(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 530 214 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
05.12.2012 Bulletin 2012/49

(51) Int Cl.:
E04C 2/34 *(2006.01)* ***E04G 9/05*** *(2006.01)*
E04G 9/02 *(2006.01)*

(21) Application number: **12382151.4**

(22) Date of filing: **18.04.2012**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **30.05.2011 ES 201130890**

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(54) Formwork panel consisting of two semi-panels

(57) Formwork panel (1) comprising two parallel flat faces (3) suitable for defining a formwork face that is in contact with the concrete. It also comprises a gap inner space (4) defined between the two flat faces (3) and stiffening means (2) necessary for the formwork panel (1) to withstand the operating pressure during the concrete setting process. The formwork panel (1) also comprises two faced semi-panels (5) coupled to each other and defining the gap inner space (4). Each semi-panel (5) comprises one of said flat faces (3) and the stiffening means (2) are built into at least one of said semi-panels (5).

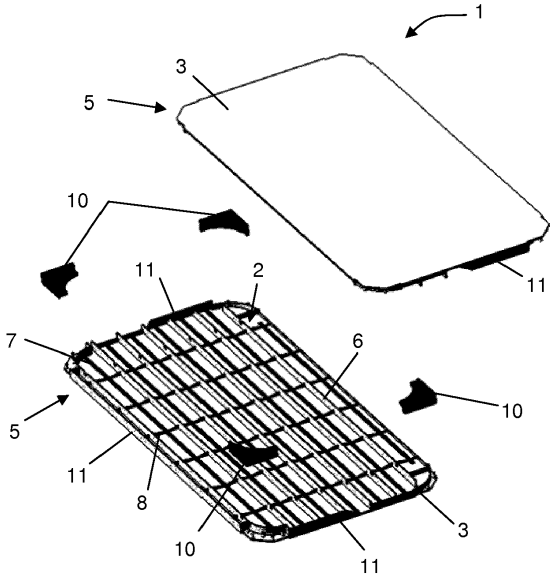

FIG .3

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Description

TECHNICAL FIELD

[0001] This invention relates to formwork panels designed, in particular, to be used in the concrete construction industry.

PRIOR ART

[0002] In the construction industry wooden panels have traditionally been used to build walls and floors. Said panels have a considerable thickness and weight, so said panels have evolved to get lighter boards, such as sandwich-type panels. In sandwich panels a core with a considerable thickness and made of a material that is not very strong is inserted between two stiff sheets that are thinner.

[0003] Formwork panels of a composite material having the stiffening means built into them are also known.

[0004] ES2198391 T3 (EP1118735 A1) thus discloses a monoblock formwork panel of a composite material that presents two flat parallel faces joined and stiffened by connecting crossbeams.

DISCLOSURE OF THE INVENTION

[0005] It is an object of the invention to provide a formwork panel, as described in the claims.

[0006] The formwork panel of the invention comprises two parallel flat faces suitable for defining a formwork face that is in contact with the concrete. It also comprises a gap inner space defined between the two flat faces and stiffening means necessary for the formwork panel to withstand the operating pressure during the concrete setting process.

[0007] The formwork panel of the invention also comprises two faced semi-panels coupled to each other and defining the gap inner space. Each semi-panel comprises one of said flat faces and the stiffening means are built into at least one of said semi-panels.

[0008] Thanks to the formwork panel of the invention, the weight of the formwork panel is reduced and its rigidity increased, thereby contributing to a simpler and cheaper manufacturing process.

[0009] These and other advantages and characteristics of the invention will be made evident in the light of the drawings and the detailed description thereof.

DESCRIPTION OF THE DRAWINGS

[0010]

FIG. 1 shows a perspective view of an embodiment of the formwork panel according to the invention with the corner reinforcements.

FIG. 2 shows a partial view in perspective of a semi-panel of the formwork panel of Fig. 1.

FIG. 3 shows an exploded view of the formwork panel of Fig. 1 with the corner reinforcements.

FIG. 4 shows a cross section along the IV-IV line of the formwork panel of Fig. 1 with the corner reinforcements.

DETAILED DISCLOSURE OF THE INVENTION

[0011] The formwork panel of the invention, as shown in Figure 1, comprises two parallel flat faces 3 suitable for defining a formwork face that is in contact with the concrete. It also comprises a gap inner space 4 defined between the two flat faces 3 and stiffening means 2 necessary for the formwork panel 1 to withstand the operating pressure during the concrete setting process.

[0012] As shown in Figure 3, the formwork panel 1 of the invention also comprises two faced semi-panels 5 coupled to each other and defining the gap inner space 4, as shown in Figure 4. Figure 2 shows one of the two semi-panels 5. Each semi-panel 5 comprises one of said flat faces 3 and the stiffening means 2 are built into at least one of said semi-panels 5.

[0013] The formwork panel 1 of the invention is suitable for operating at a site in conjunction with a plurality of formwork panels 1 that are joined to each other with fixing means not shown in the figures. On each use, the formwork face that is in contact with the concrete may be one of the two flat faces 3. In this way the lifecycle of the panel is doubled, as on each use the formwork face is either one flat face 3 or the other. In addition, the surface finish of the concrete formwork that is achieved with the formwork panel 1 of the invention is very good, with subsequent touch-up work being unnecessary.

[0014] In the preferred embodiment of the invention, the formwork panel 1 is made of plastic, preferably a composite, such as thermoplastic or thermostable plastic, which makes the removal of the formwork panel 1 far easier once the concrete has set. In addition, the flat faces 3 of formwork panel 1 are, as their name suggests, substantially flat, which is also especially advantageous in the removal of the formwork as the concrete does not adhere to the formwork face and is easy to clean. As a result, in the formwork panel 1 of the invention, therefore, it is not necessary to use formwork-removal products, such as oils, and due to the fact that the panel 1 may be recycled it also helps to protect the environment.

[0015] Thanks to the formwork panel 1 of the invention, as it is made of a light material (plastic) and as it comprises the gap inner space 4 (a lightened panel with an air chamber) reinforced by the stiffening means 2, the total weight of the panel 1 is reduced considerably without this affecting the rigidity of the panel, thereby achieving a panel 1 that is both strong and light, which is especially advantageous when handling the panels, thereby improving work ergonomics and preventing back and neck

injuries or strains etc. due to improper handling.

[0016] In the preferred embodiment, as shown in Figure 2, the stiffening means 2 comprise ribs 6 that are substantially perpendicular to the flat faces 3, where preferably said ribs 6 are disposed longitudinally. The stiffening means 2 also comprise channels 7 in which the ribs 6 of the faced semi-panel 5 are housed.

[0017] In said preferred embodiment, the formwork panel 1, as shown in Figure 2, also comprises additional ribs 8 disposed transversally, although they may be dispensed with.

[0018] In the preferred embodiment, the two semi-panels 5 are substantially equal. As a result, the manufacturing costs are reduced considerably as the manufacturing moulds are unified and simplified. It is not necessary to have two different moulds to obtain each semi-panel 5 and as the formwork panel 1 is manufactured from two semi-panels, the design of the mould is simpler and cheaper. As the moulds are easier to manufacture, breakdowns are also reduced, contributing to the reduction of costs.

[0019] Furthermore, in a simple and cheap manner, using the same mould and using different materials it is possible to obtain formwork panels with different mechanical properties, thereby complying with the different needs of customers.

[0020] In a second embodiment not shown in the figures, the channels 7 are in one of the semi-panels 5, while the ribs 6 are in the faced semi-panel 5. This embodiment is a variant of the stiffening means 2 where the two semi-panels 5 do not have to be equal. Other configurations are also feasible.

[0021] In the preferred embodiment, the ribs 6 comprise evacuation means 9, preferably in the form of an indent, as shown in Figure 2, to enable the removal of water that may be contained in the formwork panel 1. The water may filter through to the inside of panel 1 as a result of small perforations being made in the panel during construction work, such as the hammering of a nail to fix a sign, or scaffolding, so that this embodiment is especially advantageous.

[0022] The two semi-panels 5 are faced and joined to each other by joining means such as sticking and/or screwing means. In the preferred embodiment, however, welding means are used. As a result, the ribs 6 that are housed in the channels 7 of the faced semi-panel 5 are fixed by means of welding lines, thereby achieving a continuous and strong join.

[0023] Each semi-panel 5, in the preferred embodiment, comprises an outline on the outer edge with the result that when the two semi-panels 5 face each other the outer edges of each semi-panel 5 are attached to each other to form a connection joint that is sealed preferably by means of at least one welding line. Said outline of the outer edge of each semi-panel 5 comprises side walls 11 substantially perpendicular to the flat face 3. As a result, a sealed, hermetic and strong formwork panel is obtained.

[0024] A formwork panel, as it is well known by the skilled person, is subjected to severe conditions simply by being handled, particularly during the removal of the formwork, a process in which the formwork panel is subjected to various blows. The most vulnerable areas of the formwork panel must therefore be capable of withstanding said blows or impacts. Said vulnerable areas are generally the external areas, such as the outer edge, the main flat faces and the corners. When a panel is dropped it mainly occurs on the corners, which may cause a breakage or a crack that extends right through the formwork panel.

[0025] In the preferred embodiment of the invention, the vulnerable areas of the outer edge and the flat faces 3 are reinforced by welding lines, as described above. In order to protect the corners from impacts, the formwork panel 1 of the invention comprises corner reinforcements 10 located in each corner of the panel 1.

[0026] Said corner reinforcements 10 may be made of the same material as the semi-panels 5, but in the preferred embodiment, these corner reinforcements 10 are made of a stronger material to enable them to absorb the impacts better. Similarly, in the preferred embodiment said corner reinforcements 10 are additional components that are inserted during the joining operation of the two semi-panels 5. To achieve this, both the semi-panel 5 and the corner reinforcement 10 comprise guides to house the corner reinforcement 10 in the semi-panel 5 and thereby enable its insertion.

[0027] In a third embodiment, said corner reinforcements 10 form an integral part of each semi-panel 5, a semi-panel 5 with the reinforced corners being capable of being obtained directly from the mould. Furthermore, as it is well known by the skilled person, the technology now available enables products made of different materials to be obtained in a single moulding operation, so that the corner reinforcement 10 may be made of a different material to the semi-panel 5. In this embodiment manufacturing operations are therefore reduced as it is not necessary to insert the corner reinforcement 10. Furthermore, said corner reinforcements 10 may comprise the entire outer edge in order to get a stronger edge.

Claims

1. Formwork panel for concrete constructions, comprising two parallel flat faces (3), suitable for defining a formwork face that is in contact with the concrete, a gap inner space (4) defined between the two flat faces (3), and stiffening means (2) necessary for the formwork panel (1) to withstand the operating pressure during the concrete setting process, **characterised in that** it comprises two faced semi-panels (5) coupled to each other and defining the gap inner space (4) and each semi-panel (5) comprising one of said flat faces (3) and the stiffening means (2) being built into at least one of said semi-panels (5).

2. Formwork panel according to claim 1, wherein the stiffening means (2) comprise ribs (6) that are substantially perpendicular to the flat faces (3).

3. Formwork panel according to claim 2, wherein the stiffening means (2) also comprise channels (7) in which the ribs (6) of the faced semi-panel (5) are housed.

4. Formwork panel according to claims 2 or 3, wherein preferably said ribs (6) are disposed longitudinally.

5. Formwork panel according to any of claims 2 to 4, comprising additional ribs (8) disposed transversally.

6. Formwork panel according to any of the preceding claims, wherein the two semi-panels (5) are substantially equal.

7. Formwork panel according to any of claims 3 to 6, comprising joining means, preferably welding lines, which join the ribs (6) to the channels (7) of the faced semi-panel (5).

8. Formwork panel according to any of claims 2 to 7, wherein the ribs (6) comprise evacuation means (9), preferably in the form of an indent, to remove the water that may be contained in the formwork panel (1).

9. Formwork panel according to any of the preceding claims, wherein each semi-panel (5) comprises in the outer edge side walls (11) substantially perpendicular to the flat face (3) that are attached to the side walls (11) of the faced semi-panel (5).

10. Formwork panel according to any of the preceding claims, wherein a connection joint, formed when the outer edges of the two faced semi-panels (5) are coupled, comprises at least one welding line.

11. Formwork panel according to any of the preceding claims, also comprising corner reinforcements (10) located preferably in each of the corners of the formwork panel (1) to protect the formwork panel (1) against impacts.

12. Formwork panel according to claim 11, wherein said corner reinforcements (10) form an integral part of the semi-panels (5).

13. Formwork panel according to claim 11, wherein said corner reinforcements (10) are additional components that are inserted during the joining of the two semi-panels (5).

14. Formwork panel according to any of the preceding claims, wherein said panel is made of a plastic material, preferably composite.

15. Formwork panel according to any of claims 11 to 14, wherein said corner reinforcements (10) are made of a different material to the semi-panels (5).

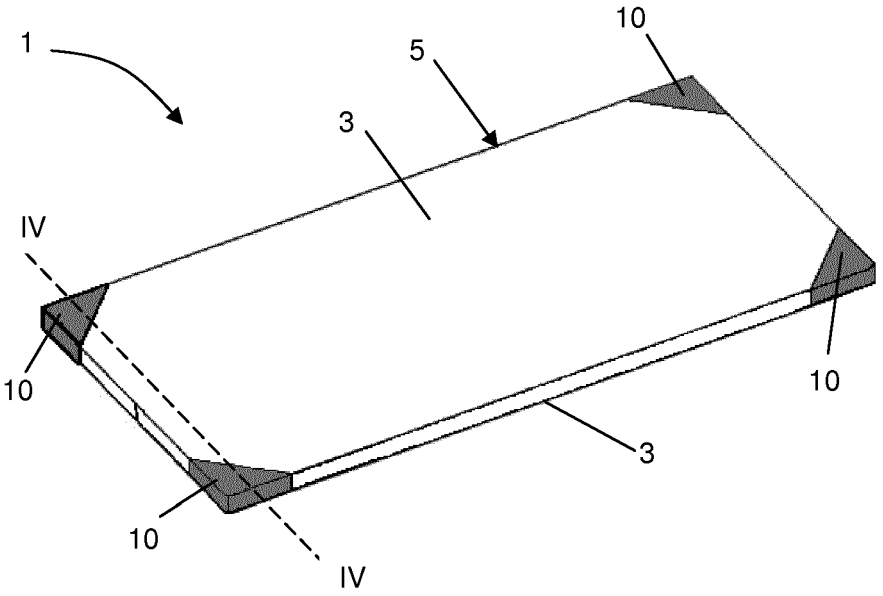

FIG .1

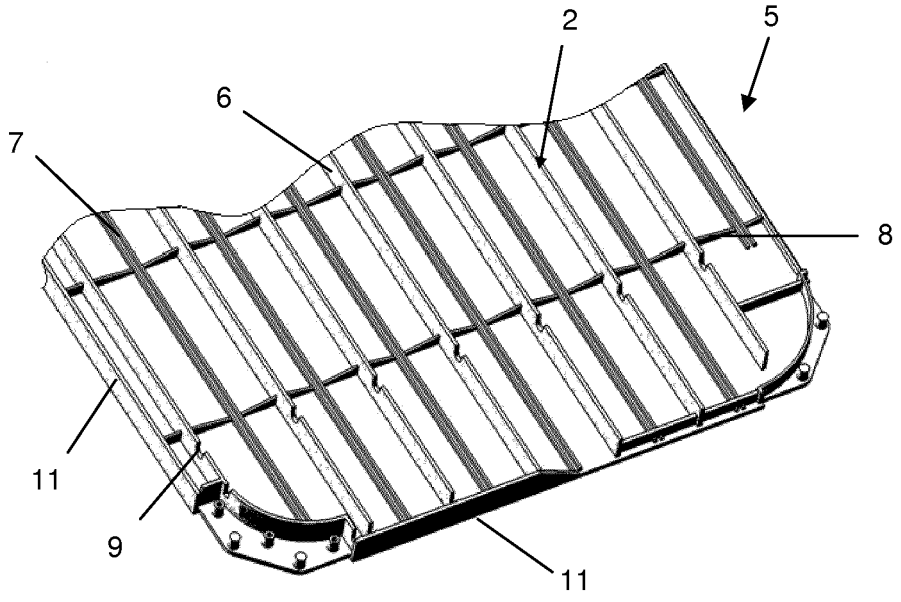

FIG .2

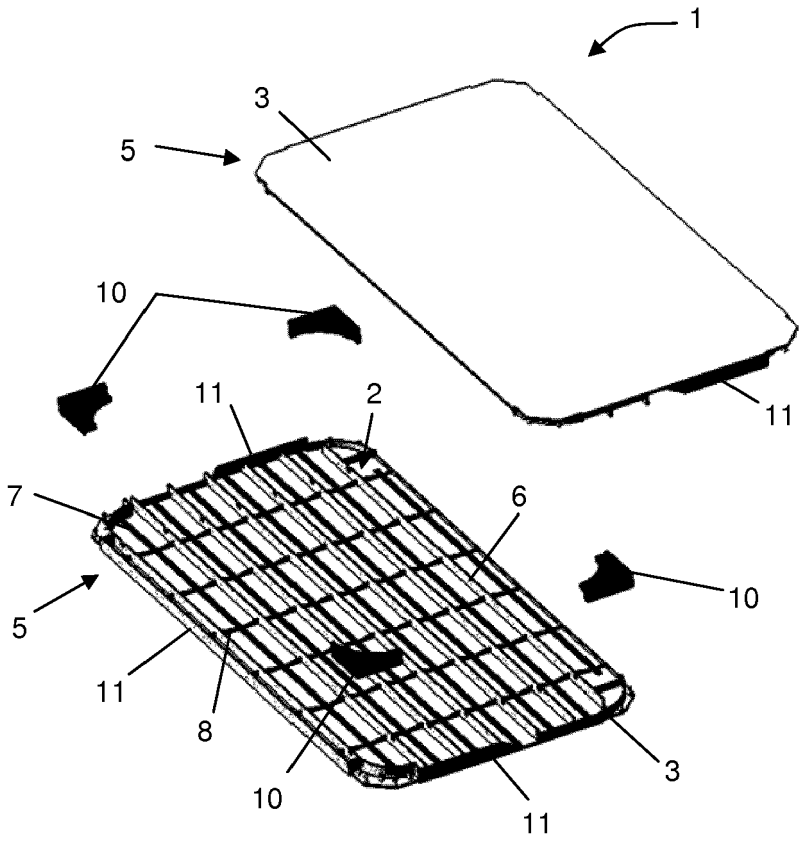

FIG .3

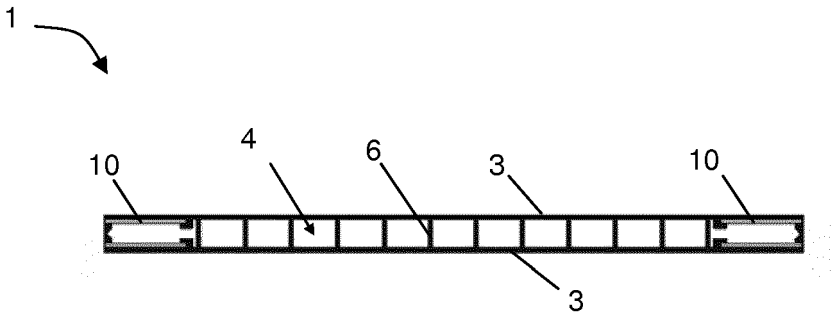

FIG .4

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EUROPEAN SEARCH REPORT

Application Number
EP 12 38 2151

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 Y	US 2008/276567 A1 (RAPAZ ANTONIO [CA]) 13 November 2008 (2008-11-13) * paragraph [0002] * * paragraph [0005] - paragraph [0006] * * paragraph [0041] - paragraph [0053]; figures 1,2,15,22 *	1-10,14 11-13,15	INV. E04C2/34 E04G9/05 E04G9/02
X Y	US 2007/266669 A1 (RAPAZ ANTONIO [CA]) 22 November 2007 (2007-11-22) * paragraph [0002] * * paragraph [0080] - paragraph [0087]; figures 10,12a,b,c,13a,b,c *	1-5,7,9, 14 11-13,15	
Y	WO 91/06730 A1 (HJELM BO ALLAN [SE]) 16 May 1991 (1991-05-16) * page 4, line 3 - line 15 * * page 5, line 34 - page 6, line 4; figures 1-5 *	11,13,15	
Y	EP 2 299 029 A1 (DOKA IND GMBH [AT]) 23 March 2011 (2011-03-23) * paragraph [0002] * * paragraph [0042] - paragraph [0054]; figures 1,2 *	11,12,15	

TECHNICAL FIELDS SEARCHED (IPC)
E04C E04G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 September 2012	Giannakou, Evangelia

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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13-09-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2008276567 A1	13-11-2008	CA 2690248 A1	20-11-2008
		EP 2167754 A1	31-03-2010
		US 2008276567 A1	13-11-2008
		WO 2008138116 A1	20-11-2008
US 2007266669 A1	22-11-2007	CA 2585349 A1	17-11-2007
		EP 2137357 A1	30-12-2009
		US 2007266669 A1	22-11-2007
		WO 2008113187 A1	25-09-2008
WO 9106730 A1	16-05-1991	AU 6710690 A	31-05-1991
		SE 464768 B	10-06-1991
		SE 8903590 A	28-04-1991
		WO 9106730 A1	16-05-1991
EP 2299029 A1	23-03-2011	CN 102667030 A	12-09-2012
		EP 2299029 A1	23-03-2011
		EP 2488713 A1	22-08-2012
		WO 2011032716 A1	24-03-2011

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- ES 2198391 T3 **[0004]**
- EP 1118735 A1 **[0004]**