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

(11) **EP 2 148 039 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.01.2010 Bulletin 2010/04

(51) Int Cl.:
E06B 9/01 *(2006.01)* *E04C 2/34* *(2006.01)*

(21) Application number: **08380220.7**

(22) Date of filing: **22.07.2008**

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

(71) Applicant: **Trenzametal, S.L.**
49012 Zamora (ES)

(72) Inventor: **Bermejo Sotillo, Miguel Angel**
49012 Zamora (ES)

(74) Representative: **Manzano Cantos, Gregorio et al**
Cabinet Manzano
Embajadores, 55
28012 Madrid (ES)

(54) **Monoblock tridimensional structural panel**

(57) The invention relates to a monobloc three-dimensional structural panel relating to a one-piece three-dimensional panel, preferably made from planar sheet metal or by a molding process, achieving a structural grid of two, three or more parallel planes, with variable geometry, for its use as an enclosing, protection or decoration element, and also for support substructures or panel structures using the channels thereof for cable or piping installations.

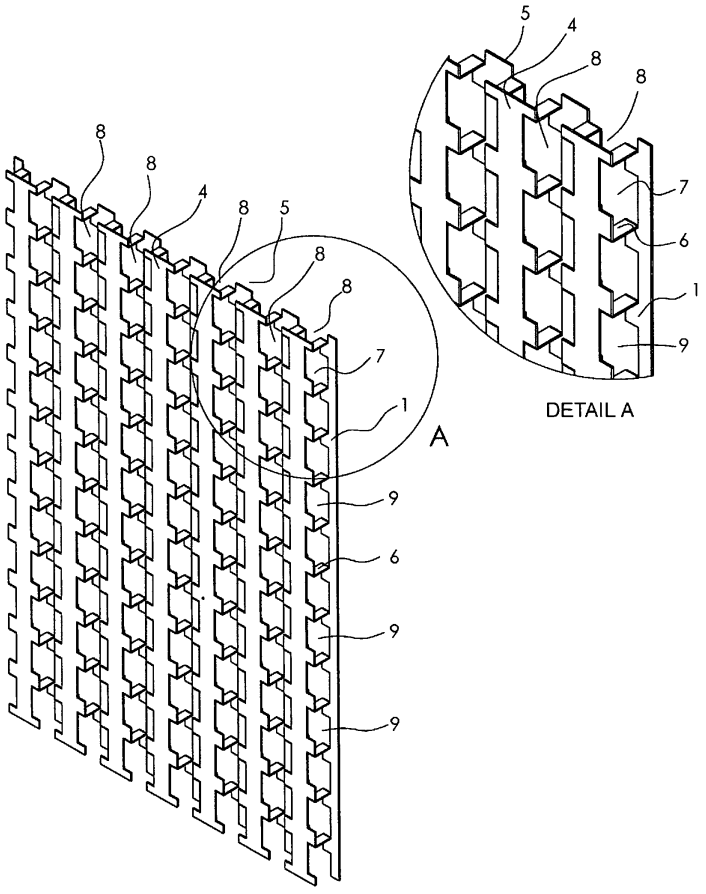


FIG. 1C

EP 2 148 039 A1

Description

Object of the Invention

[0001] The invention relates to a one-piece three-dimensional panel, preferably made from planar sheet metal by a cutting and bending process or by a molding process using any type of typical material of the art, achieving a structural grid of two, three or more parallel planes with variable geometry for its use in architecture and construction, being used both as an enclosing, protection or decoration element, and also as a substructure for securing other elements or as a structure of panels, plates or coverings.

[0002] The monobloc three-dimensional structural panel of the invention can be assembled in an independent use on any support for functions such as decoration and covering in facades, ceilings, walls or surfaces of all types; protection in handrails, balconies, ledges or the like; vertical enclosures in railings, lattices, partitions, fences or others.

[0003] The monobloc three-dimensional structural panel of the invention, in substructure use, creates a load-bearing substructure for ceiling, floor and wall applications in which cable or piping guiding and installation are needed, which cables or piping will pass through the channels created between the parallel planes, leaving an outer plane firmly fixed to the construction work support and the other plane being used as a base for the covering.

[0004] The monobloc three-dimensional structural panel of the invention can also be used as an integrated structure in sandwich panels, creating light, hollow, strong, reinforced and ventilated panels.

[0005] Another type of use for the monobloc three-dimensional structural panel of the invention is as an inner structure for forming partitions of plates placed against one another in which the cover plates are placed on both faces of the panel, using the channels thereof for electrical installations in addition to creating strong reinforced panels with a great support capacity for functional or decorative elements such as radiators, bookshelves, partitions or others which are fixed thereon.

[0006] Among the many unclassifiable applications of the monobloc three-dimensional structural panel of the invention there is that of being incorporated as a structure for organizing steel framework beds of floor slabs and other concrete slabs, combining it with other applications of the invention or not.

Background of the Invention

[0007] Currently no structural elements are known with the same features having the many applications of the object of the invention and constructed from a simple die-cut metal plate and having the auto-transformation versatility in figures with a different composition enabling the versatile and varied applications which have already been explained above, the metal structures which are used for reinforcing the web of panels or other bodies are generally invariable, closed and mainly rigid structures, invariable based on welded, knotted or tied metal profile or linkage members.

Inventive Step

[0008] The advantageous purpose of the invention as can be summarized from the description in relation to the object thereof in the first paragraphs of this specification is to provide a monobloc three-dimensional structural element made essentially from a planar sheet by die-cutting, die-pressing or molding, without wasting material, without the need of welding or mechanical joints and which can be used without added elements or forming part of the panels.

Description of the Invention

[0009] The invention is consequently based on transforming a configured or unfolded planar sheet metal into two, three or more parallel planes creating a permeable, structural and strong volume, or on molding the material for obtaining a monobloc three-dimensional structural panel.

[0010] The monobloc three-dimensional structural panel object of the invention is preferably made in a single continuous manufacturing process (without excluding a discontinuous process), starting by die-cutting planar sheet metal creating a plurality of aligned and symmetrically distributed regular cuts in a conveniently reticular distribution, followed by bending or pressing, which transforms the planar body of the sheet into two parallel planes joined by the segments resulting from the uncut lines determining the space separating them by way of a cellular web. Once the two parallel planes have been created, transverse and longitudinal, horizontal and vertical channels are made in the inner space. In these conditions the panel can be curved about an axis in any of the aforementioned geometric directions, always leaving the planes parallel to one another unaltered. Another possible geometry is to bend the panel by one of its intercalated or intermediate segments of the uncut segments, forming planes broken at different angles. Another possible option of the invention is a panel with three planes parallel to one another, likewise separated by the mentioned segments determining the spacing, creating a panel with three levels with two series of vertical (longitudinal) channels in two different parallel planes, as well as two series of horizontal (transverse) channels equally forming two different parallel planes.

[0011] Another possible embodiment of the monobloc panel as a substructure according to the invention is to firmly fix an outer plane on a face which can be a slab, a ground plate or a wall and adhering on the other outer plane of the panel a covering which can be a covering for ceilings, floors or walls. Conduits or pipes, cables,

piping or any other service installation means are introduced in the horizontal (longitudinal) channels.

[0012] In the particularities of the invention, an installation of the panel with structural functions is considered in which a plate is placed on each outer face and the inner horizontal (transverse) and vertical (longitudinal) channels are used for the passage of pipes or conduits and cables and any other service installation element.

[0013] An added detail of the object of the invention is that since a laminar product, more specifically simple sheet metal, is essentially the basis of the invention, the die-cutting, die-pressing, shearing treatment or the like is conveniently and preferably carried out in a continuous process which can virtually carry out the cutting or die-cutting thereof and the transformation into a panel with two or three parallel planes in two steps with subsequent treatments for transforming said panels into non-planar volumetric figures, such as the cases given as an example.

[0014] A broader idea of the features of the invention will be made below with reference to the set of drawings.

[0015] In the drawings:

Figures 1A, 1B, 1C are frontal foreshortened perspective views of the preferred embodiment for obtaining the monobloc three-dimensional structural panel and an enlarged detail of the grid thereof defining a cellular web.

Figures 2.1 and 2.1A are a frontal foreshortened perspective view and a plan view with a possible geometry of the curved monobloc three-dimensional structural panel.

Figures 2.2 and 2.2A are a frontal foreshortened perspective view and a plan view with a possible geometry of the angled monobloc three-dimensional structural panel.

Figures 2.3, 2.3A and 2.3B are a frontal foreshortened perspective view, a plan view and a side elevational view of a possible geometry of the broken monobloc three-dimensional structural panel.

Figures 3 and 3A are a frontal foreshortened perspective view and a front view of the unfolded monobloc three-dimensional structural panel in three planes used as a substructure.

Figures 4 and 4A are a frontal foreshortened perspective view and a front elevational view of the monobloc three-dimensional structural panel used as a structure.

Description of a Preferred Embodiment of the Invention

[0016] The following description focuses on the corresponding illustration of the depictions of the invention, based on the following:

[0017] The monobloc three-dimensional structural panel (1) of Figure 1C is preferably made in a single continuous manufacturing process starting with die-cutting the planar sheet metal (2), Figure 1A, in a regular reticular arrangement in a transverse and longitudinal direction, creating cuts (3), Figure 1B, with a preferably broken shape, and followed by bending or pressing (Figure 1C), transforming the planar body of the sheet into two parallel planes (4) and (5) joined by segments (6) determining the space (4) separating said two planes by way of a cellular web. Once the two parallel planes (4) and (5) have been created, horizontal (transverse) (9), and vertical (longitudinal) (8) channels are formed in the inner space. As described in Figures 2.1 and 2.1A the panel can be curved about an axis, always leaving the planes (4) and (5) parallel to one another. Another possible geometry, in Figures 2.2 and 2.2A, is to bend the panel by one of its segments (10). Figures 2.3, 2.3A and 2.3B depict a panel (11) with three planes (4), (5) and (12) parallel to one another, separated by segments (6) and (13) determining the spacing, creating a three-level panel with two series of vertical (longitudinal) channels (8) and (14) in two different parallel planes as well as two series of horizontal (transverse) (9) and channels (15) equally forming two different parallel planes.

[0018] Figures 3 and 3A depict a use of the panel (1) as a substructure, firmly fixing an outer plane on the face (17), which can be a slab, a ground plate or a wall, and adhering on the other outer plane the covering (16), which can be a covering for ceilings, floors or walls. Conduits or pipes (18) are introduced in the channels (8).

[0019] Figures 4 and 4A depict an installation of the panel (11) with structural functions in which a plate (19) is placed on each outer face (4) and (5) and the inner vertical (8) and (14) and horizontal (9) and (15) channels are used for the passage of pipes or conduits (18) and cables (20).

[0020] Having sufficiently described the nature of the invention it is stated for the purposes thereof that it etc...

Claims

1. A monobloc three-dimensional structural panel which is developed by a preferably continuous die-cutting and bending or pressing manufacturing process, which is **characterized by** comprising a single planar body of die-cut sheet metal (2) with a plurality of discontinuous cuts (3) in a regular reticulated arrangement in a transverse and longitudinal direction and followed by a bending or pressing operation, such body being broken down into two parallel surface planes (4) and (5) or three parallel surface planes (4), (5) and (12) joined by small transverse planes by way of pins determining, once unfolded, the thickness of the panel and the separation of the planes (4) and (5) and (4), (5) and (12).

2. The monobloc three-dimensional structural panel which is developed by a molding manufacturing process, which is **characterized by** creating a one-piece structural grid formed by two parallel surface planes (4) and (5) or three parallel surface planes (4), (5) and (12) joined by transverse elements determining the thickness of the panel and the distance between the planes (4) and (5) and (4), (5) and (12).

3. The monobloc three-dimensional structural panel according to claims 1 and 2, wherein the panels (1) and (11) are **characterized by** having vertical (longitudinal) (8), horizontal (transverse) (9) channels in a single plane and vertical (longitudinal) (8) and (14), horizontal (transverse) (9) and (15) channels in two parallel planes respectively.

4. The monobloc three-dimensional structural panel according to claims 1, 2 and 3, wherein the cellular structure of the panels (1) and (11) is **characterized in that** they are curved, bent or broken, always maintaining the planes parallel to one another.

5. The monobloc three-dimensional structural panel according to claims 1, 2, 3 and 4, wherein the panels (1) and (11) are **characterized in that** they are a substructure firmly fixing an outer plane on the face (17) which can be a slab, a ground plate or a wall and adhering on the other outer plane a covering (16) which can be a covering for ceilings, floors or walls, and housing piping (18) and cables (20) in the channels (8), (9), (14) and (15) and other service installations.

6. The monobloc three-dimensional structural panel according to claims 1, 2, 3 and 4, wherein the panels (1) and (11) are **characterized in that** they are structures of vertical enclosure faces (19) placing on each outer face a plate and housing piping (18) and cables (20) and other service installations in the channels (8), (9), (14) and (15).

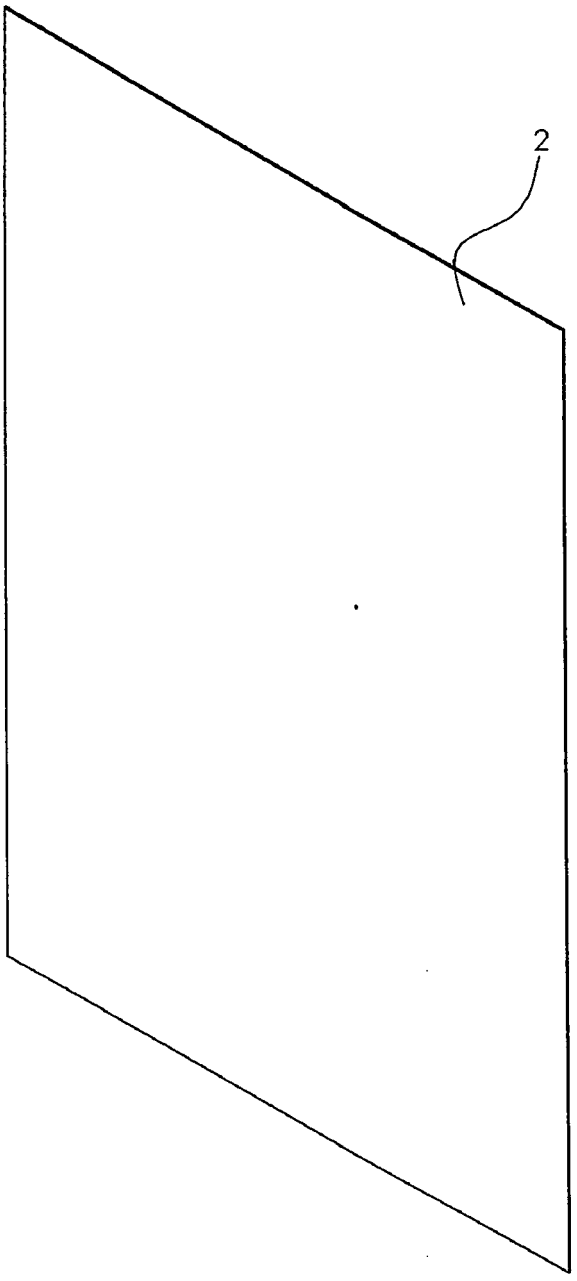


FIG. 1A

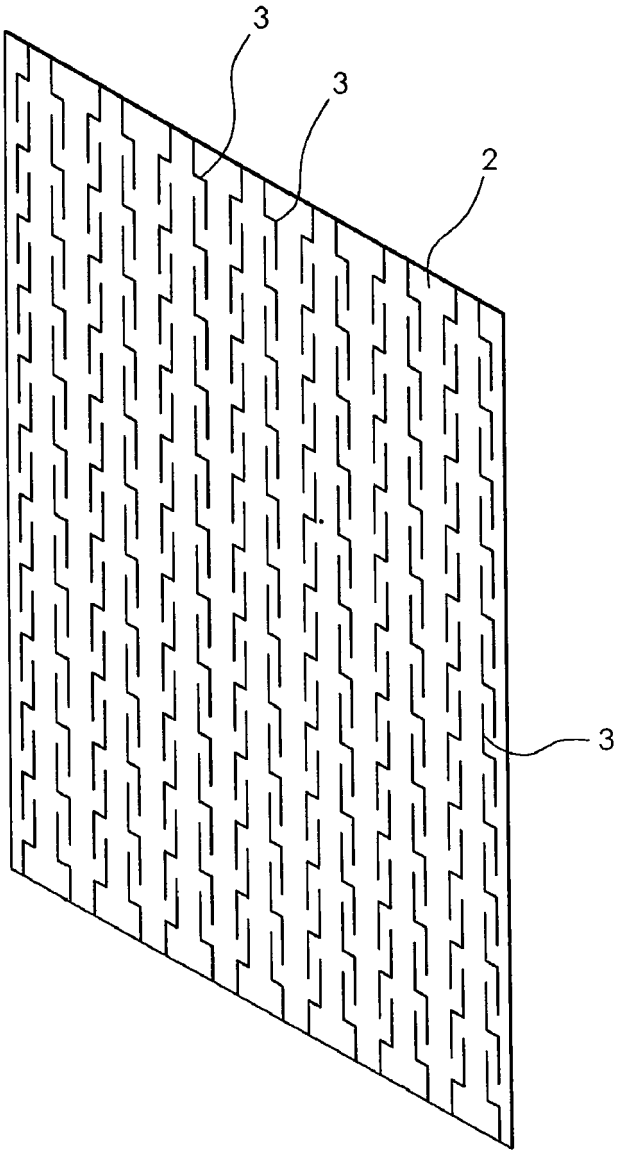


FIG. 1B

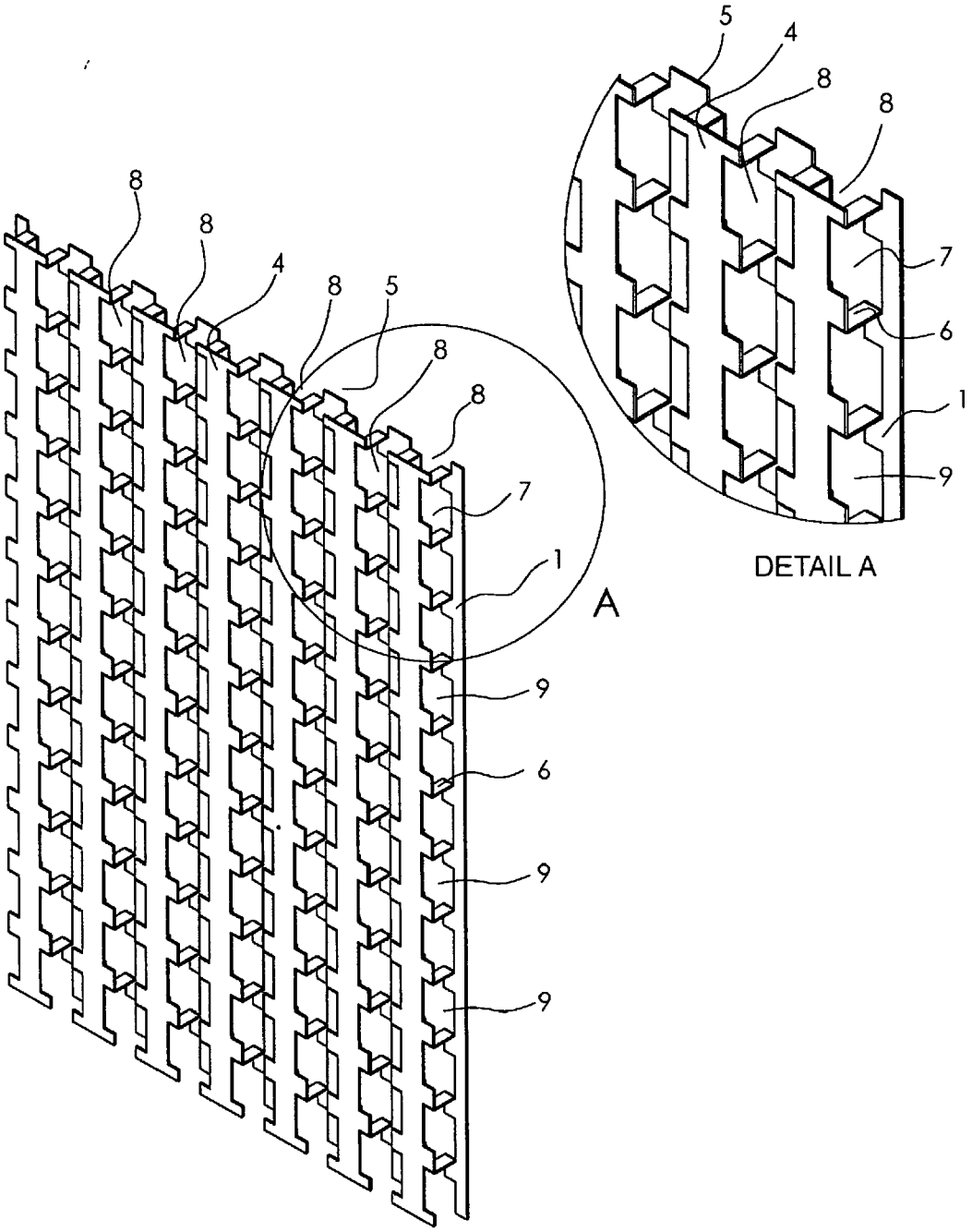
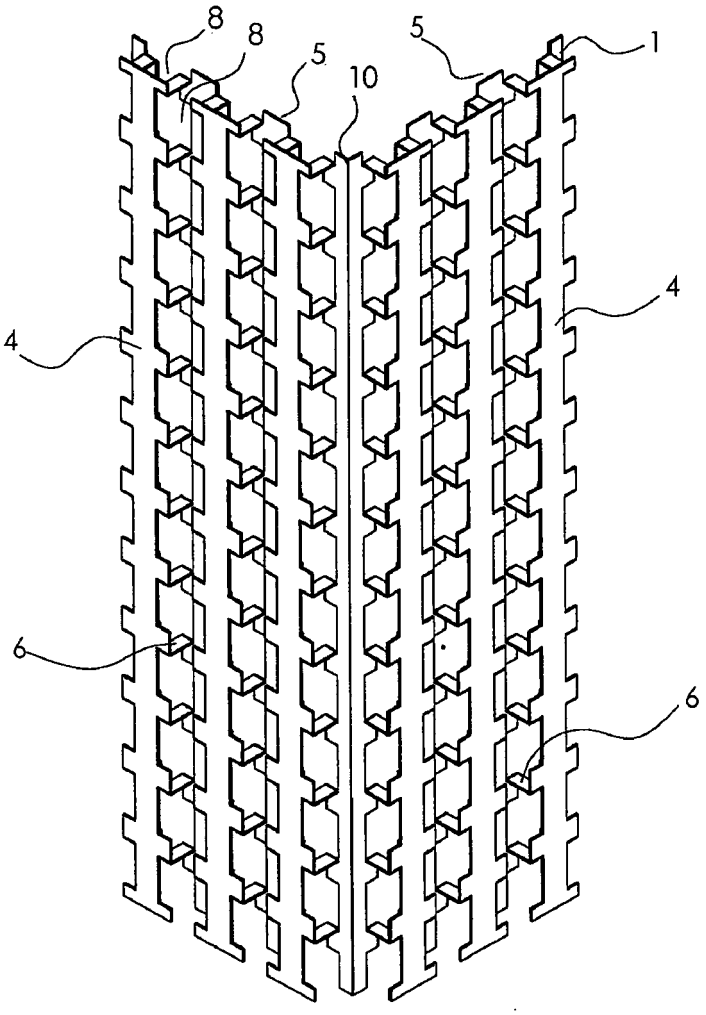


FIG. 1C

FIG. 2.2



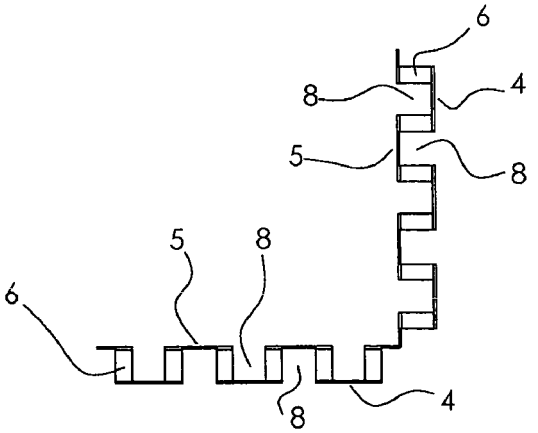


FIG. 2.2A

FIG. 2.3

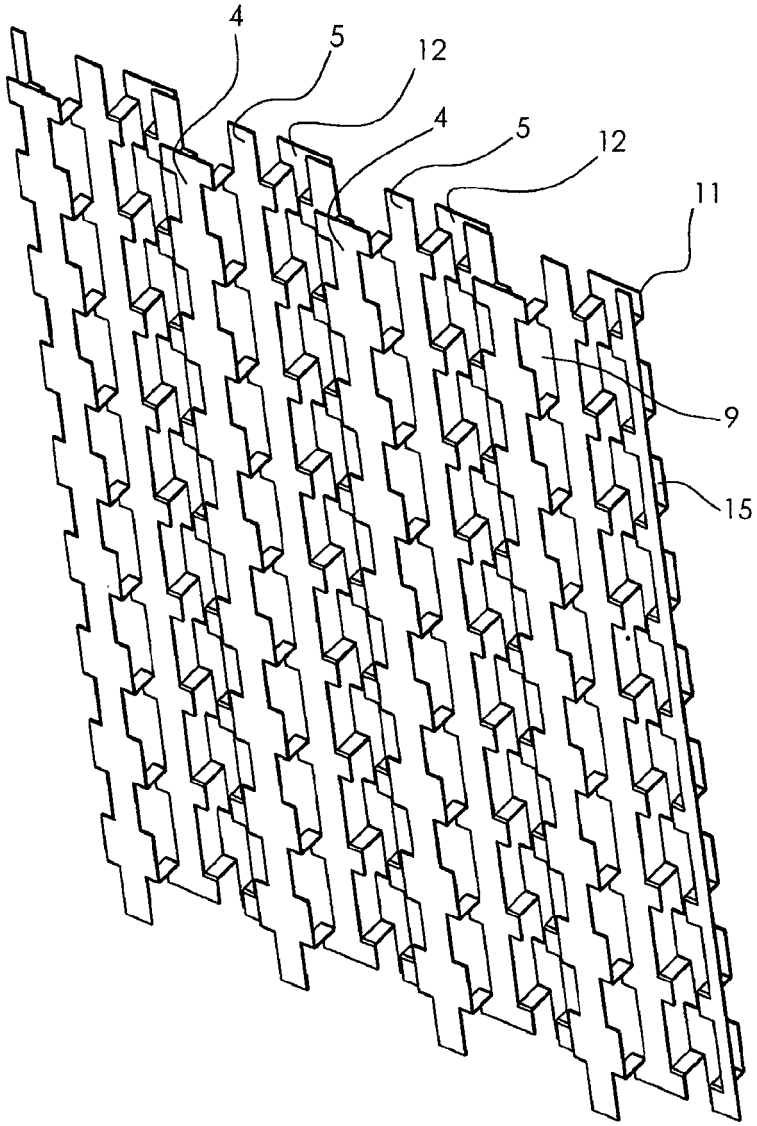
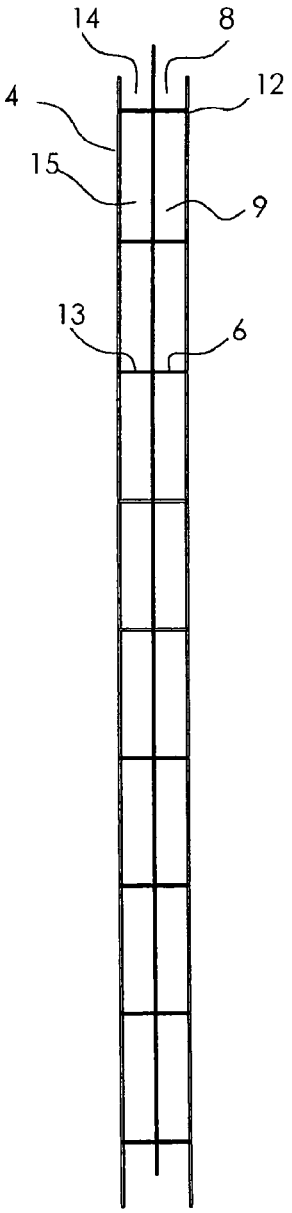


FIG. 2.3B



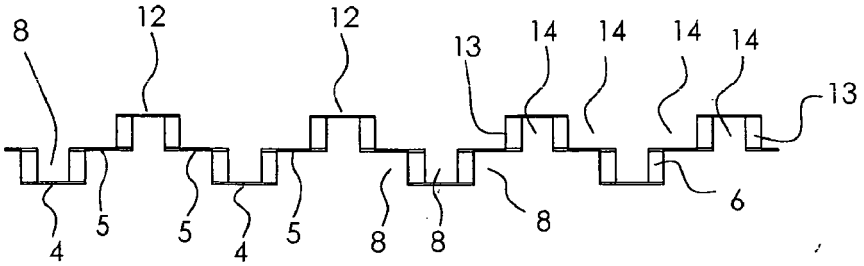
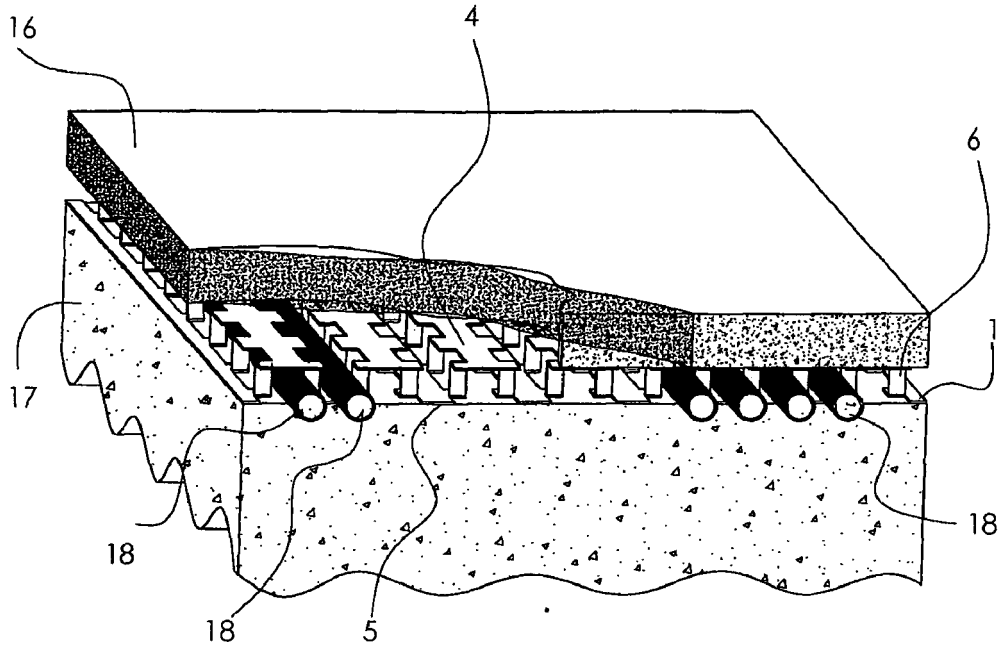


FIG. 2.3A

FIG. 3



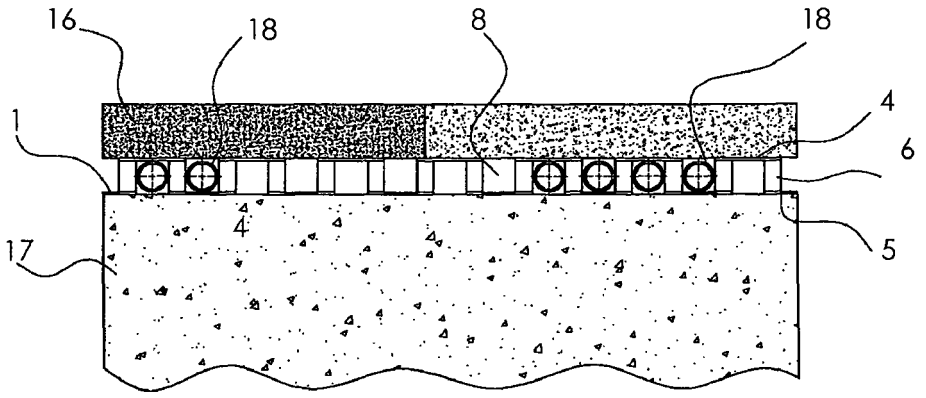


FIG. 3A

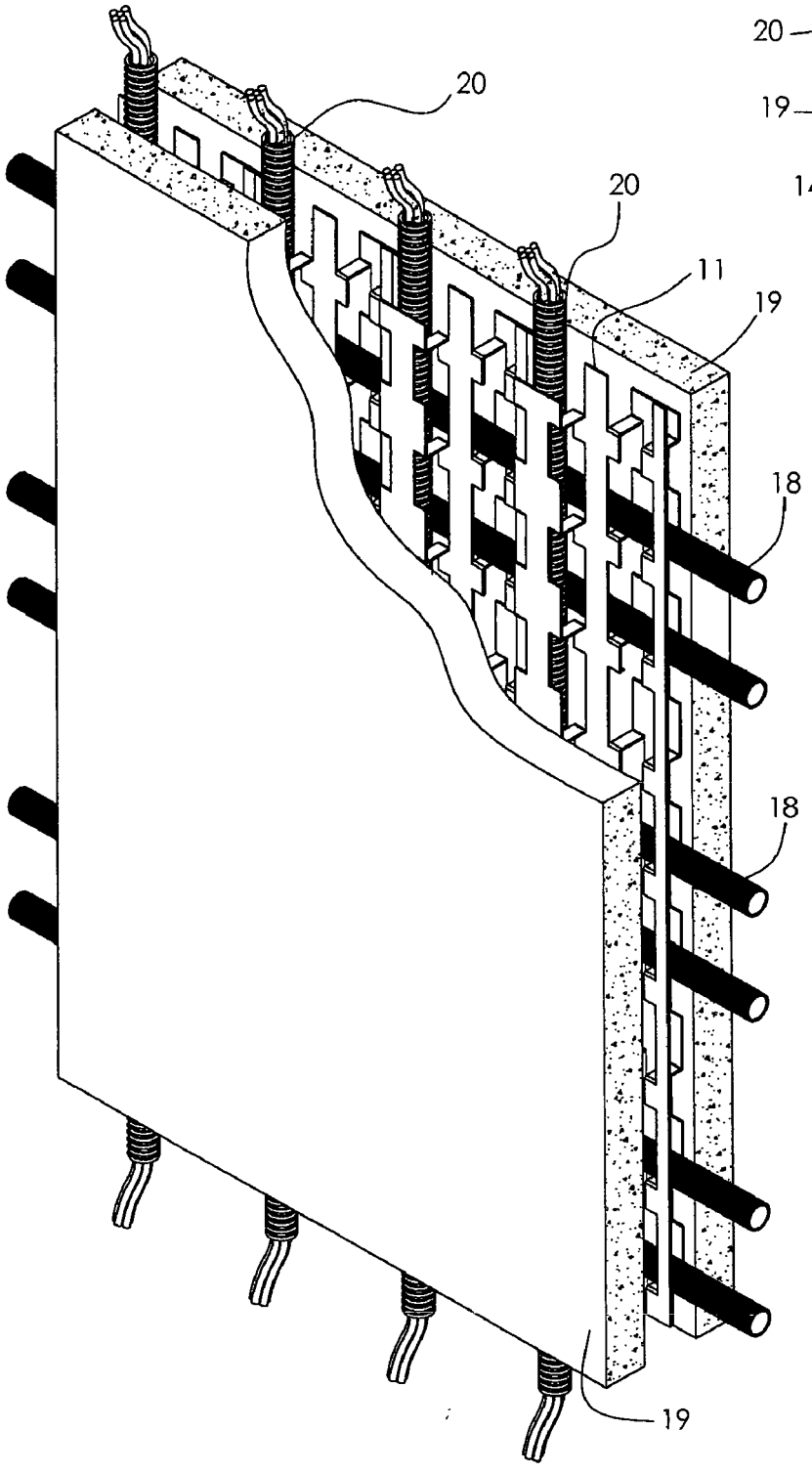


FIG. 4

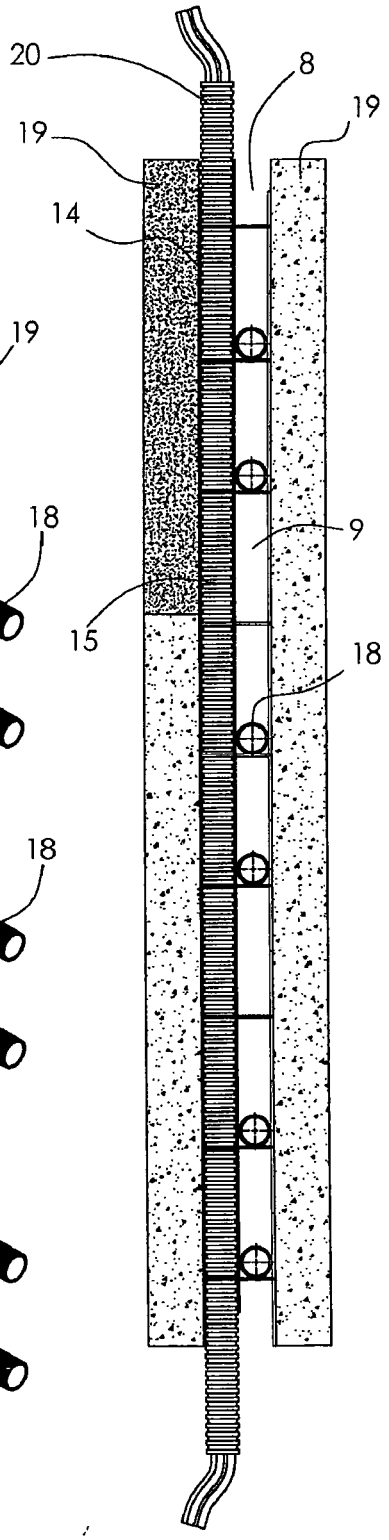


FIG. 4A

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 08 38 0220

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	US 3 287 873 A (LAURA MCDAILL) 29 November 1966 (1966-11-29) * figures 3,4,13 *	1,3	INV. E06B9/01 ADD. E04C2/34
X	EP 1 724 409 A (MAISCH F PROTEKTORWERK [DE]) 22 November 2006 (2006-11-22) * paragraphs [0024], [0025] *	1,4-6	
X	US 3 112 533 A (FRANZ HAUER ERWIN) 3 December 1963 (1963-12-03) * figures 2,3,10 *	1	
X	FR 1 332 549 A (HENRI CHOMETTE) 19 July 1963 (1963-07-19) * the whole document *	2	
A	US 3 058 266 A (RICHARD HARVEY) 16 October 1962 (1962-10-16) * column 2, line 61 - line 62 *	2	
A	US 7 051 489 B1 (SWISZCZ PAUL G [US] ET AL) 30 May 2006 (2006-05-30) * figure 45 *	4	TECHNICAL FIELDS SEARCHED (IPC) E06B E04C
A	US 3 111 204 A (HENRY PHARE DEREK) 19 November 1963 (1963-11-19) * column 2, line 49 - line 54; figure 10 *	5,6	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 December 2008	Jülich, Saskia

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

3

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 38 0220

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-12-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3287873 A	29-11-1966	NONE	
EP 1724409 A	22-11-2006	NONE	
US 3112533 A	03-12-1963	NONE	
FR 1332549 A	19-07-1963	NONE	
US 3058266 A	16-10-1962	NONE	
US 7051489 B1	30-05-2006	US 2006112655 A1	01-06-2006
US 3111204 A	19-11-1963	NONE	

EPO FORM P0459

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