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

(11) EP 1 074 669 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.02.2001 Bulletin 2001/06

(51) Int Cl.[7]: **E04C 2/08**, E04F 13/18

(21) Application number: **99500135.1**

(22) Date of filing: **02.08.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(71) Applicant: **Raduan Paniagua, Juan Ignacio**
Andorra la Vella (AD)

(72) Inventor: **Raduan Paniagua, Juan Ignacio**
Andorra la Vella (AD)

(74) Representative: **Marques Alos, Fernando**
Tuset, 34
08006 Barcelona (ES)

(54) Self-carrying plate

(57) The innovative SELF-CARRYING PLATE is composed of a sheet with a polygonal geometric shape composed of a central flat rolled area (1) equipped with layered ledges (2) framing the central area of the plate (1), connecting on each edge of the flat polygonal piece some grooves (3) with edging on ends (4) of finished comers (5) that are positioned on the same plane as the central laminate area (1).

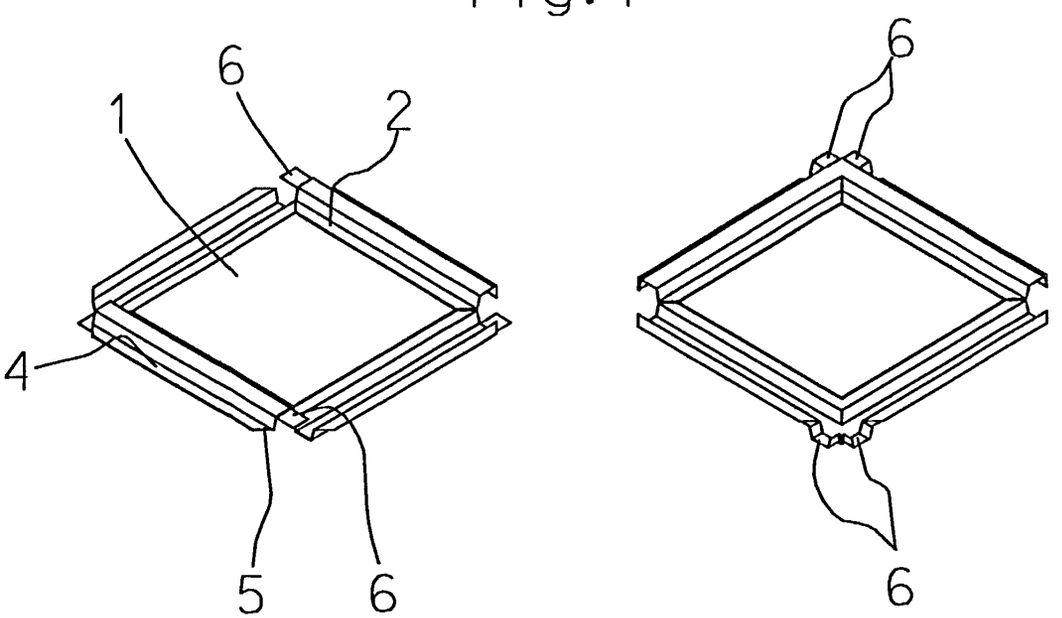
The grooves (3) are positioned consecutively or alternately, each section being constituted generically in the shape of a "U" or inverted "U".

The grooves also have supports (6) composed of a prolongation of the groove (3), but considerably smaller, i.e., slightly lower at the point of union.

When the SELF-CARRYING PLATE is triangular in shape, another means of connection is used composed of a hexagonal cover (7) equipped with several vertical decks (10) protruding radially on the bottom, each of which is associated with a union element (8) of a tubular configuration into which the groove assembly pieces are inserted.

On the top of the hexagonal cover there is a slightly larger rubber sealing piece (9) which exerts pressure on the angle and seals the hexagonal joint.

Fig. 1



EP 1 074 669 A1

Description

[0001] The object of the invention as expressed in the statement of this descriptive report consists of a "**SELF-CARRYING PLATE**", applied to the construction of industrial structures.

[0002] Industrial structures such as construction booths, garages, warehouses, hangars, exhibit stands, etc. are traditionally made from metal structures that are later covered with sheet metal, Uralite or another material.

[0003] These structures are expensive since they require the use of different elements such as base supports, pillars, frames, beams, bars, etc.

[0004] In addition, the plates used to cover the structure are only ribbed on one side, reinforcing the area of compression and traction and thereby causing a low moment of inertia which results in curving in most cases.

[0005] The new SELF-CARRYING PLATE has therefore been developed, which presents a structure of coupled modular sheets that incorporates the formation of beams and girders, thanks to which the traditional constructions made of pillars, sheets, porticos, etc. are eliminated.

[0006] The new SELF-CARRYING PLATE is basically composed of a sheet made by pressing, injection, cutting, laminating, etc. in any appropriate mouldable material with a certain degree of resistance.

[0007] Said sheet, applicable to the construction of different buildings, may be formed into different geometric shapes: polygonal, square, rectangular, triangular or hexagonal (circular or oval) etc., composed of a central flat rolled area equipped with ledges or depressions like slight layers framing the central area of the plate, connecting on each edge of the flat polygonal piece some grooves with perpendicular extreme edges of outside trimmed points adopting the same inclination as the central laminate area.

[0008] These level variations on the sides of the central plate act like seats on the superposition of SELF-CARRYING PLATES, preventing the installation of successive plates from causing any variation in the plane and placement levels of the structure.

[0009] The consecutive or alternate "U" or inverted "U" grooves on all of the edges present a sectional shape of a polygonal, semicircular, semielliptical section, etc.

[0010] In other words, a square plate may contain two consecutive "U" shaped grooves and two other inverted "U" grooves or may have alternating "U" and inverted "U" grooves.

[0011] Moreover, the grooves present plate supports composed of a body of the same section in "U" as the groove, but slightly lower at the point of union with same so as to avoid unevenness or torsion on coupling.

[0012] In the case of quadrangular plates with two-by-two consecutive inverse grooves, these assembly supports are positioned on the vertexes opposite the intermediate union of the two directioned grooves as continuations of same, while if the grooves are positioned in alternating "U" and inverted "U", said supports for anchoring in lowered "U" are positioned equidistantly on each one of the extremities of each groove.

[0013] Another innovation of the invention consists of a support for triangular plates composed of a body or hexagonal cover with perpendicular decks equipped with lowered "U" section joining supports. To do so it incorporates supports on the decks and perpendicularly thereto hexagonal bodies or any other appropriate shape coinciding with the shape of the groove, joined by means of a slightly pivoting intermediate appendix which prevents tension on the erected structure adapting to possible angular variations.

[0014] On the top of the said hexagonal body there is a piece of rubber the rubber which is the same shape but slightly larger which puts pressure on the angle and seals the hexagonal joint.

[0015] The hexagaonal plate may optionally present supports for triangular anchors only, in which case the new support is half of that previously described.

[0016] These SELF-CARRYING PLATES allow for the construction of sections where plates with different geometrical shapes are coupled together configuring vaulted spatial networks, geodesic domes, etc.

[0017] The plates may also have deeper grooves which are superimposed on one another to configure formwork orifices for the application of concrete which enable the formation of internal pillars for structural reinforcement.

[0018] The new SELF-CARRYING PLATE allows for the option of conventional coupling methods between plates, such as internally threaded tubular elements, quadrangular or circular sections, which will perform a compression function for the structure and cables which will perform a traction function.

[0019] It also allows for the incorporation, in the case of structures in two or three directions, of threaded tubular intersections or conventional double intersections or rods with an intermediate body for anchorage to the threaded tubular elements as traditional coupling methods.

[0020] The new SELF-CARRYING PLATE allows for the construction of industrial structures with a high level of stability and reinforcement as compared to traditional structures.

DESCRIPTION OF THE DRAWINGS

[0021] To illustrate all that has been mentioned thus far, this descriptive report is accompanied by several pages of drawings which are considered an integral part of the report and which depict, in a simplified and outlined manner, an example of the practical possibilities of this invention which is strictly illustrative and not limitative.

[0022] In these drawings:

[0023] Figure 1 shows two views in perspective of two square plates with crossed supports, one with an alternating "U" and inverted "U" grooves and the other with a consecutive two-by-two design.

[0024] Figure 2 is a view of the plan of the plates in Figure 1 which shows the grooved sections and lower part of the central plate.

[0025] Figure 3 is a perspective and plan view of a triangular shaped plate.

[0026] Figure 4 is a view of a hexagonal operative module made from coupling together two triangular plates.

[0027] Figure 5 is a view of a plate structure composed of square sections with oversized or deep grooves appropriate for the configuration of formwork for generating reinforced concrete pillars.

[0028] Figure 6 is a view of a geodesic structured made from the new SELF-CARRYING PLATES.

[0029] Figure 7 is a view of the supports.

DESCRIPTION OF A PRACTICAL CASE

[0030] The new SELF-CARRYING PLATE is composed of a sheet made by pressing, injection, cutting, laminating, etc. in any appropriate mouldable material with a certain degree of resistance, which may be formed into different geometric shapes, preferably square, triangular or hexagonal composed of a central flat rolled area (1) equipped with layered ledges (2) framing the central area of the plate (1), connecting on each edge of the flat polygonal piece some grooves (3) with edging on ends (4) of finished comers (5) that are positioned on the same plane as the central laminate area (1).

[0031] The grooves (3) are positioned consecutively or alternately and may be rectangular, semicircular or any other shape constituted generically by a "U" or inverted "U". In other words a square plate may, for example, contain two consecutive "U" shaped grooves and two other inverted "U" grooves or may have alternating "U" and inverted "U" grooves.

[0032] The grooves present plate supports (6) composed of a prolongation of the groove (3), but considerably smaller, i.e., slightly lower at the point of connection therewith.

[0033] In the case of quadrangular plates with two-by-two consecutive inverse grooves, these assembly supports (6) are positioned on the vertexes joining the two grooves (3) oriented as a continuation of same, while if the grooves are positioned in alternating "U" and inverted "U", said supports for anchoring in lowered "U" are positioned consecutively on one end of each groove (3).

[0034] When the plate is triangular shaped, another type of connection is used which consists of a hexagonal cover (7) equipped with several vertical platinas (10) protruding radially on the bottom with a tubular coupling element associated to each one (8) into which the groove assembly elements are inserted.

[0035] These coupling elements (8) may be hexagonal or any other appropriate shape but always coinciding with or similar to the shape of the groove (3) and are joined to the platinas (10) by means of a slightly pivoting intermediate arm (11) which prevents tension on the assembled structure, adapting to possible angular variations.

[0036] The top of the hexagonal cover contains a slightly larger sealing rubber piece (9) which exerts pressure on the angle and seals the hexagonal joint.

[0037] At the beginning of the structure, said hexagonal covers (7) suitable for the insertion of six hexagonal coupling elements (8), will present a form split down the middle in two to form a body for the insertion of three triangular plates.

[0038] These SELF-CARRYING PLATES allow for the construction of sections where plates with different geometrical shapes are coupled together configuring vaulted spatial networks, geodesic domes, etc.

[0039] In addition, the plates may also have deeper grooves (12) which are superimposed on one another to configure formwork orifices for the application of concrete which enable the formation of internal pillars, girders, braces and beams for structural reinforcement when the shapes and loads require.

[0040] Having established the expressed concept, the following list of claims synthesises the innovations being claimed:

Claims

1. "**SELF-CARRYING PLATE**", applied to the construction of structures in general and to industrial structures in particular, characterised essentially by the fact that it is made from a sheet made by pressing, injection, cutting, laminating, etc. in any appropriate mouldable material with a certain degree of resistance and which may come in different geometric polygonal shapes, preferably square, triangular or rectangular, composed of a central flat rolled area (1) equipped with layered ledges (2) framing the central area of the plate, connecting on each edge of the flat polygonal piece some grooves (3) with edging on ends (4) of finished comers (5) that are positioned on the same plane as the central laminate area (1)

2. "**SELF-CARRYING PLATE**", according to the preceding claim, characterised by grooves (3) on the perimeter of the centre plate (1) which may be rectangular, semicircular or any other shape constituted generically by a "U" or inverted "U". In other words alternating "U" and inverted "U" grooves or two consecutive "U" shaped grooves and two other inverted "U" grooves.

3. "**SELF-CARRYING PLATE**", according to the pre-

ceding claims, characterised by the fact that the grooves have plate supports (6) composed of a prolongation of the groove (3) which is considerably smaller, i.e., slightly lower at the point of union.

4. "**SELF-CARRYING PLATE**", according to the preceding claims, characterised by the fact that when the SELF-CARRYING PLATE is triangular in shape, the type of connection used consists of a hexagonal cover (7) equipped with several vertical decks (10) protruding radially on the bottom with a tubular coupling element associated to each one (8) into which the groove assembly elements are inserted which may be any appropriate shape coinciding with or similar to the shape of the groove (3) and are joined to the platinas (10) by means of a slightly pivoting intermediate arm (11). The top of the hexagonal cover (7) contains a slightly larger sealing rubber piece (9) which exerts pressure on the angle and seals the hexagonal joint.

5. "**SELF-CARRYING PLATE**", according to previous daims, characterised by the fad that the hexagonal cover (7) may be split into two halves composing one body for the insertion of only three triangular plates.

6. "**SELF-CARRYING PLATE**" according to previous daims, characterised by the fad that the grooves (12) may be deep enough so that by superimposing them on one another they form a formwork orifice for the application of concrete.

7. "**SELF-CARRYING PLATE**", according to previous claims, allow for the construction of sections where plates with different geometrical shapes are coupled together configuring vaulted spatial networks, geodesic domes, etc.

Fig.1

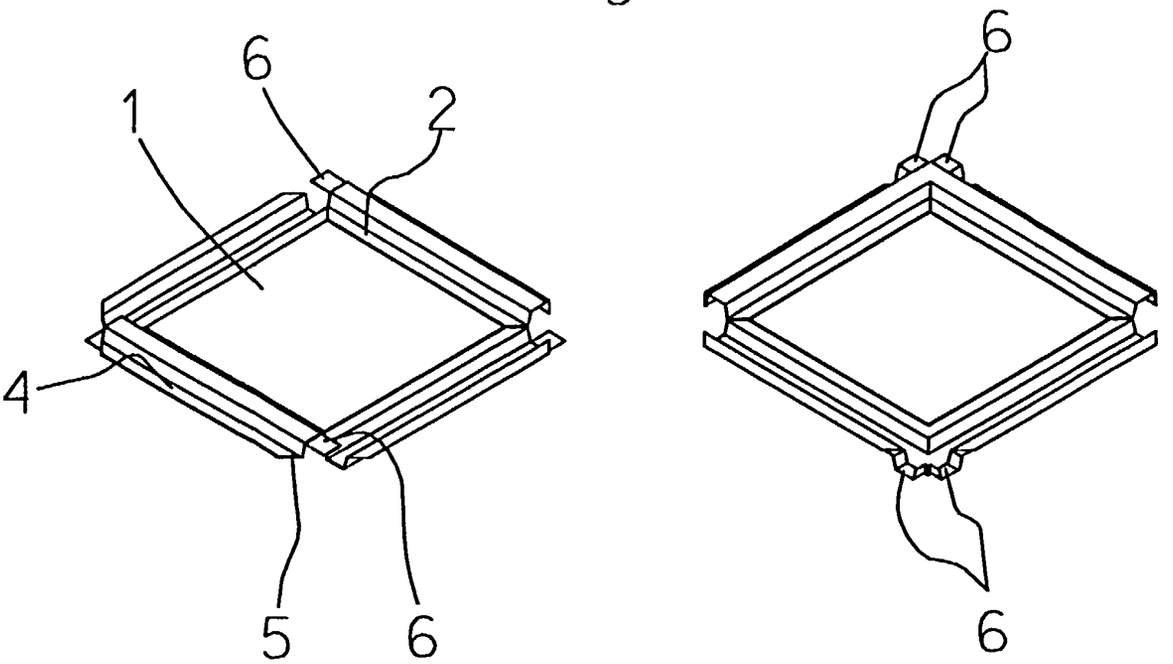


Fig.2

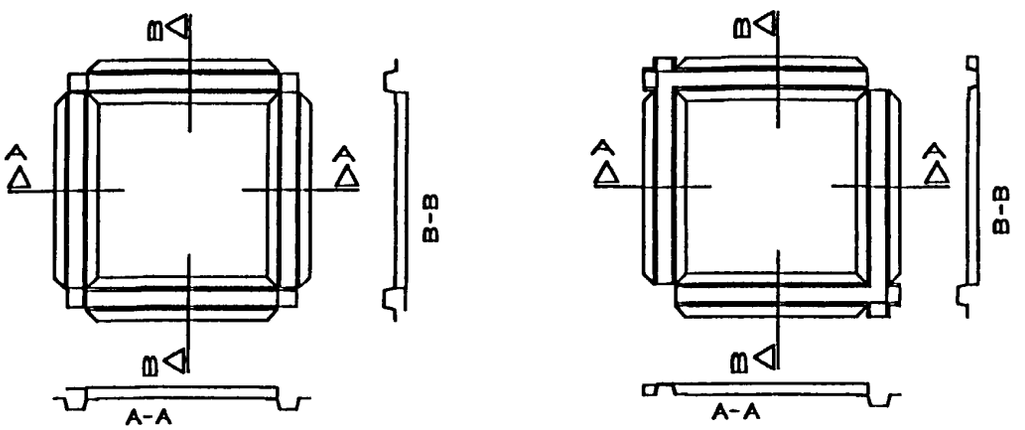


Fig.3

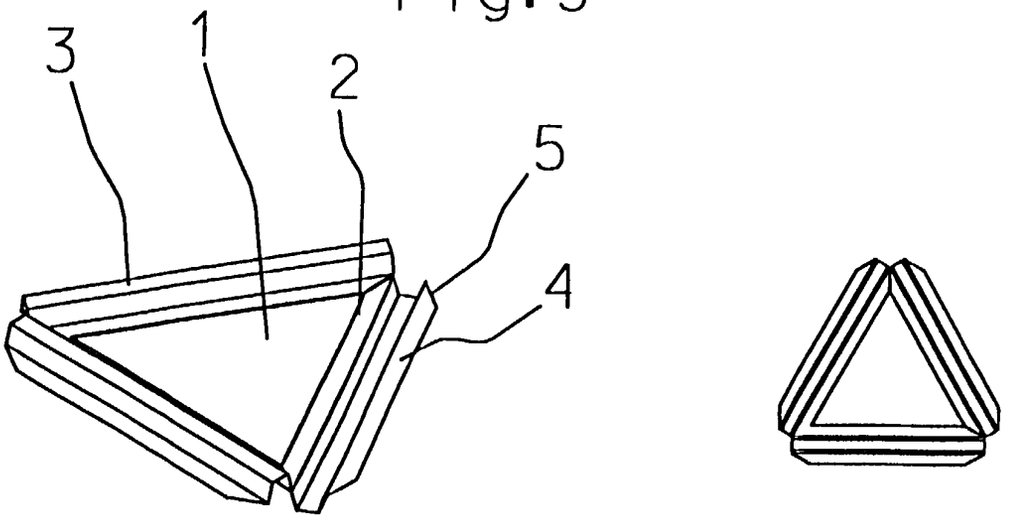


Fig.4

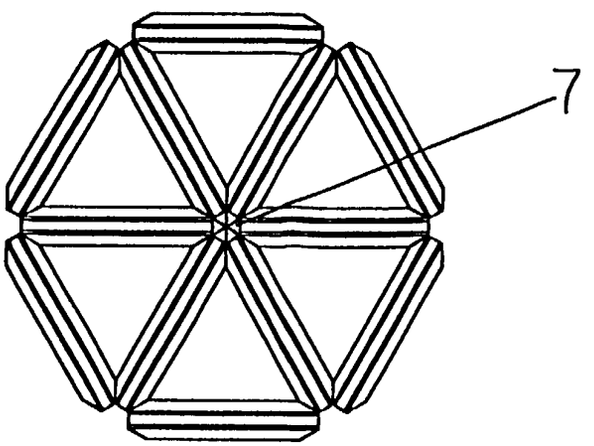


Fig.5

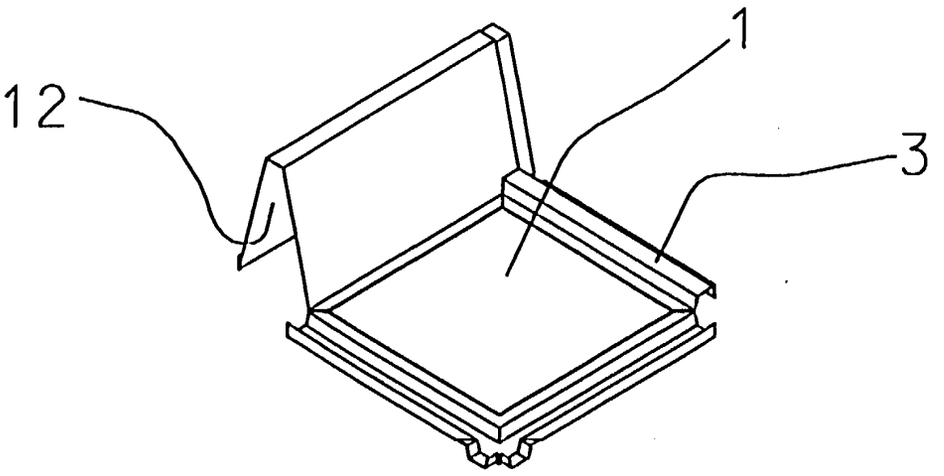


Fig.6

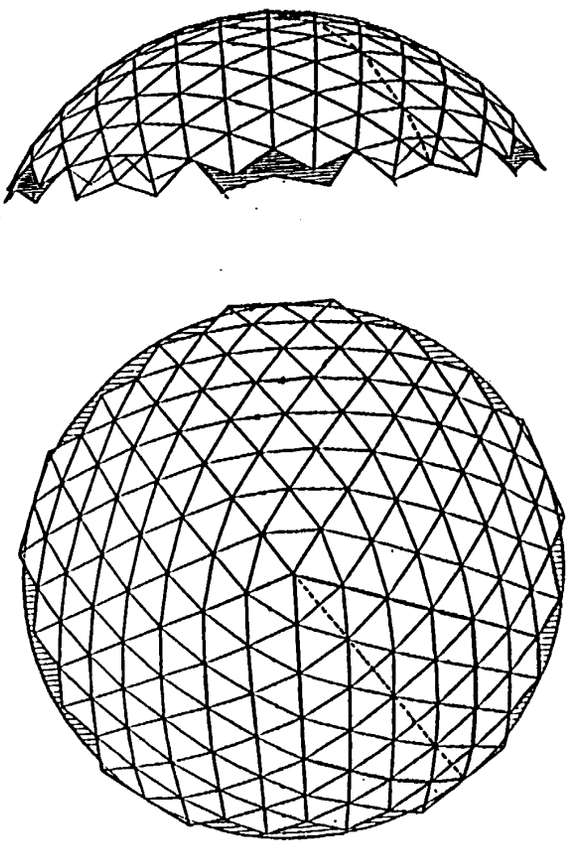
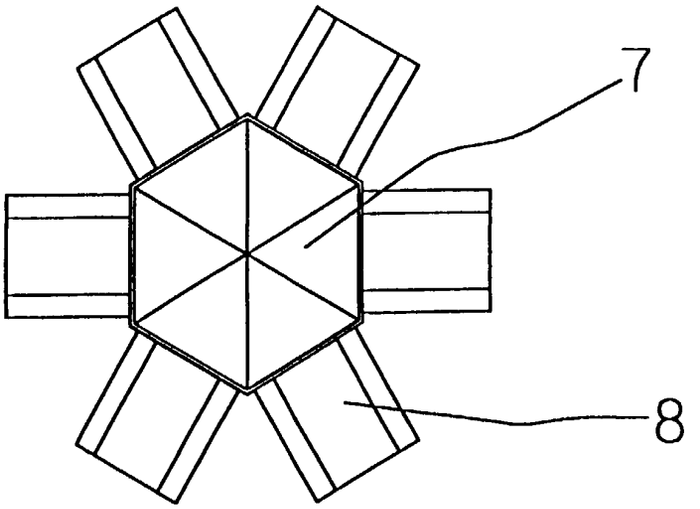
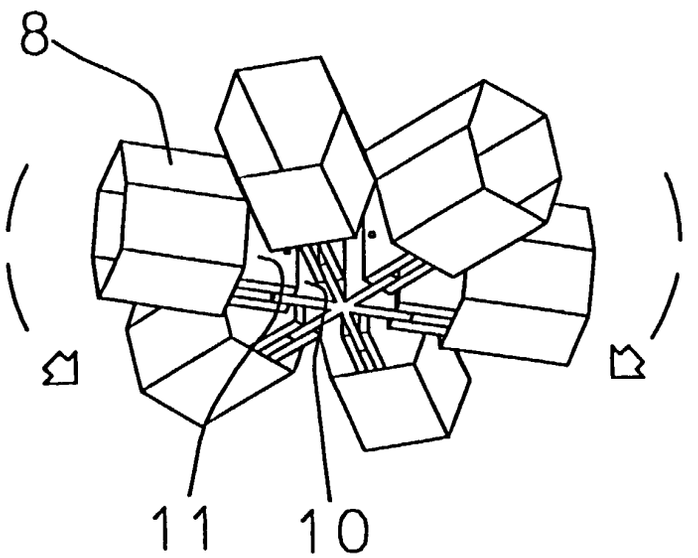
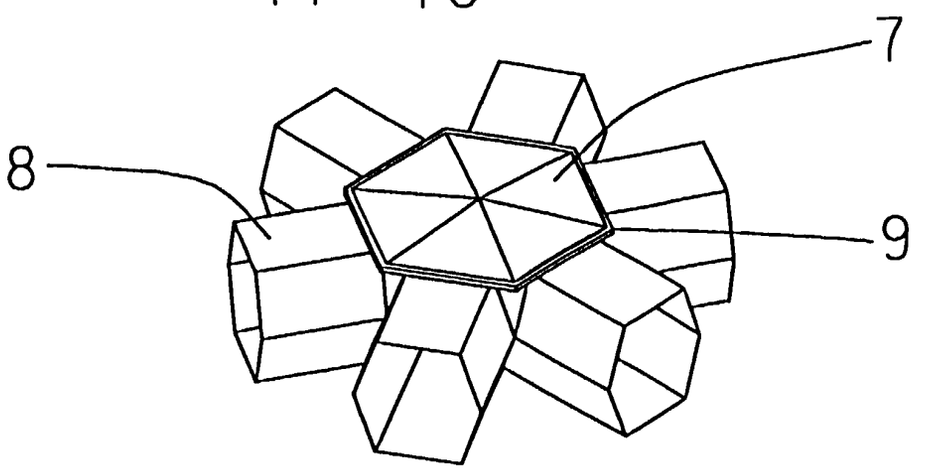


Fig.7







European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 50 0135

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	DE 295 02 332 U (PANIAGUA ET AL.) 11 May 1995 (1995-05-11) * the whole document *	1	E04C2/08 E04F13/18
A	DE 15 09 301 A (FARBWERKE HOECHST) 4 June 1969 (1969-06-04) * the whole document *	1-3	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

E04C
E04B
E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 November 1999	Mysliwetz, W

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 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 99 50 0135

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.

24-11-1999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 29502332 U	11-05-1995	ES 2124104 A	16-01-1999
		FR 2716224 A	18-08-1995
DE 1509301 A	04-06-1969	NONE	

EPO FORM P0459

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