028] The term "brick slip" refers to a thinner version of the classic brick. The brick clip may also be regarded as a slice of a brick since it has the same properties and quality of the brick. Unlike bricks, brick slips are glued to an insulating board or wall. The brick slips can therefore also be fired as brick slips but can also come from bricks that are sawn in two in their longitudinal direction. In addition to using clay as a material, use can also be made of other materials such as quartzite, slate, or granite, but also plastic.

[0029] The term "pattern" in this document refers to a layout in which the brick slips are glued to an insulating board or wall. Since the brick slips cover the entire insulating board and there is no excess, the term pattern also directly refers to the shape of the insulating board.

[0030] The term "insulation" also directly refers to an insulating board since the insulating board is used as a substrate for gluing the brick slips but is also used for shielding and separating the internal and external wall. This insulating board protects against external influences and limits the energy loss of the house to the outside.

[0031] The term "joint" means the opening and free space between the brick slips where the joint has a size

of 2 to 15 mm. The term "jointless" which is used further in this document refers to very small joints or joints that are no longer filled afterwards.

[0032] The term "supporting base" refers to the skeleton frame of the house and preferably the load-bearing wall or interior wall of the house. The wall panels are anchored on this base.

[0033] The first aspect of the invention is a composite four-sided wall panel comprising a pattern of full brick slips, which brick slips are glued in rows on the front side of an insulating board, wherein both the pattern of the brick slips and the insulating board have the same corresponding shape. The wall panel comprises at least two opposite sides which are rectilinear and two other opposite sides which are stepped.

[0034] The brick slips completely cover the insulating board with no excess and therefore the combination can be regarded as one whole. By using only full brick slips, no free space is provided at the front. Due to the lack of free space, it is not necessary to provide additional work after the external wall has been erected, for example for jointing. The brick slips in adjacent rows may have an overlap of preferably a 1/4, 2/4, 3/4.

[0035] According to a preferred embodiment, the brick slips have a size of 40 to 65 mm in height, 195 to 215 mm in length and 10 to 30 mm in thickness. The pattern of the brick slips can preferably be provided with a joint with a thickness of 2 to 15 mm. This has the advantage of a wall panel where brick slips can be chosen and where the wall panels can have a joint or be jointless. This gives, for example, the option of choosing a jointless pattern which, after erection of the external wall, does not require jointing, thereby saving time and costs.

[0036] The brick slips can be glued to the insulating board, preferably with silicone glue. The silicone glue can preferably be applied mechanically to the insulating board, after which the brick slips can preferably be placed on the insulating board by means of a mold. Placing the brick slips with a mold has the advantage of ensuring correct alignment between the brick slips.

[0037] The pattern of the wall panel has 4 to 12 rows of brick slips, with each row having 1 to 12 brick slips. The limitation on the number brick slips in the pattern limits the size of the wall panel. The bearing capacity of the insulating board is hereby sufficiently large to support the weight of the brick slips during the placement, transport, and erection of the wall panels. However, this has the additional advantage that the wall panels can be easily placed.

[0038] The insulating board has a thickness of preferably at least 2 times the thickness of a brick slip, more preferably 4 to 10 times the thickness of a brick slip. This offers the freedom to use the wall panels in a new building as well as for an external wall renovation. A groove is provided in the insulating board which extends over the entire circumference of the insulating board. Preferably, the groove in the insulating board can be provided from the mold. The joints could also be applied mechanically

by, for example, a milling element.

[0039] The groove in the insulating board is approximately in the middle of the thickness of the insulating board with a thickness of 10 to 20 mm. The advantage of this positioning is that the walls of the groove are still strong enough to support the wall panels during installation.

[0040] The groove around the perimeter of the insulating board is divided into four parts with each groove overlapping into the groove of the adjacent side on the same wall panel. The grooves on the stepped side are larger than the groove on the rectilinear sides. The advantage of this is that when spraying the groove with, for example, polyurethane, there is more contact surface with the groove and thus a better, firmer, and watertight connection with an adjoining wall panel.

[0041] The insulating board is preferably, as mentioned above, made in a mold using high-density expanded polystyrene or a similar tough, hard and water-repellent material. Polystyrene is very easy to use with a mold because it can easily assume all shapes of the mold and thus has the correct dimensions when curing.

[0042] Such a preferred form of the composite wall panel is a pattern substantially describing a parallelogram.

[0043] A second preferred form is a composite wall panel which substantially describes a triangle.

[0044] A third preferred form is a composite wall panel which has substantially two contiguous, 90° angled triangles and describes a pyramid, preferably a left and a right angular pyramidal wall panel.

[0045] By using the three preferred forms mentioned above, a completely square external wall can be erected. The stepped sides of all the wall panels connect up nicely with the stepped sides of the adjoining wall panels. In each case, one stepped side of the wall panels rests on the stepped side of an adjoining wall panel. Depending on the side, length of the side and the previous row of brick slips of the square external wall, it is possible that when creating a corner it is necessary to end with a half brick slip or with a full brick slip. Depending on the case, a left or a right angular pyramidal wall panel can be used.

[0046] The advantage of this is that the connections between the wall panels support each other and the connection is difficult to see or not visible, making the external wall difficult to distinguish from traditional masonry.

[0047] The wall panel can be adapted for making, for example, door and/or window openings. The adjustment of the wall panel can preferably be done by a saw element. Markings are provided on the insulating board on the other side of the brick slips, which show guide cutting lines. The advantage of the markings is that they help to adjust the panel and can contribute here so that the adaptation of several wall panels together can provide a window or different with straight walls. The guidelines on the other side of the brick slips from the wall panel are provided at locations that indicate the middle of the joints between the brick slips.

[0048] As a second aspect, there is a multiplicity of several wall panels for erecting an external wall.

[0049] As previously described, all wall panels are provided with two stepped sides that connect correctly to each other from different adjoining wall panels. The advantage is that in each case a stepped side of one wall panel rests on the stepped side at the adjacent wall panel. As described above, this directly provides better stability and ensures that the pattern of the external wall is very close to traditional masonry. As described above, all sides are provided with a groove. The groove in the stepped side can herein preferably be injected with polyurethane, more preferably with silicone glue on the stepped sides. The bonding between the straight sides of the wall panels is preferably done by using silicone glue. This bonding ensures a firm, hard and watertight seal between the wall panels. By making a combination of wall panels described in the preferred embodiments above, it is possible to erect a completely square external wall.

[0050] When connecting one wall panel to a second wall panel, the alignment of these wall panels can be determined. By placing a connecting slat in the adjacent grooves of the rectilinear sides of the wall panel, where these grooves meet. This has the advantage that the wall panels do not shift during the drying of the adhesive. Preferably the connecting slat is slightly thicker than the thickness of the groove on the rectilinear side of the insulating panel. This has the advantage that the connecting slat is clamped in the groove, which ensures that it no longer shifts on its own.

[0051] The connecting slat is preferably made of PVC and is narrow, rectilinear, and rigid. The connecting slat has a size with a width of 550-650 mm, a height of 20-40 mm and a thickness of approximately 2 mm. Because the height of the groove in the rectilinear side is approximately half the height of the connecting slat, half of the connecting slat still protrudes in the height direction. This has the advantage that the wall panels can be connected directly to the other half and placing the wall panel automatically has a correct alignment.

[0052] The wall panels can each be individually anchored to the supporting base. An anchoring hook can be placed in the groove of the rectilinear sides of the wall panel. A plug can be placed through the bore in the anchoring hook which anchors the wall panel to the supporting base. This prevents the wall panels from separating from the supporting base and they will remain in place when another wall panel is placed.

[0053] A suitable anchoring hook comprises two parts, a part which can be slid into the groove and a fastening part on the load-bearing wall provided with a bore. This anchoring hook is preferably a somewhat L-shaped profile, one side being provided with a bore and the other side being connected perpendicularly to the retractable part. The anchoring hook is preferably PVC and can preferably be made in a mold.

[0054] The external wall can be provided with, for ex-

ample, door and/or window openings and the wall panels can each be individually reworked, preferably by making use of the guide markings on the back of the wall panel. The adjustment can be done by a sawing element. If the wall panel has a jointless brick slip pattern, an incision can be made on the guide markings by means of a sawing element. The incision divides this wall panel into two parts, where the unwanted part can be broken off.

[0055] The assembly is available in a kit according to the first and second aspects. The advantage of working according to this assembly of panels is that with knowledge of the number of right angles and the length of the sides it is easy to calculate which and how many panels, connecting slats and anchoring hooks the kit should contain.

Claims

1. Composite four-sided wall panel comprising a pattern of full brick slips, which brick slips are glued in several rows to an insulating board, wherein both the pattern of the brick slips and the insulating board have the same corresponding shape and wherein at least two sides are rectilinear and the other two sides are stepped,
characterized in that the insulating board has a thickness of at least 2 times the thickness of a brick slip, and wherein the insulating board is provided with a groove which groove extends along the entire circumference of the insulating board. 20
2. Wall panel according to claim 1, **characterized in that** the brick slip has a height of 40 to 65 mm, a width of 195 to 215 mm and a thickness of 10 to 30 mm. 25
3. Wall panel according to claim 1 or 2, **characterized in that** the brick slips are glued to the insulating panel by means of a silicone glue. 30
4. Wall panel according to claim 1, 2 or 3, **characterized in that** the pattern comprises 4 to 12 rows of brick slips. 35
5. Wall panel according to any of the preceding claims 1-4, **characterized in that** the groove is provided approximately in the middle of the thickness of the insulating board. 40
6. Wall panel according to any of the preceding claims 1-5, **characterized in that** the groove has a depth of 10 to 20 mm. 45
7. Wall panel according to any of the preceding claims 1-6, **characterized in that** the groove comprises two stepped sub-grooves and two rectilinear sub-grooves, the width of the stepped sub-grooves being 50
8. Wall panel according to any of the preceding claims 1-7, **characterized in that** the insulating board is made of high-density expanded polystyrene or a similar rigid, hard, water-repellent insulating panel. 55
9. Wall panel according to any of the preceding claims 1-8, **characterized in that** the wall panel describes substantially a parallelogram.
10. Wall panel according to any of the preceding claims 1-8, **characterized in that** the wall panel describes substantially a triangle.
11. Wall panel according to the preceding claim 10, **characterized in that** the wall panel describes two triangles at an angle of 90°.
12. Assembly of one or more wall panels according to any of the preceding claims 1-11, further comprising a connecting slat and anchoring hook, **characterized in that** it is designed to be presented in a kit.
13. Assembly according to claim 12, **characterized in that** the connecting slat describes a rectangular shape with a width of 550-650 mm, a height of 20-40 mm and a thickness of approximately 2 mm, **characterized in that** it fits into the groove of the rectilinear side.
14. Assembly according to claim 12, **characterized in that** the anchoring hook comprises an anchoring opening, **characterized in that** it fits into the groove of the rectilinear side.

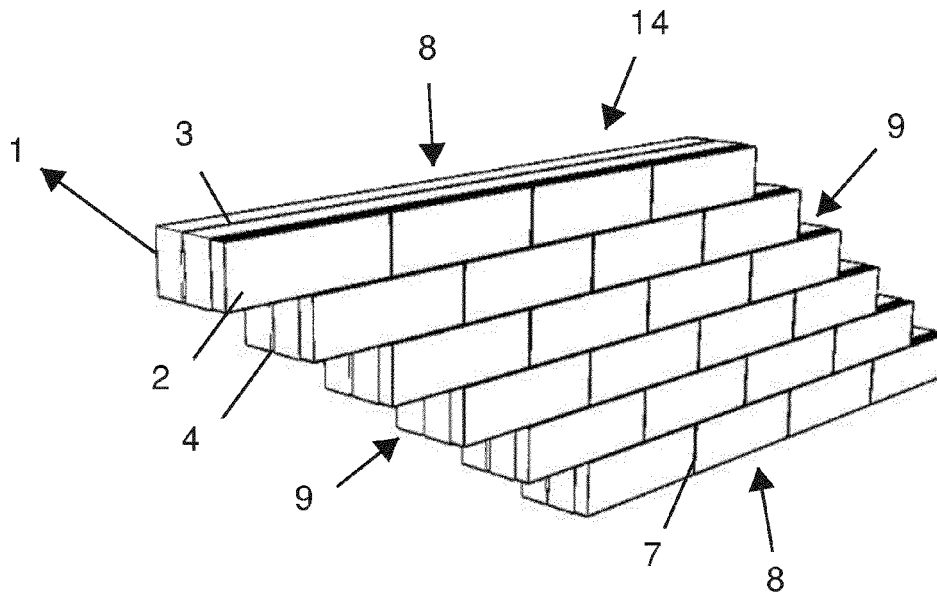


Fig. 1

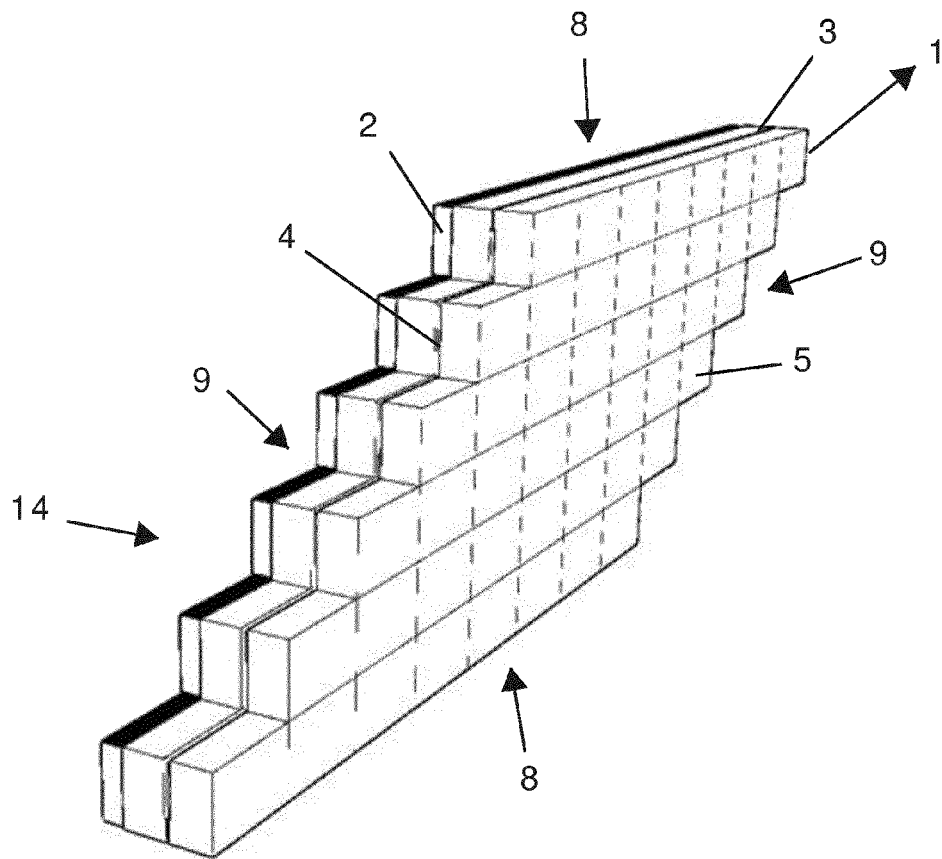
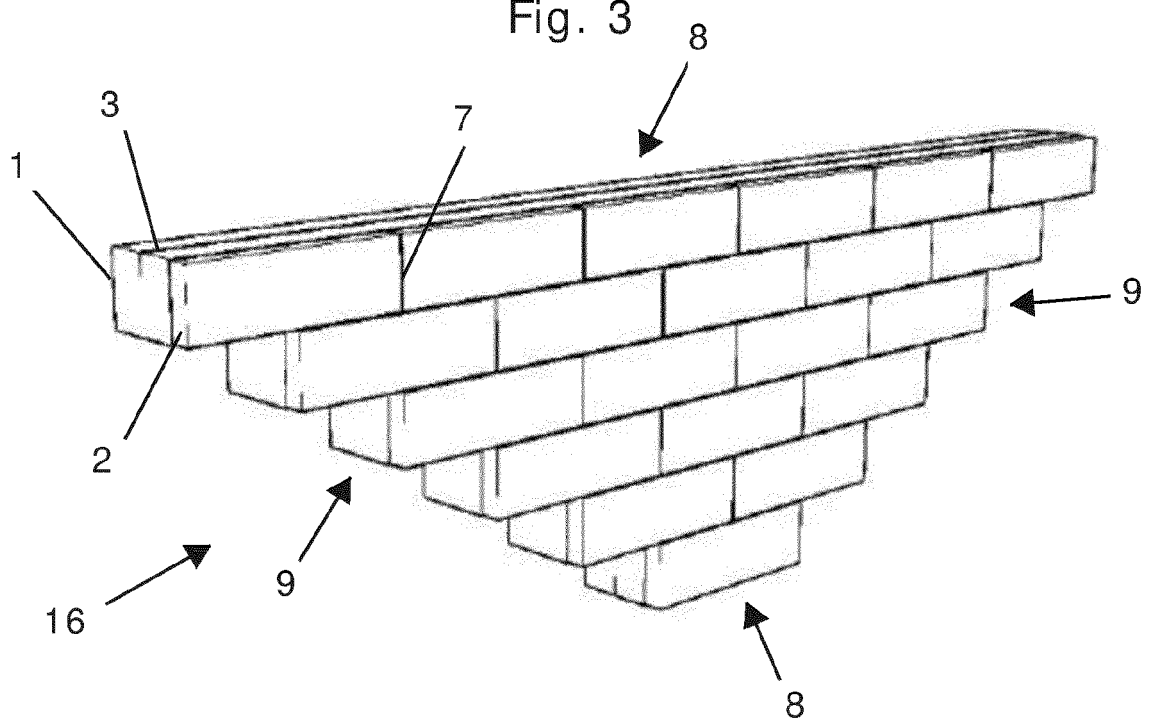
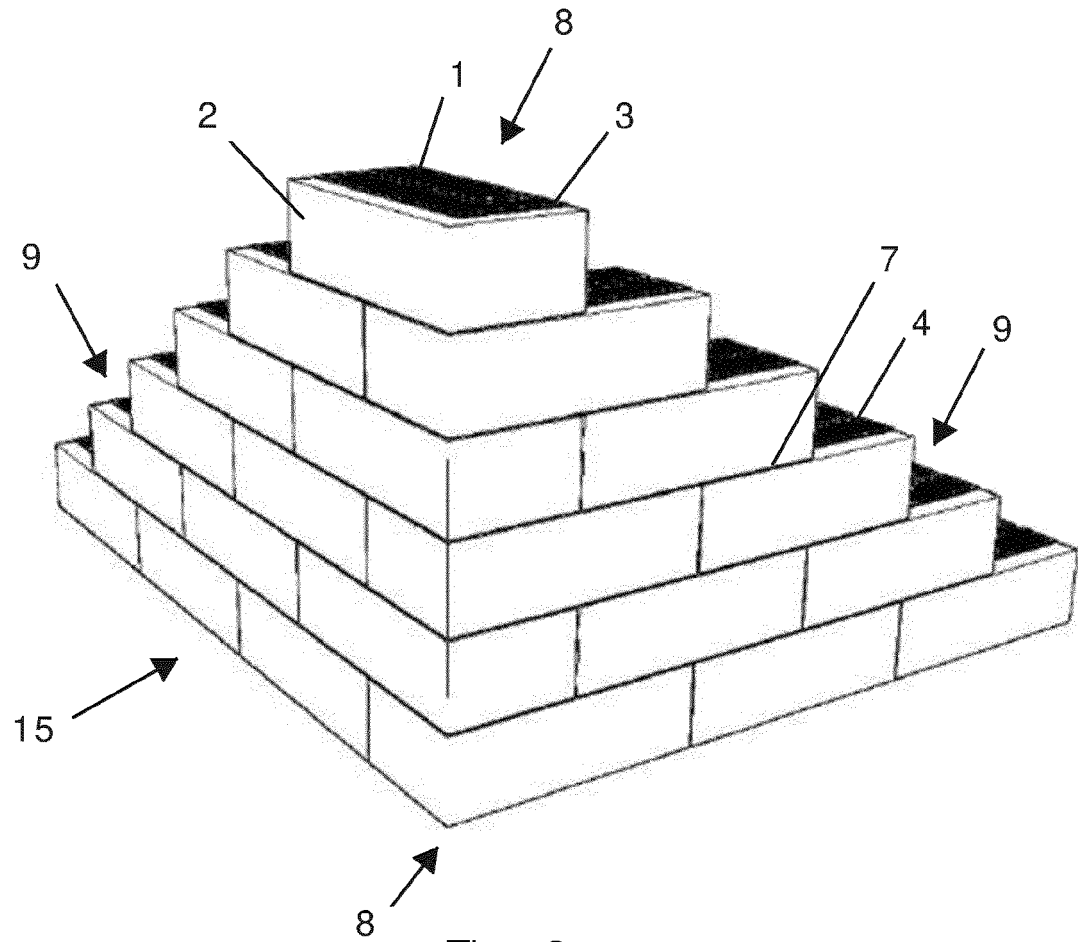


Fig. 2



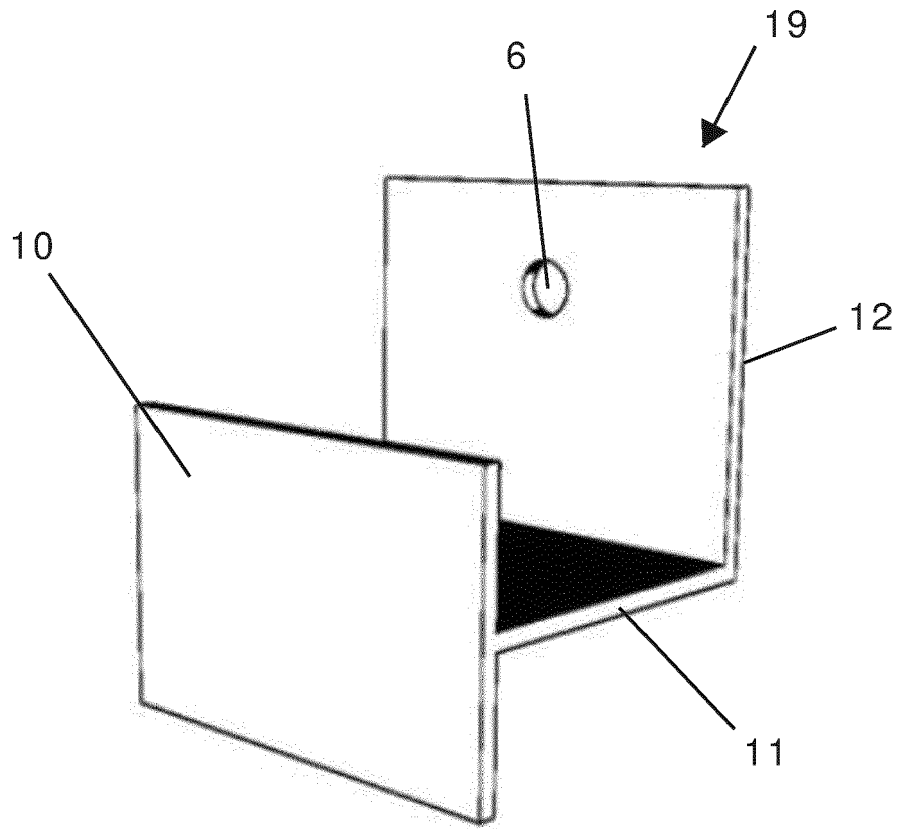


Fig. 5

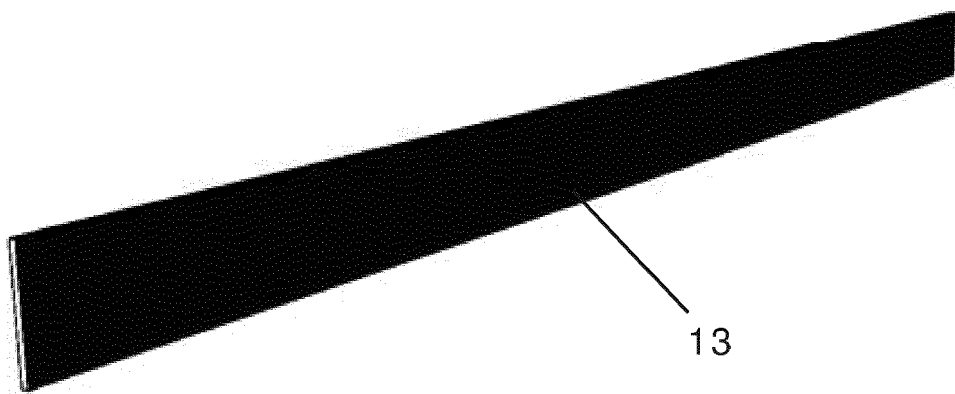


Fig. 6

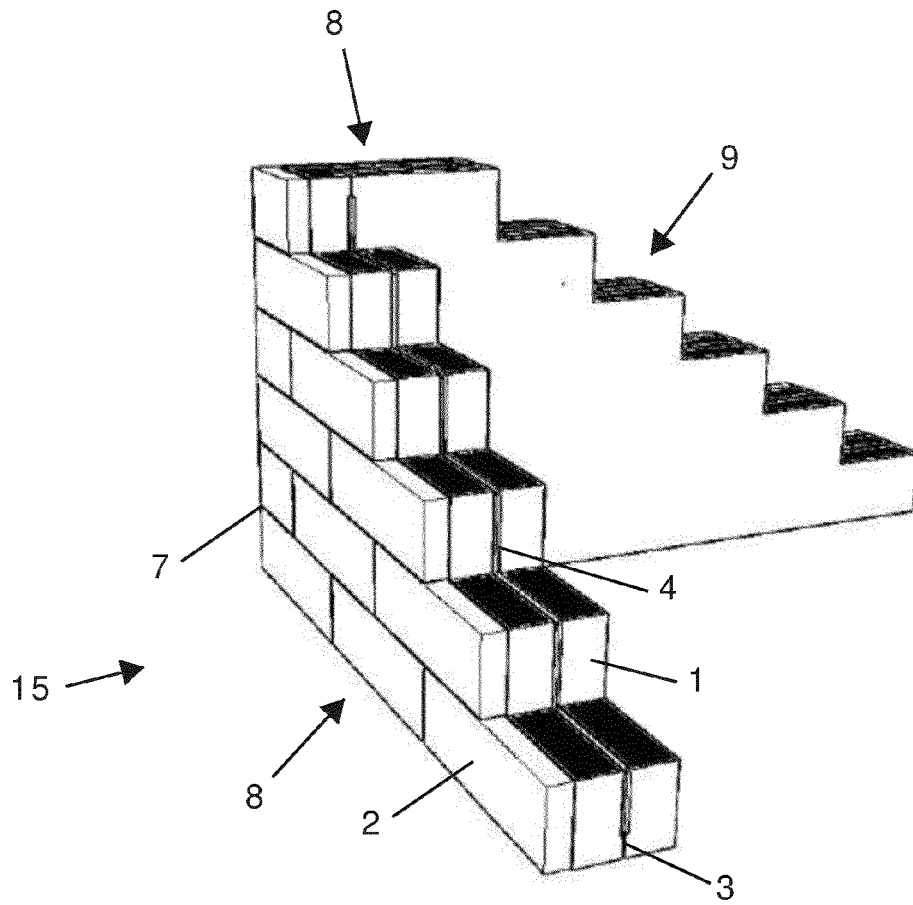


Fig. 7

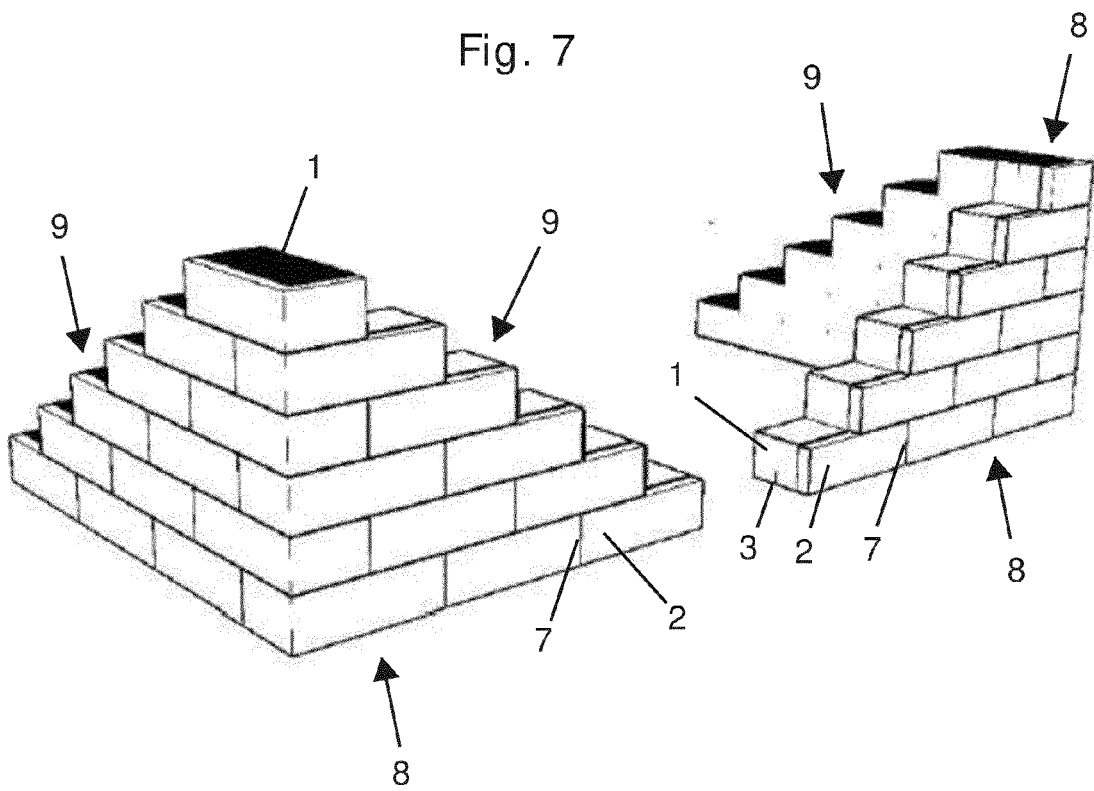


Fig. 8

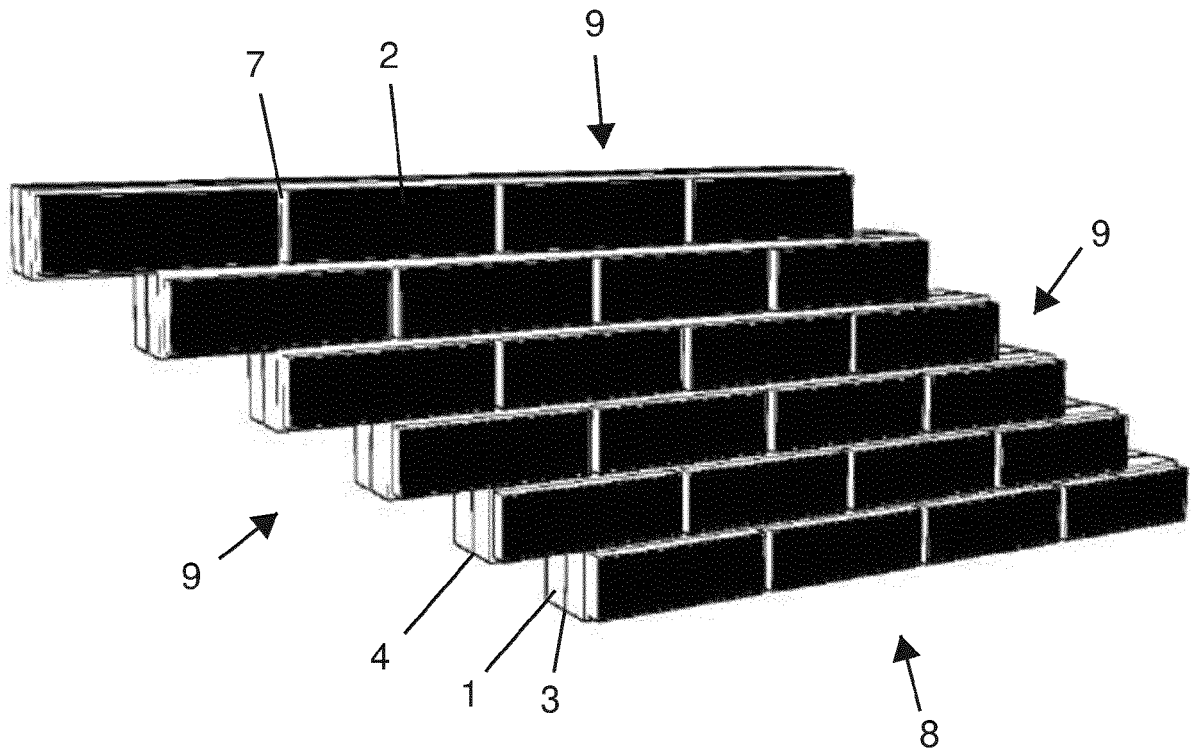


Fig. 9

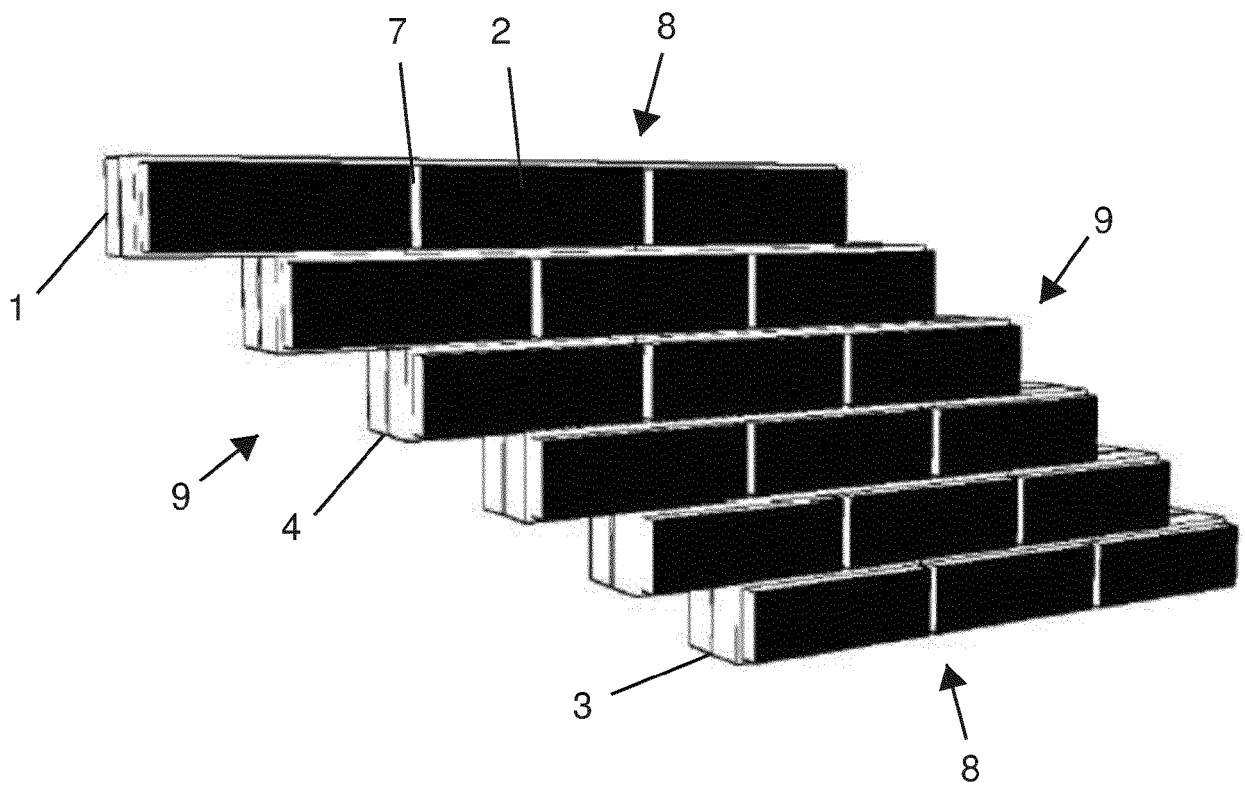


Fig. 10

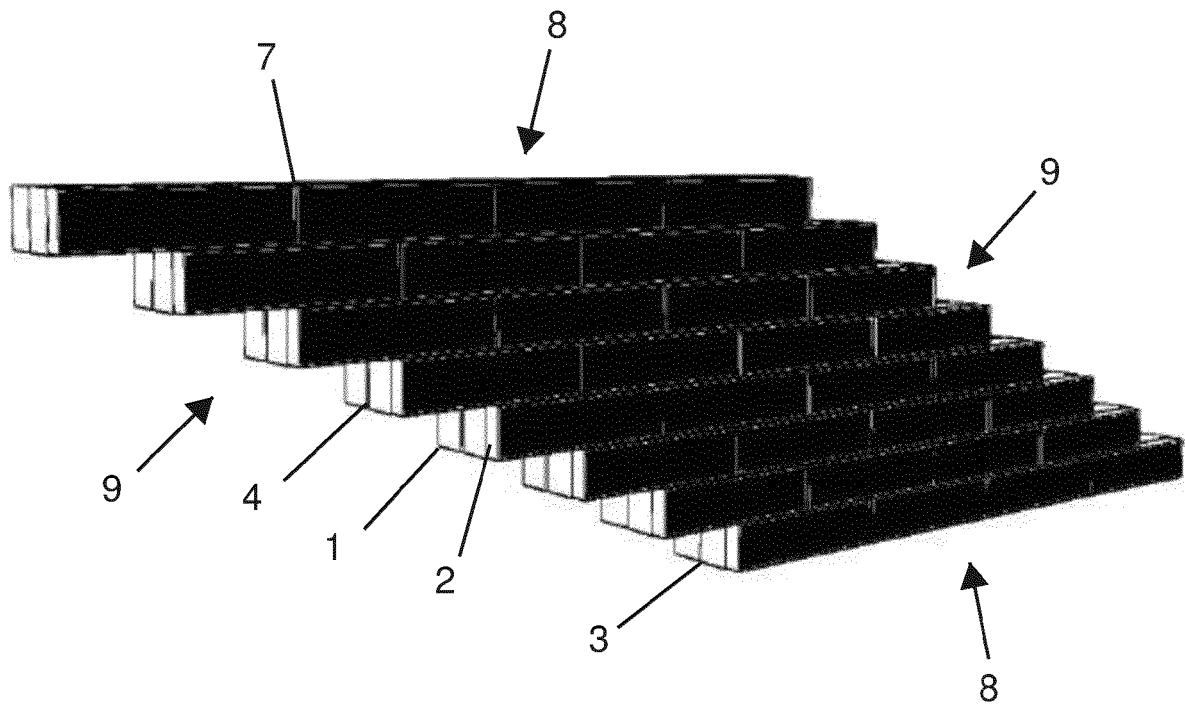


Fig. 11

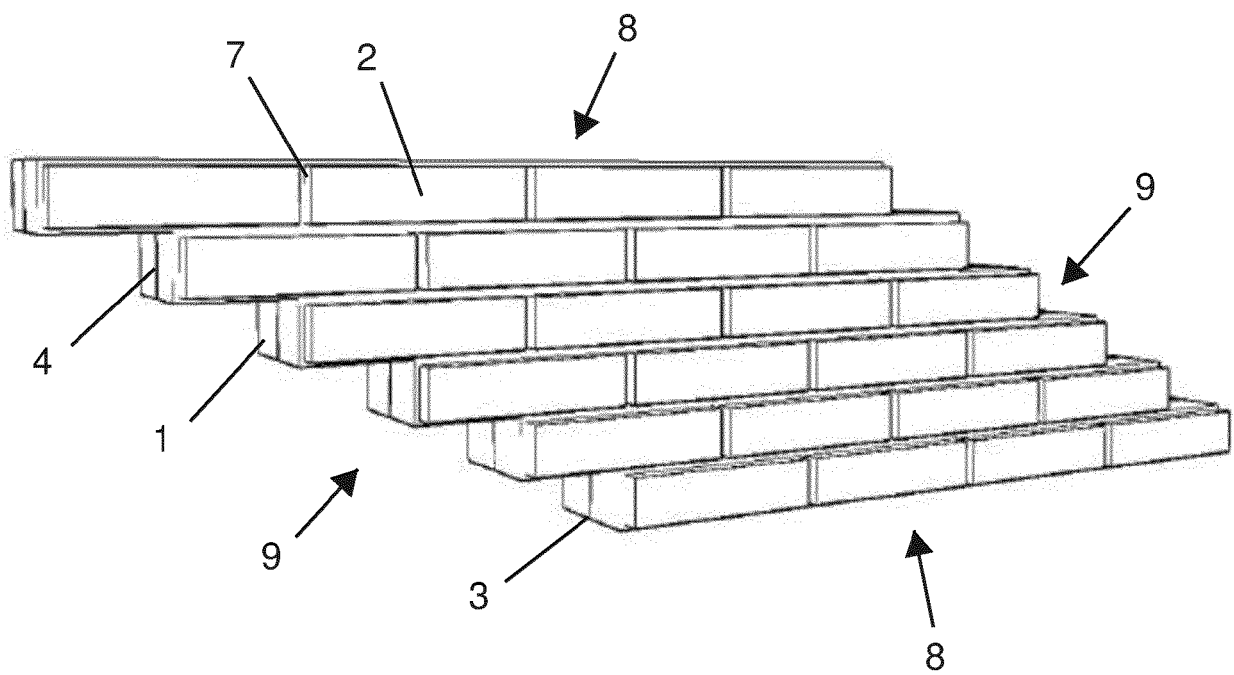


Fig. 12

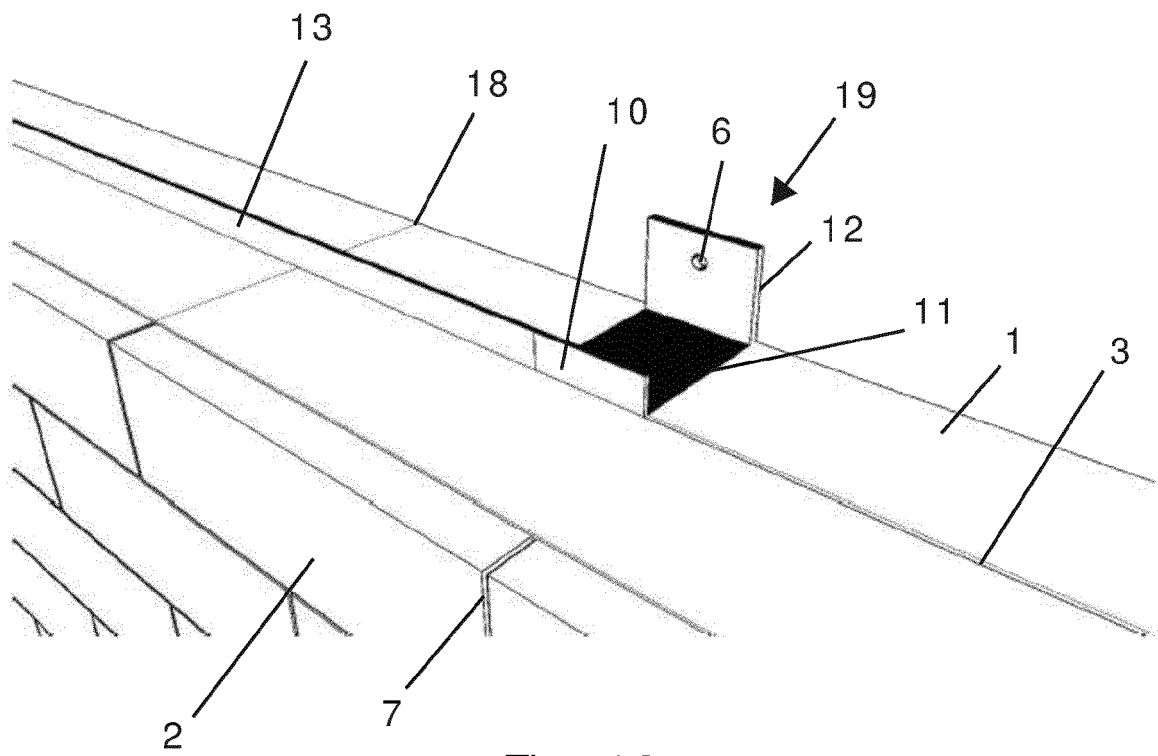


Fig. 13

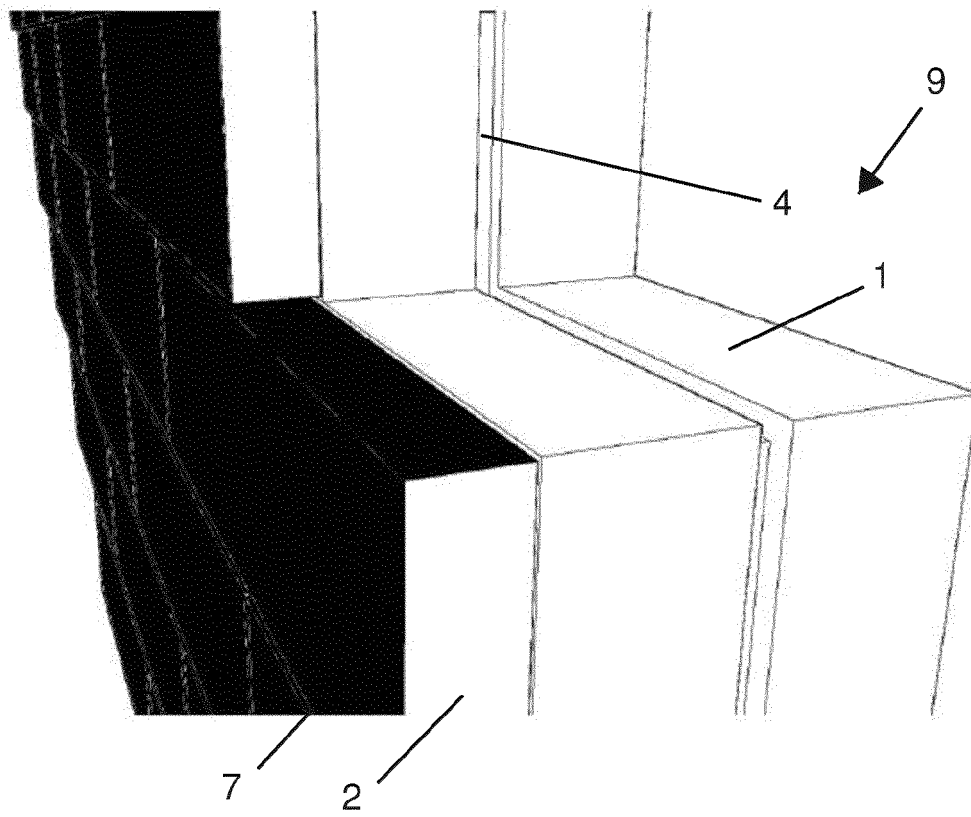


Fig. 14

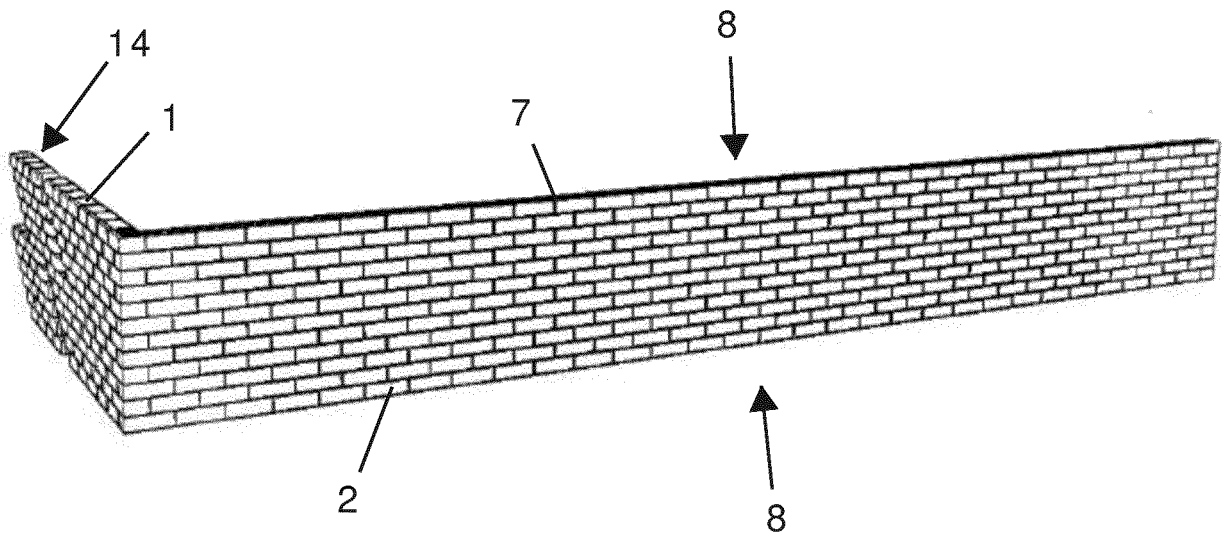


Fig. 15

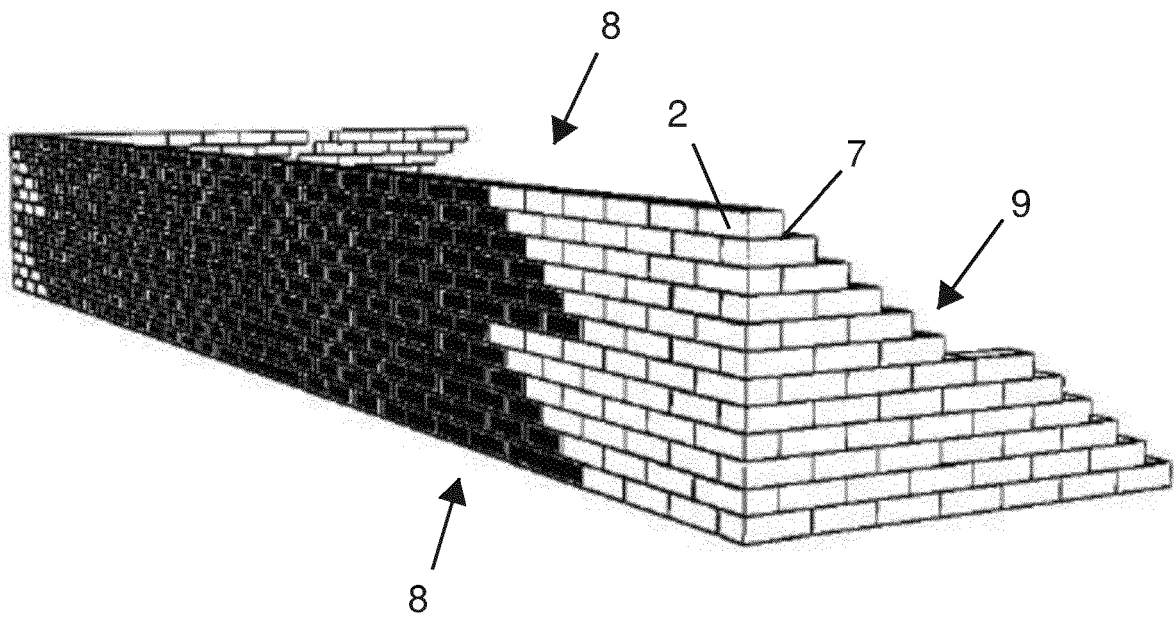


Fig. 16

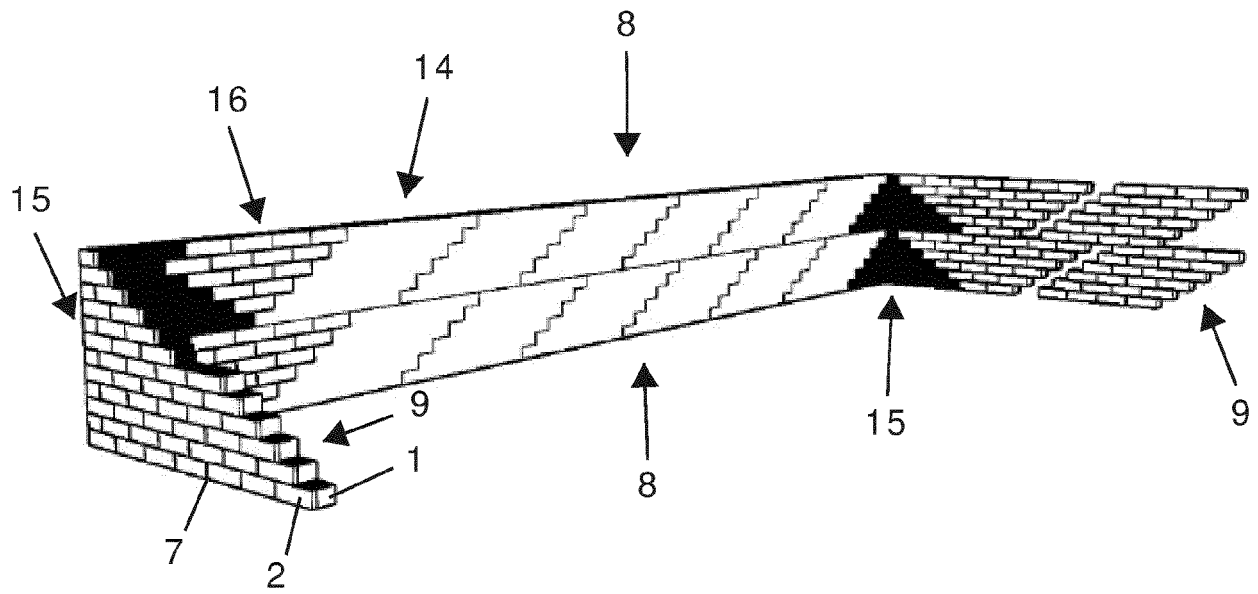


Fig. 17

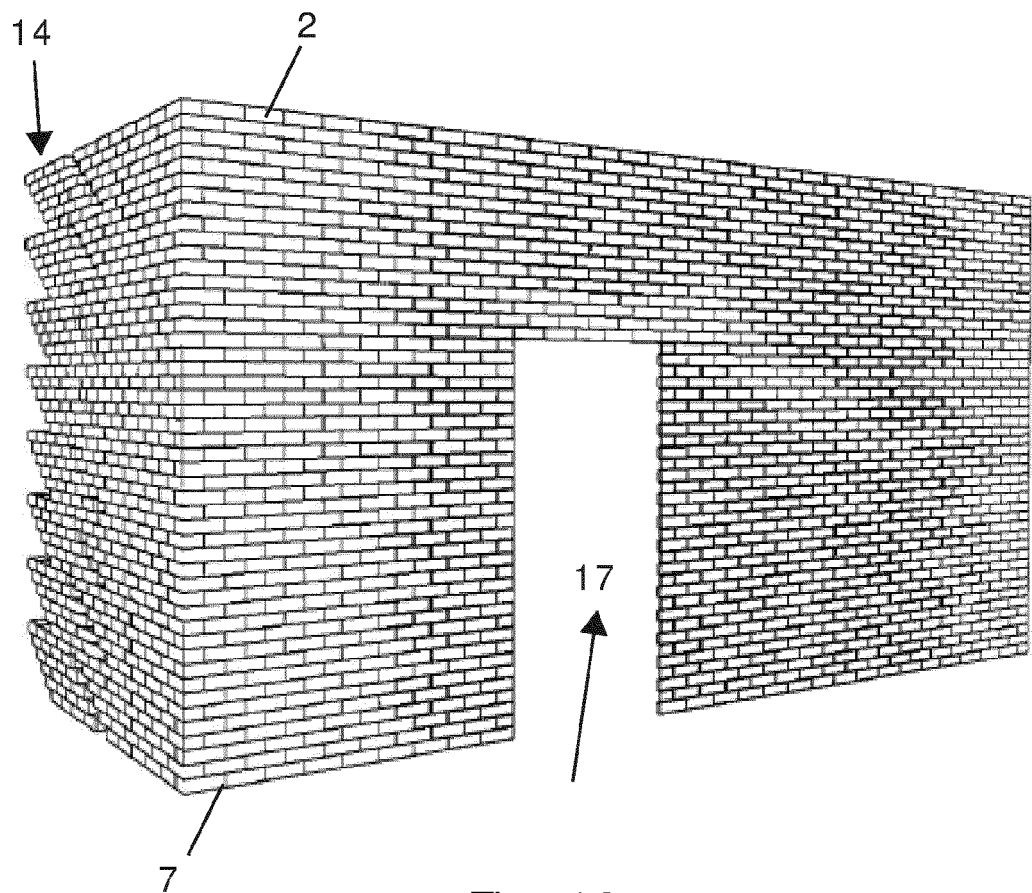


Fig. 18



EUROPEAN SEARCH REPORT

Application Number

EP 22 16 7703

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	GB 2 536 036 A (WESTPORT STONE WORKS) 7 September 2016 (2016-09-07) * page 1, lines 22-27 * * page 3, line 33 - page 6, line 11 * -----	1-14	INV. E04C2/288 E04C2/04
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