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(54) Wall block element

(57) A wall block element (1, 2, 3) for building and/or landscaping purposes, such as for building a retaining wall (4), masonry wall (5) and/or a curb. The wall block element (1, 2, 3) comprises a first panel (6) and a second panel (7), at least said first panel (6) being a natural stone slab. At least two spacer elements (8, 9) made of steel are arranged at a distance from each other for placing

and adjoining the first panel (6) and the second panel (7) together in parallel and at a distance in relation to each other. An inner space (10) is defined by the panels in-between the panels in which inner space a filling material (11), such as cast concrete, can be placed, said spacer elements each having connecting means (12) to attach at least the first panel to the spacer elements.

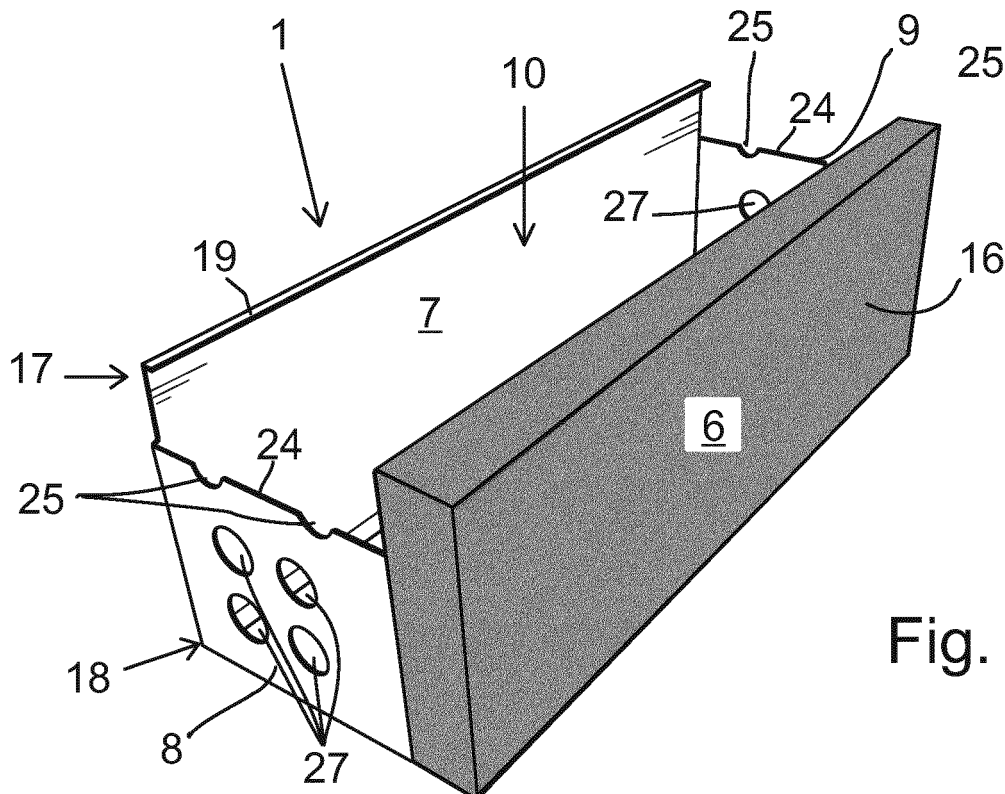


Fig. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a wall block element. The wall block elements may be e.g. used for building a basement wall and/or for landscaping purposes, such as for building a retaining wall, a masonry wall and/or a curb.

BACKGROUND OF THE INVENTION

[0002] In prior art there are known several types of wall block elements for landscaping purposes, such as for building retaining walls, masonry walls and/or curbs. The wall block elements may be made of concrete, lightweight aggregate or a natural stone. In many landscaping applications the look of natural stone block elements is most pleasing. The problem associated with wall block elements, which conventionally are massive natural stone blocks, is that they are heavy and very difficult or impossible to be handled by manpower. Therefore, a special lifting apparatus is needed for the transfer and installation of such elements.

OBJECTIVE OF THE INVENTION

[0003] The objective of the invention is to alleviate the disadvantages mentioned above.

[0004] In particular, it is an objective of the present invention to provide wall block elements which, at least when installed to form a retaining wall, a masonry wall or a curb, has a look of genuine natural stone, and which wall block elements are also lightweight and can be lifted and handled by manpower without a need for a lifting apparatus.

SUMMARY OF THE INVENTION

[0005] According to an aspect, the present invention provides a wall block element. According to the invention the wall block element comprises a first panel and a second panel, at least said first panel being a natural stone slab, one or more spacer elements, made of metal for placing and adjoining the first panel and the second panel together in parallel and at a distance in relation to each other, and an inner space being defined by the panels in-between the panels, in which inner space a filling material, such as cast concrete, can be placed, said spacer elements each having connecting means to attach at least the first panel to the spacer elements.

[0006] The advantage of the invention is that the wall block element is lightweight and easy to lift, handle and install by manpower. No lifting apparatus will be necessarily needed. For example, while a massive granite (density about 2750 kg/m³) wall block element having dimensions in conformity with the aggregate concrete masonry unit standards, e.g. with a length 600 mm, height

200 mm and width 200 mm, weighs about 66 kg, the wall block element with a structure according to the invention and e.g. having two natural stone slabs, with a length 600 mm, height 200 mm and thickness 20 mm, weighs only about 15 kg.

[0007] In an embodiment of the invention, the connecting means comprise a connecting flange which is parallel to the surface of the panel to which the connecting flange is attached.

[0008] In an embodiment of the invention, the connecting means comprise a glue joint by which the connecting flange is attached to the panel. The glue joint is advantageous because it does not require any holes, borings or other machining to be made in the natural stone slab. The surface of the natural stone slab achieved by sawing is suitable for gluing.

[0009] In an embodiment of the invention, the connecting means comprise a plurality of holes arranged at each connecting flange to enhance the grip of the glue joint. The plurality of holes can be arranged as a pattern of perforations.

[0010] In an embodiment of the invention, the second panel is made of a sheet metal and is an integral structure with the spacer elements, said wall block element being for the retaining wall in which the second panel is against the soil and the first panel having an outer surface as a façade of the wall block element.

[0011] In an embodiment of the invention, the second panel and the spacer elements are formed of a single sheet metal blank, the two spacer elements, being bent from the ends of the second panel perpendicularly in relation to the plane of the second panel.

[0012] In an embodiment of the invention, the second panel comprises an upper edge and a lower edge, said upper edge having an edge bend which is directed perpendicularly towards the first panel, and said lower edge having a receptable which opens to an opposite direction in relation to the direction of the edge bend, the receptable being adapted to receive inside the edge bend of another wall block element.

[0013] In an embodiment of the invention, the first panel and the second panel are both natural stone slabs, both of said natural stone slabs having a sawn inner surface which is towards the inner space and a treated outer surface. The treatment of the outer surface may include sawing, splitting, cleaving, polishing, honing, bush hammering, flaming, sand blasting, shot blasting and/or water jetting. The wall block element having two natural stone slabs on its opposite sides is suitable for building a masonry wall wherein both sides of the wall are exposed and visible.

[0014] In an embodiment of the invention, the wall block element comprises two spacer elements which are separate from each other.

[0015] In an embodiment of the invention, the first panel and the second panel have two end surfaces which are sawn surfaces, and that the spacer elements are connected with glue joints to said end surfaces.

[0016] In an embodiment of the invention, the connecting means comprise connecting flanges which are bent perpendicularly from the sheet steel material of the spacer elements to be parallel with the inner surfaces of the panels, said connecting flanges being connected with glue joints to the sawn inner surfaces.

[0017] In an embodiment of the invention, the spacer elements are placed into the inner space, the spacer elements being located at a distance from the end surfaces of the panels.

[0018] In an embodiment of the invention, the spacer element comprises an upper edge having one or more notches which are located at a distance below the upper surface of the panels.

[0019] In an embodiment of the invention, the spacer element comprises one or more holes to provide a path for the filling material, such as cast concrete.

[0020] In an embodiment of the invention, the spacer element comprises a stiffening flange at the lower edge of the spacer element.

[0021] In an embodiment of the invention, the stiffening flange is bent perpendicularly from the plane of the sheet metal material of the spacer element.

[0022] In an embodiment of the invention, the thickness of the natural stone slab is 1 to 8 cm.

[0023] In an embodiment of the invention, the wall block element has outer dimensions which are in conformity with the aggregate concrete masonry unit standards.

[0024] It is to be understood that the aspects and embodiments of the invention described above may be used in any combination with each other. Several of the aspects and embodiments may be combined together to form a further embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The accompanying drawings, which are included to provide a further understanding of the invention and constitute a part of this specification, illustrate embodiments of the invention and together with the description help to explain the principles of the invention. In the drawings:

Figure 1 is a perspective view of a first embodiment of the wall block element according to the invention,

Figure 2 shows the wall block element of Figure 1 the first panel being drawn with a dash line and shown as transparent,

Figure 3 is an axonometric view of a retaining wall built from the wall block elements of Figure 1,

Figure 4 is a schematic cross section of IV-IV of the retaining wall of Figure 3,

Figure 5 is a perspective view of a second embodi-

ment of the wall block element according to the invention,

Figure 6 shows the wall block element of Figure 5 the first panel and the second panel being drawn with a dash line and shown as transparent,

Figure 7 is a perspective view of a third embodiment of the wall block element according to the invention,

Figure 8 shows the wall block element of Figure 7 the first panel and the second panel being drawn with a dash line and shown as transparent,

Figure 9 is an axonometric view of a masonry wall built from the wall block elements of Figure 5, and

Figure 10 is an axonometric view of a masonry wall built from the wall block elements of Figure 7.

DETAILED DESCRIPTION OF THE INVENTION

[0026] Figures 1 and 2 show a first embodiment of the wall block element 1. The wall block element is suitable for building a basement wall of a building or a retaining wall 4 (see also Figures 3 and 4). A retaining wall is a structure designed and constructed to resist the lateral pressure of soil when there is a desired change in ground elevation that exceeds the angle of repose of the soil.

[0027] The wall block element 1 comprises a first panel 6 and a second panel 7. In this embodiment the second panel 7 is made of sheet metal (sheet steel or sheet aluminium) and the first panel 6 is a natural stone slab. Two spacer elements 8, 9 which are made of sheet metal are arranged at a distance from each other to placing and adjoin the first panel 6 and the second panel 7 together in parallel and at a distance in relation to each other. An inner space 10 is defined by the panels in-between the panels 6 and 7. A filling material 11, such as cast concrete, can be placed into the inner space 10. As can be seen in Figure 2, each of the spacer elements 8 and 9 have connecting means 12 to attach the first panel 6 to the spacer elements 8 and 9. The connecting means 12 comprise a connecting flange 13 which is parallel to the surface of the first panel 1 to which the connecting flange 13 is attached by a glue joint. In order to enhance the grip of the glue joint a plurality of holes 14 are arranged at the connecting flanges 13.

[0028] The second panel 7 is made of a sheet metal and is an integral structure with the spacer elements 8, 9. As shown in Figure 4, in the retaining wall 5 the second panel 7 is against the soil 15 and the first panel 6 having an outer surface 16 as a façade of the wall block element 1 and forming a façade of the retaining wall.

[0029] Referring again to Figure 2, the second panel 7 and the spacer elements 8, 9 are formed of a single sheet metal blank. The two spacer elements 8, 9 are bent from the ends of the second panel 7 perpendicularly in

relation to the plane of the second panel 7.

[0030] With reference to Figure 2 and 4, the second panel 7 comprises an upper edge 17 and a lower edge 18. The upper edge 17 has an edge bend 19 which is directed perpendicularly towards the first panel 6. The lower edge 18 has a receptacle 20 formed as an open hem which opens to an opposite direction in relation to the direction of the edge bend 19, the receptacle 20 being adapted to receive inside the edge bend of another wall block element. The interlocking of the edge bend 19 and the receptacle 20 holds the wall block elements 1 firmly before and during the inner spaces 10 are filled with the filling material 11. Preferably the filling material 11 is cast concrete. The inner spaces 10 of the different wall block elements 1 are all vertically and laterally connected to each other to allow the concrete flow inside the wall during casting. For this purpose, the spacer elements 8, 9 comprise holes 27 to provide a path for the filling material 11. The spacer elements 8, 9 comprise notches 25 formed at the upper edge 24. The notches are located at a distance h below the upper surface of the panel 6. As shown in Figures 3 and 4 reinforcement bars 26 can be placed on the support of the notches 25.

[0031] A further embodiment is shown in Figures 5, 6 and 9. In this embodiment the wall block element 2 comprises a first panel 6 which is a natural stone slab and a second panel 7 which is also a natural stone slab. Such a wall block element 2 having two natural stone slabs on its opposite sides is suitable for building a masonry wall (see Figure 9) wherein both sides of the wall are exposed and visible.

[0032] The first panel 6 and the second panel 7 both have a sawn inner surface 21 which is towards the inner space 10 and a treated outer surface 22 on the façade sides of the slabs. The outer surface 22 may be treated by any known process suitable for treating a natural stone surface. These include sawing, splitting, cleaving, polishing, honing, bush hammering, flaming, sand blasting, shot blasting and/or water jetting. Two spacer elements 8, 9 made of sheet metal (such as sheet steel or sheet aluminium) are arranged at a distance from each other for placing and adjoining the first panel 6 and the second panel 7 together in parallel and at a distance in relation to each other. An inner space 10 is defined in-between the first and second natural stone slab panels 6, 7. A filling material (not shown), such as cast concrete, can be placed inside the inner space 10. The spacer elements 8, 9 have connecting means 12 to attach the first and second natural stone slab panels 6, 7 to the spacer elements 8, 9.

[0033] Referring again to Figures 5 and 6, the wall block element 2, 3 comprises two spacer elements 8, 9 which are separate from each other. The first panel 6 and the second panel 7 have vertical end surfaces 23 which are sawn surfaces. The spacer elements 8, 9 are connected with glue joints to these end surfaces 23.

[0034] Each of the spacer elements 8 and 9 are formed of a single sheet metal blank. The spacer elements 8 and

9 are identical. The connecting means 12 comprise a connecting flange 13 at the vertical edge regions of the spacer elements. The spacer elements 8 and 9 are attached by glue joints to the end surfaces 23 of the first panel 6 and the second panel 7. In order to enhance the grip of the glue joint a plurality of holes 14 are arranged at the connecting flanges 13.

[0035] Also in the embodiment of Figures 5 and 6, the spacer elements 8, 9 comprise an upper edge 24 having notches 25, which are located at a distance h below the upper surface of the panels. The notches 25 can form a support for the reinforcement bar. The spacer elements 8, 9 comprise holes 27 to provide a path for the filling material 11, such as cast concrete. Further, the spacer elements 8, 9 comprise a stiffening flange 28 at the lower edge 29 of the spacer element. The stiffening flange 28 is bent perpendicularly from the plane of the sheet metal material of the spacer element 8, 9.

[0036] A further embodiment is shown in Figures 7, 8 and 10. In this embodiment the wall block element 2 comprises a first panel 6 which is a natural stone slab and a second panel 7 which is also a natural stone slab. Such a wall block element 2 having two natural stone slabs on its opposite sides is suitable for building a masonry wall (see Figure 10) wherein both sides of the wall are exposed and visible.

[0037] The first panel 6 and the second panel 7 both have a sawn inner surface 21 which is towards the inner space 10 and a treated outer surface 22 on the façade sides of the slabs. The outer surface 22 may be treated by any known process suitable for treating a natural stone surface. These include sawing, splitting, cleaving, polishing, honing, bush hammering, flaming, sand blasting, shot blasting and/or water jetting. Two spacer elements 8, 9 made of sheet metal (sheet steel or sheet aluminium) are arranged at a distance from each other for placing and adjoining the first panel 6 and the second panel 7 together in parallel and at a distance in relation to each other. An inner space 10 is defined in-between the first and second natural stone slab panels 6, 7. A filling material (not shown), such as cast concrete, can be placed inside the inner space 10. The spacer elements 8, 9 have connecting means 12 to attach the first and second natural stone slab panels 6, 7 to the spacer elements 8, 9.

[0038] Referring to Figures 7 and 8, the wall block element 2, 3 comprises two spacer elements 8, 9 which are separate from each other. The spacer elements 8, 9 are placed into the inner space 10. The spacer elements are located at a distance from the vertical end surfaces 23 of the panels 6 and 7. The connecting means 12 comprise connecting flanges 13 which are bent perpendicularly from the sheet metal material of the spacer elements 8, 9 to be parallel with the inner surfaces 21 of the panels 6, 7, said connecting flanges being connected with glue joints to the sawn inner surfaces.

[0039] Each of the spacer elements 8 and 9 are formed of a single sheet metal blank. The spacer elements 8 and 9 are identical. The connecting means 12 comprise a

connecting flange 13 at the vertical edge regions of the spacer elements. The spacer elements 8 and 9 are attached by glue joints to the inner surfaces 21 of the first panel 6 and the second panel 7. In order to enhance the grip of the glue joint a plurality of holes 14 are arranged at the connecting flanges 13.

[0040] Also in the embodiment of Figures 7 and 8, the spacer elements 8, 9 comprise an upper edge 24 having notches 25, which are located at a distance below the upper surface of the panels. The notches 25 can form a support for the reinforcement bar (not shown). The spacer elements 8, 9 comprise holes 27 to provide a path for the filling material 11, such as cast concrete. Further, the spacer element 8, 9 comprises a stiffening flange 28 at the lower edge 29 of the spacer element. The stiffening flange 28 is bent perpendicularly from the plane of the sheet metal material of the spacer element 8, 9.

[0041] In the embodiments of Figures 1 to 10 the thickness of the natural stone slab may be 1 to 8 cm depending on the application. A natural stone slab having a treated outer surface 22 may have a thickness which is 1 cm or more. A natural stone slab having a split (cleaved) outer surface 22 may have a thickness of 5 to 8 cm. Preferably, the wall block elements 1, 2, 3 have outer dimensions which are in conformity with the aggregate concrete masonry unit standards. Such a wall block element 1, 2, 3 may have dimensions e.g. length 600 mm, height 200 mm and width 150 mm or 200 mm or 300 mm.

[0042] Although the invention has been described in conjunction with a certain type of wall block element, it should be understood that the invention is not limited to any certain type of wall block element. While the present inventions have been described in connection with a number of exemplary embodiments, and implementations, the present inventions are not so limited, but rather cover various modifications, and equivalent arrangements, which fall within the purview of prospective claims.

Claims

1. A wall block element (1, 2, 3), **characterized in that** the wall block element (1, 2, 3) comprises

- a first panel (6) and a second panel (7), at least said first panel (6) being a natural stone slab, and
- one or more spacer elements (8, 9) made of metal for placing and adjoining the first panel (6) and the second panel (7) together in parallel and at a distance in relation to each other, and
- an inner space (10) being defined by the panels in-between the panels, in which inner space a filling material (11), such as cast concrete, can be placed, said spacer elements each having connecting means (12) to attach at least the first panel to the spacer elements.

2. The wall block element according to claim 1, **characterized in that** the connecting means (12) comprise a connecting flange (13) which is parallel to the surface of the panel (1, 2, 3) to which the connecting flange is attached.

3. The wall block element according to claim 2, **characterized in that** the connecting means (12) comprise a glue joint by which the connecting flange (13) is attached to the panel (1, 2, 3).

4. The wall block element according to claim 3, **characterized in that** connecting means (12) comprise a plurality of holes (14) arranged at each connecting flange (13) to enhance the grip of the glue joint.

5. The wall block element according to any one of the claims 1 to 4, **characterized in that** the second panel (7) is made of a sheet metal and is an integral structure with the spacer elements (8, 9), said wall block element (1) being for the retaining wall (4) in which the second panel (7) is against the soil (15) and the first panel (6) having an outer surface (16) as a façade of the wall block element (1).

6. The wall block element according to any one of the claims 1 to 5, **characterized in that** the second panel (7) and the spacer elements (8, 9) are formed of a single sheet metal blank, the two spacer elements (8, 9) being bent from the ends of the second panel (7) perpendicularly in relation to the plane of the second panel.

7. The wall block element according to any one of the claims 1 to 6, **characterized in that** the second panel (7) comprises an upper edge (17) and a lower edge (18), said upper edge (17) having an edge bend (19) which is directed perpendicularly towards the first panel (6), and said lower edge (18) having a receptacle (20) which opens to an opposite direction in relation to the direction of the edge bend, the receptacle being adapted to receive inside the edge bend of another wall block element.

8. The wall block element according to any one of the claims 1 to 4, **characterized in that** the first panel (6) and the second panel (7) are natural stone slabs, both of said natural stone slabs having a sawn inner surface (21) which is towards the inner space (10) and a treated outer surface (22).

9. The wall block element according to claim 8, **characterized in that** the wall block element (2, 3) comprises two spacer elements (8, 9) which are separate from each other.

10. The wall block element according to claim 8 or 9, **characterized in that** the first panel (6) and the sec-

ond panel (7) have two end surfaces (23) which are
sawn surfaces, and that the spacer elements (8, 9)
are connected with glue joints to said end surfaces.

11. The wall block element according to claim 9, **characterized in that** the connecting means (12) comprise connecting flanges (13) which are bent perpendicularly from the sheet metal material of the spacer elements (8, 9) to be parallel with the inner surfaces (21) of the panels (2, 3), said connecting flanges being connected with glue joints to the sawn inner surfaces. 5 10
12. The wall block element according to any one of the claim 11, **characterized in that** the spacer elements (8, 9) are placed into the inner space (10), the spacer elements being located at a distance from the end surfaces (23) of the panels. 15
13. The wall block element according to any one of the claims 1 to 12, **characterized in that** the spacer element (8, 9) comprises an upper edge (24) having one or more notches (25), which are located at a distance (h) below the upper surface of the panels, whereby a reinforcement bar (26) can be placed on the support of the notches. 20 25
14. The wall block element according to any one of the claims 1 to 13, **characterized in that** the spacer element (8, 9) comprises one or more holes (27) to provide a path for the filling material (11), such as cast concrete. 30
15. The wall block element according to any one of the claims 1 to 14, **characterized in that** the spacer element (8, 9) comprises a stiffening flange (28) at the lower edge (29) of the spacer element. 35
16. The wall block element according to any one of the claims 1 to 14, **characterized in that** the stiffening flange (28) is bent perpendicularly from the plane of the sheet metal material of the spacer element (8, 9). 40
17. The wall block element according to any one of the claims 1 to 16, **characterized in that** the thickness of the natural stone slab is 1 to 8 cm. 45
18. The wall block element according to any one of the claims 1 to 17, **characterized in that** the wall block element (1, 2, 3) has outer dimensions which are in conformity with the aggregate concrete masonry unit standards. 50

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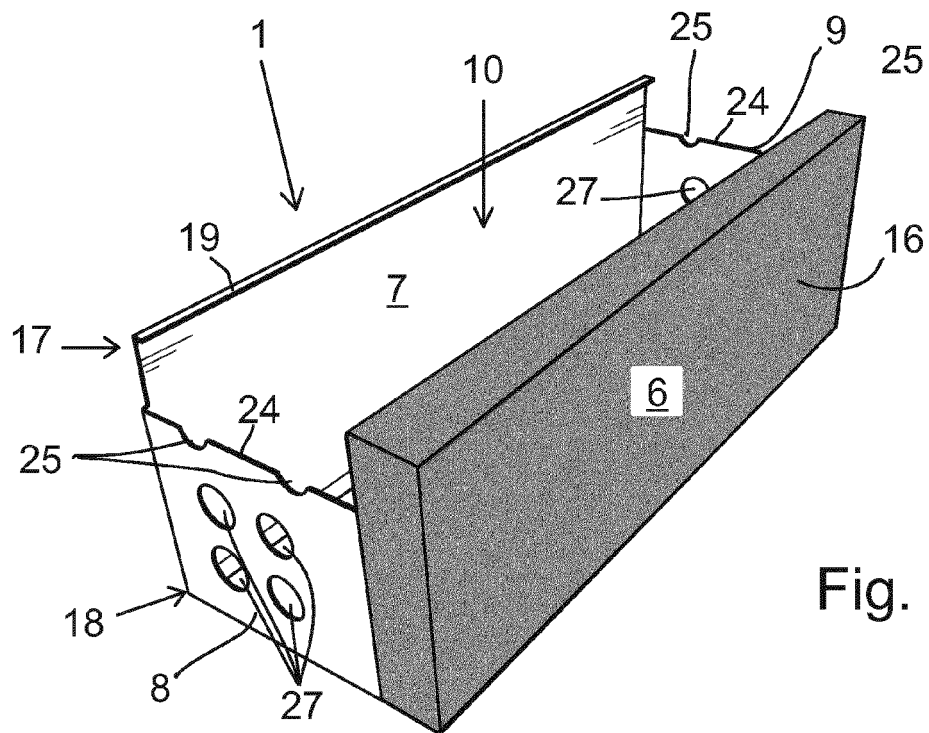


Fig. 1

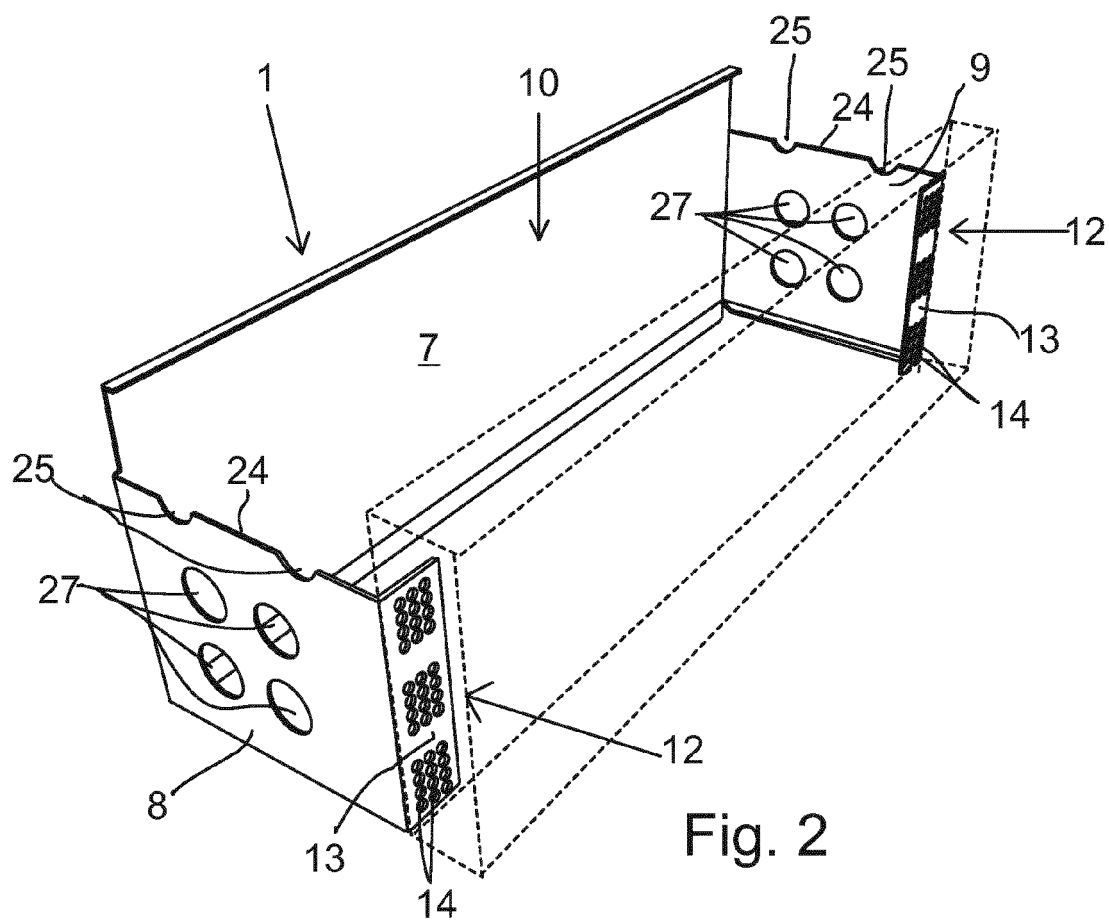
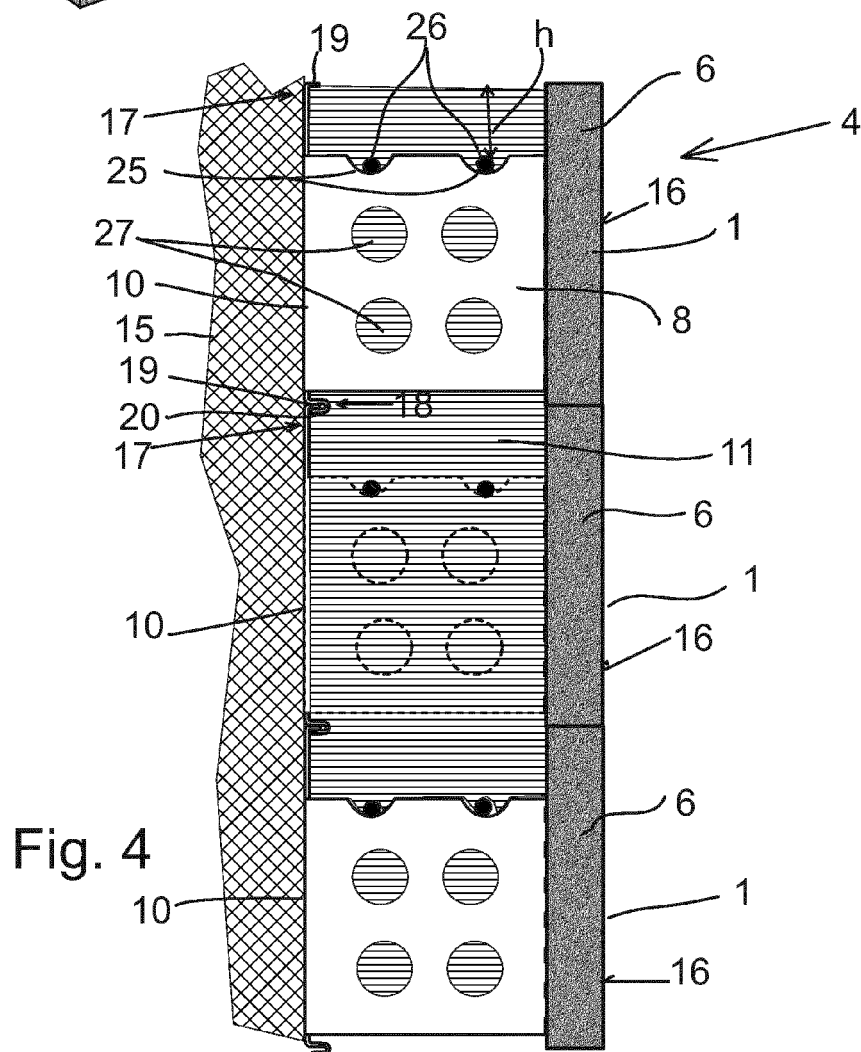
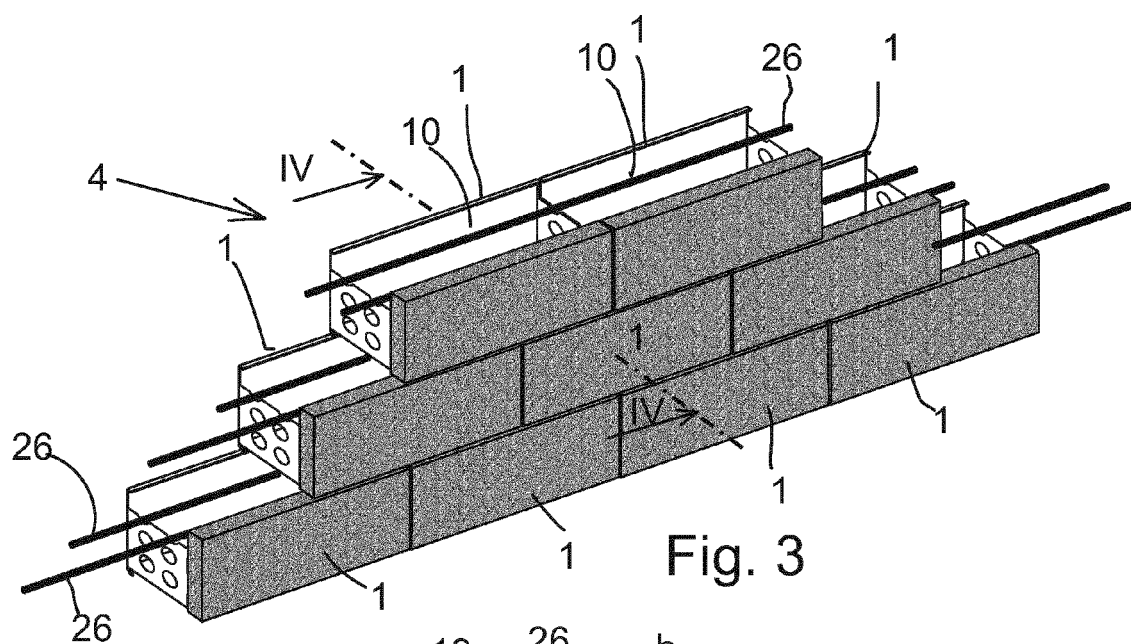
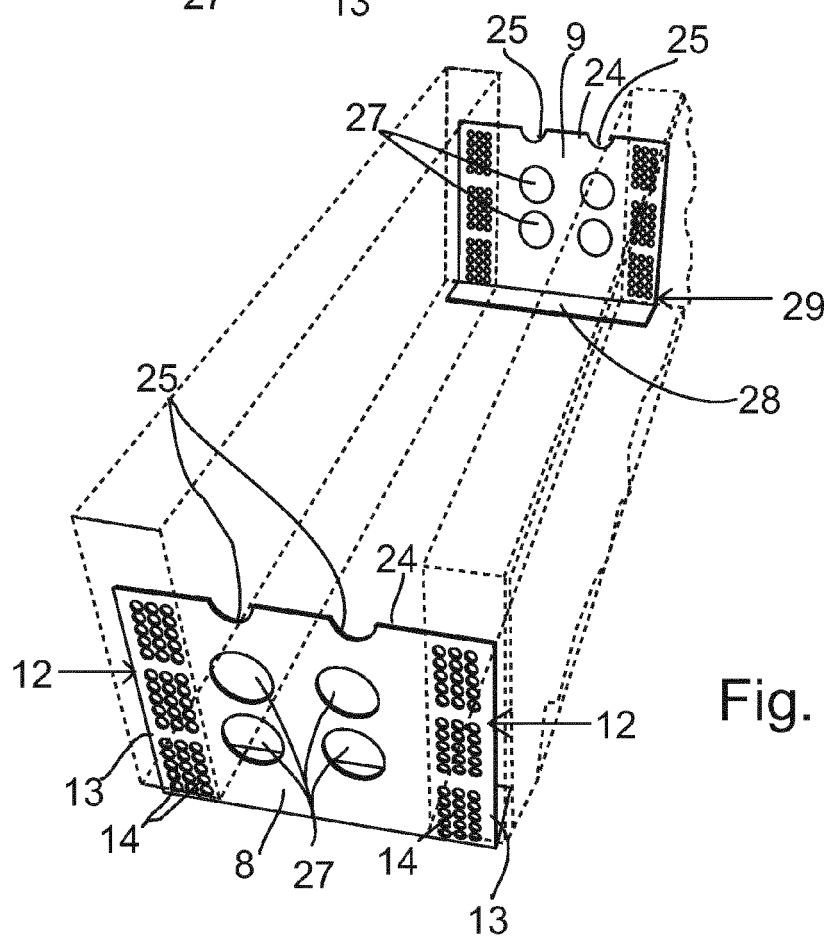
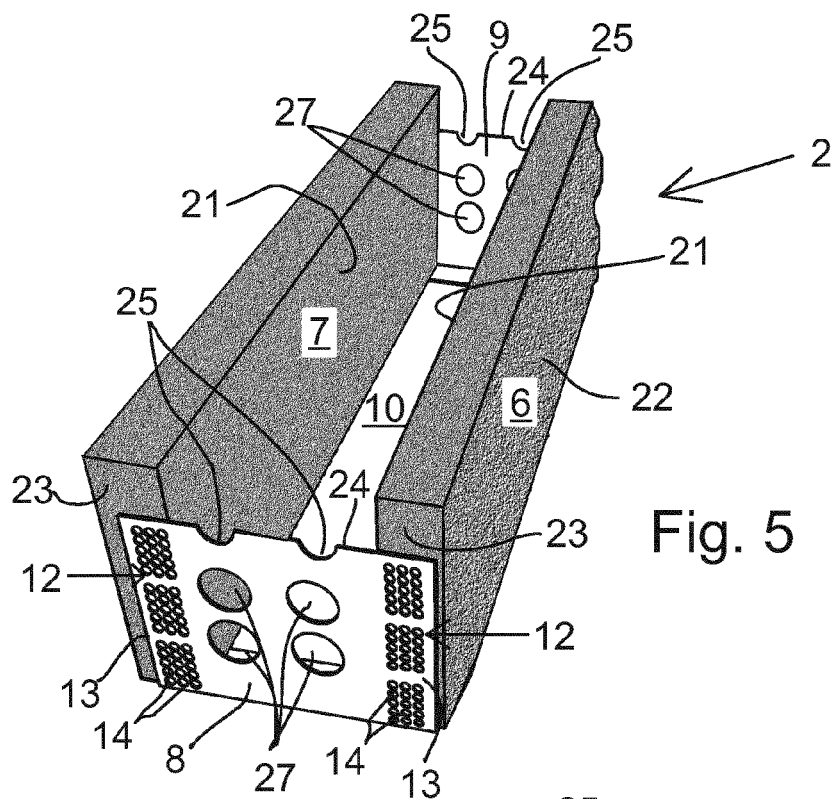


Fig. 2





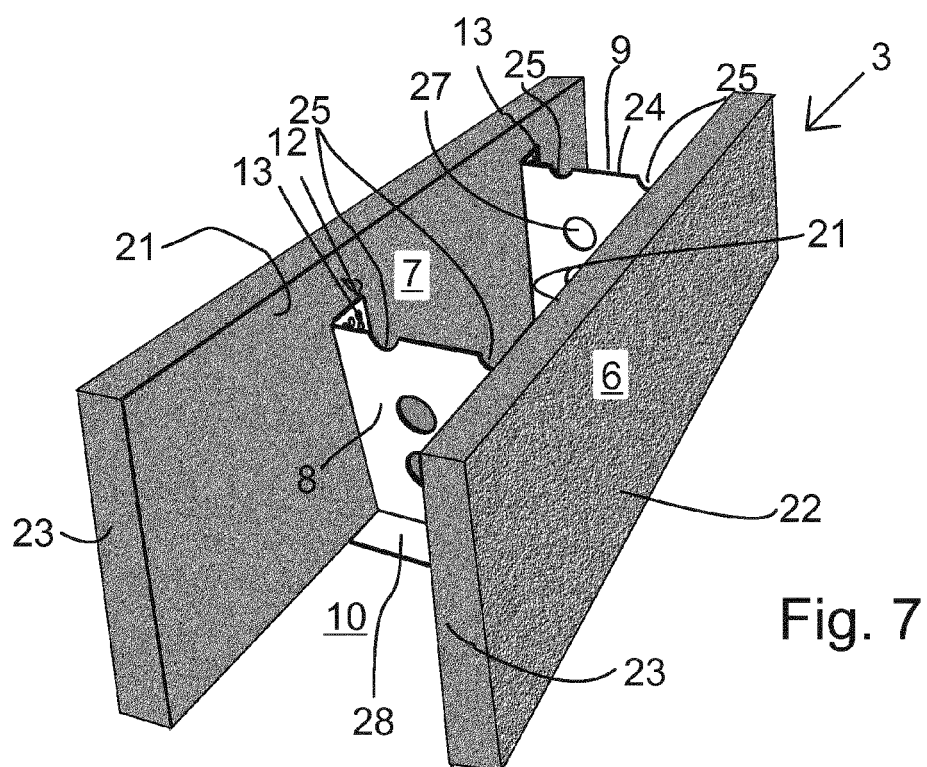


Fig. 7

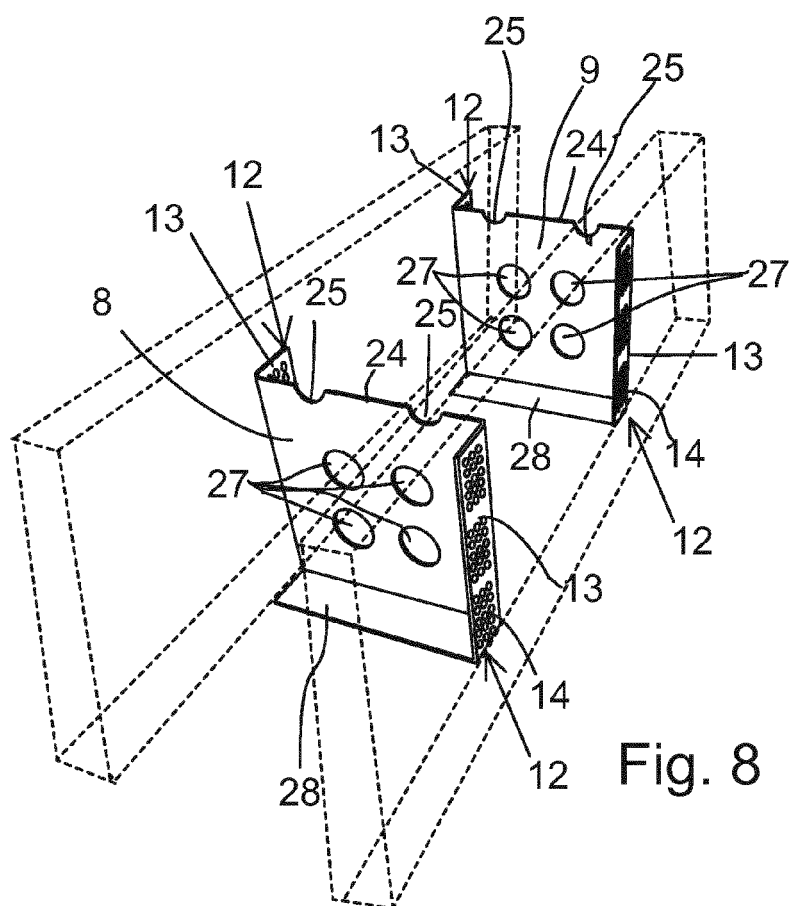


Fig. 8

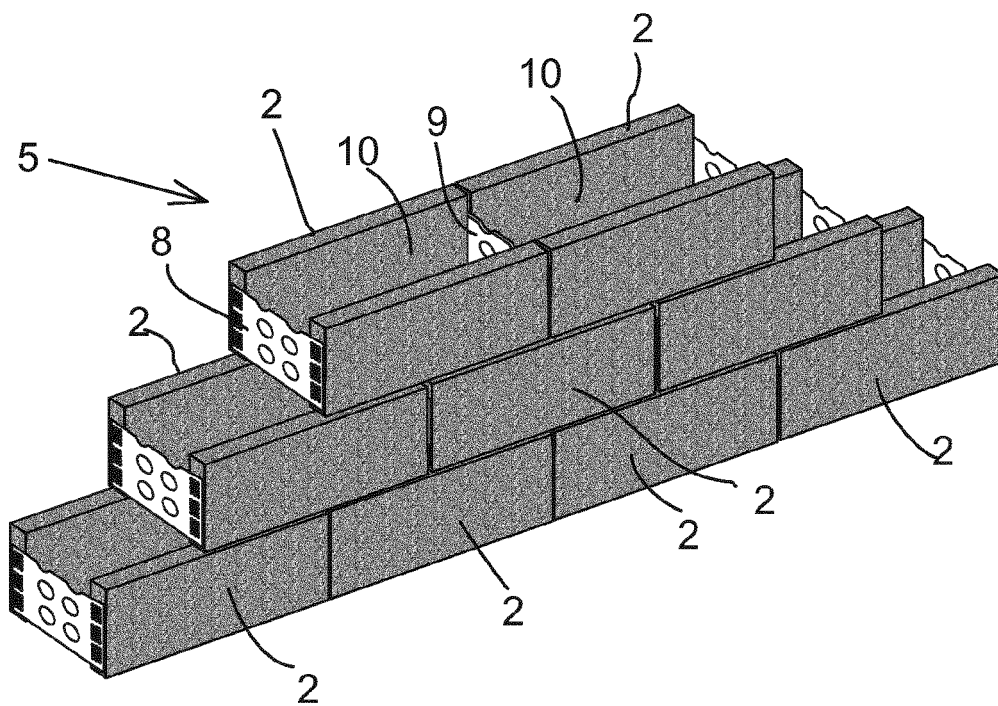


Fig. 9

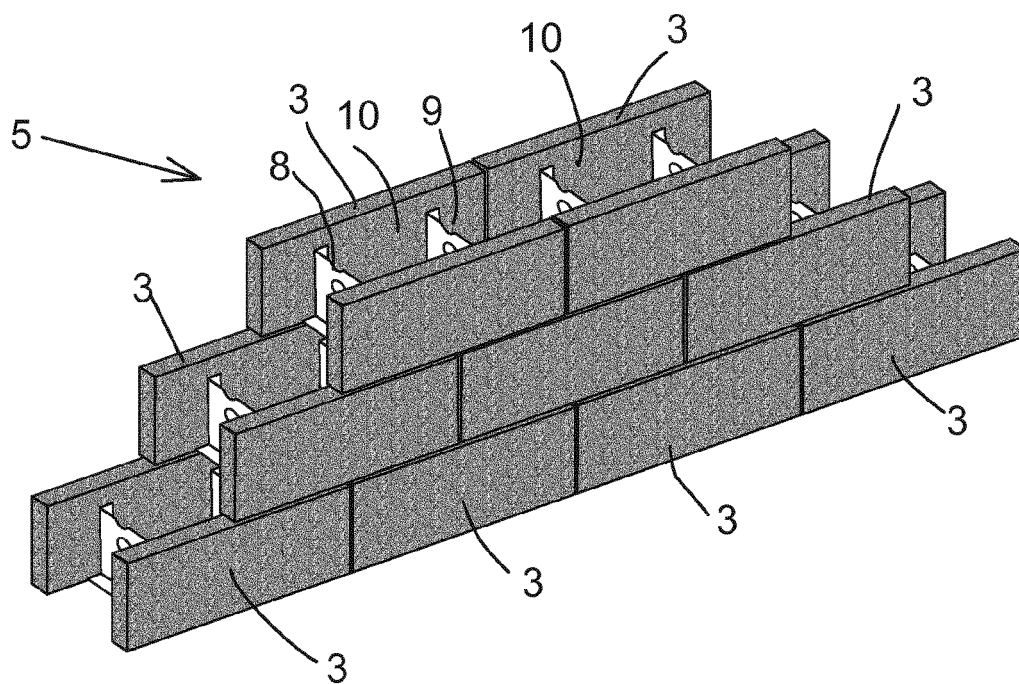


Fig. 10



EUROPEAN SEARCH REPORT

Application Number
EP 13 18 2192

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 402 141 A (GLASSPOOL GRAHAM [GB]) 1 December 2004 (2004-12-01) * figures 5a-d, 6a-d * * page 9, lines 22-32 * * page 16, lines 1-31 * * pages 19-20 *	1-4, 8-10,12, 17,18	INV. E04C1/39 E04B2/42 E04B2/54 E02D29/02 E04B2/02
X	WO 01/17739 A2 (PENTAWALL CORP [US] PENTSTAR CORP [US]) 15 March 2001 (2001-03-15) * page 4, lines 7-10 * * page 10, lines 3-8 * * page 17, lines 12-21 * * page 20, line 20 - page 21, line 23 * * figures 15a-d, 20a-b, 21a-b, 22a-c *	1-3,8, 10-13, 15-18	
X	US 2012/073229 A1 (CASTONGUAY BERTIN [CA] ET AL) 29 March 2012 (2012-03-29) * paragraphs [0067], [0079]; figures 18a, 18b *	1,2,8,9, 12,17,18	TECHNICAL FIELDS SEARCHED (IPC)
X	US 2011/000161 A1 (AUBE STEPHANE [CA] ET AL) 6 January 2011 (2011-01-06) * paragraphs [0002], [0003], [0040], [0045]; figures 1, 8-9 *	1,2,8,9, 12,14, 17,18	E04C E04B E02D
X	US 2009/041552 A1 (HAMMER JAMES [US]) 12 February 2009 (2009-02-12) * paragraphs [0002], [0003], [0041]; claim 1; figures 1-2 *	1,2,8, 12,17,18	
A	EP 1 975 332 A2 (PONTAROLO ENGINEERING S P A [IT]) 1 October 2008 (2008-10-01) * paragraphs [0008] - [0013]; figures 1-6 * -/--	1-18	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 October 2013	Examiner Vratsanou, Violandi
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04001)



EUROPEAN SEARCH REPORT

Application Number
EP 13 18 2192

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	WO 2012/081048 A2 (LAZZAROTTO ETTORE [IT]) 21 June 2012 (2012-06-21) * abstract; figures 1-4, 8 *	1-18	
A	WO 2009/075412 A1 (KIM KYU-HUE [KR]; KIM KANG-SUCK [KR]) 18 June 2009 (2009-06-18) * abstract; figures 1-20 *	1-18	
			TECHNICAL FIELDS SEARCHED (IPC)
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 October 2013	Examiner Vratsanou, Violandi
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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The members are as contained in the European Patent Office EDP file on
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09-10-2013

Patent document cited in search report		Publication date	Patent family member(s)			Publication date
GB 2402141	A	01-12-2004	AU	2004241359	A1	02-12-2004
			EP	1625260	A1	15-02-2006
			GB	2402141	A	01-12-2004
			US	2007022708	A1	01-02-2007
			WO	2004104312	A1	02-12-2004

WO 0117739	A2	15-03-2001	AU	7090900	A	10-04-2001
			BR	0013858	A	15-07-2003
			CA	2384077	A1	15-03-2002
			CN	1382240	A	27-11-2002
			EP	1242221	A2	25-09-2002
			JP	2003535236	A	25-11-2003
			MX	PA02002457	A	20-08-2002
			NZ	518097	A	24-09-2004
			US	6978581	B1	27-12-2005
			WO	0117739	A2	15-03-2001

US 2012073229	A1	29-03-2012	AU	2011307995	A1	11-04-2013
			CA	2806259	A1	05-04-2012
			EP	2622141	A1	07-08-2013
			US	2012073229	A1	29-03-2012
			WO	2012040852	A1	05-04-2012

US 2011000161	A1	06-01-2011	NONE			

US 2009041552	A1	12-02-2009	NONE			

EP 1975332	A2	01-10-2008	CA	2627451	A1	26-09-2008
			EP	1975332	A2	01-10-2008
			US	2008236084	A1	02-10-2008

WO 2012081048	A2	21-06-2012	NONE			

WO 2009075412	A1	18-06-2009	EP	2092133	A1	26-08-2009
			WO	2009075412	A1	18-06-2009

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82