



(11)

EP 4 257 765 A1

(12)

EUROPEAN PATENT APPLICATION
published in accordance with Art. 153(4) EPC

(43) Date of publication:
11.10.2023 Bulletin 2023/41

(51) International Patent Classification (IPC):
E04B 1/348^(2006.01) E04B 1/342^(2006.01)

(21) Application number: **21901115.2**

(52) Cooperative Patent Classification (CPC):
E04B 1/19; E04B 1/342; E04B 1/348; E04H 1/00

(22) Date of filing: **02.12.2021**

(86) International application number:
PCT/MX2021/050082

(87) International publication number:
WO 2022/119434 (09.06.2022 Gazette 2022/23)

(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
Designated Validation States:
KH MA MD TN

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(30) Priority: **03.12.2020 AR P200103382**

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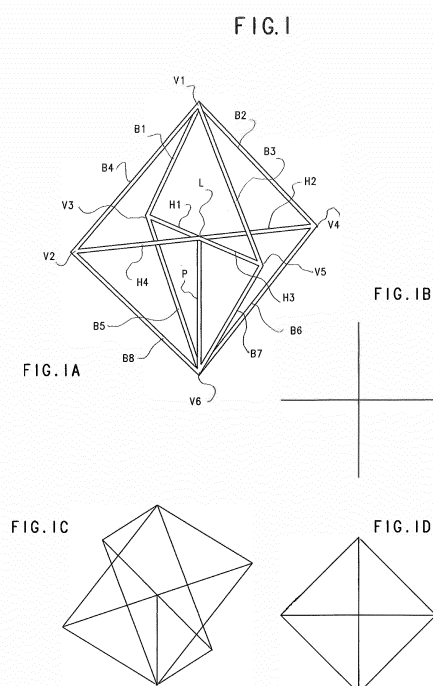
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(54) **OCTAHEDRAL RETICULATED STEREO MODULE FOR THE CONSTRUCTION OF BUILDINGS**

(57) Reticulated stereo module for the construction of buildings of the type that uses elements of reticulated stereo octahedral type and quadrangular panels for the construction of walls, floors and ceilings, which consists of 4 upper diagonal bars, 4 lower diagonal bars, 4 horizontal bars in the center in a crosswise direction, and 1 strut bar placed between the lower vertex and the central node and/or 1 tension bar placed between the upper vertex and the central node.



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Description

[0001] The present invention refers to a reticulated stereo module for the construction of buildings of the type that uses elements of reticulated stereo octahedral type and quadrangular panels for the construction of walls, floors and ceilings, which consists of 4 upper diagonal bars (with pyramid shape), 4 lower diagonal bars (with pyramid shape), 4 horizontal bars in the center in a crosswise direction, and 1 strut bar placed between the lower vertex and the central node and/or 1 tension bar placed between the upper vertex and the central node.

TECHNICAL FIELD OF THE INVENTION

[0002] The present invention falls within the technical scope of the structures composed of units that involve at least important parts of two sides of a room, that is units in the form of closed cell boxes or in the form of a shell.

[0003] It is based on the triangle and its non-deformability, that due to the juxtaposition with other equal ones, allows the formation of enclosures with quadrangular floors and walls, suitable for the configuration of rooms, being applicable in respect of residential buildings, hotels, offices, etc.

PRIOR ART AND PROBLEMS TO BE SOLVED

[0004] Within the Prior Art, the use of a structural skeleton that sets a three-dimensional network of pyramidal modules, such as the three-dimensional network disclosed in the Invention Patent No. AR026905A1, which allows obtaining highly resistant living spaces or cells to ease the construction of buildings, with matching walls with diagonal bars of a semi-octahedron determining the living spaces that are horizontally and vertically juxtaposed with each other, is widely known; but the structural skeleton of pyramidal structure includes horizontal bars consistent with the horizontal edges of the semi-octahedron, that are the ones that close and strengthen the structure and, furthermore, support the floor quadrangular plate.

[0005] This is illustrated in Figure 3 of said antecedent, wherein vertex (A) is common to the bars or edges (A1), (A2), (A3) and (A4); and the ends or endpoints (1), (2), (3) and (4) thereof determine a square or base wherein the floor quadrangular plate is supported.

[0006] Said geometry has the problem that the floor plate has an excessive surface that requires a large amount of material to support the entire loads it receives; likewise, the horizontal bars, as beams, turn out to be of a vast length and require a large amount of material to absorb bending stress. In contrast with the present invention, wherein the floor is set attaching two modules with a quadrangular plate supported in horizontal bars of shorter length than the ones of the semi-octahedron and require less material. The floor quadrangular plate turns out to be of a smaller surface, supports less load and

requires less material.

[0007] Furthermore, another proven advance on this matter may be observed in the Invention Patent No. MX2012008417A, which is based on a tetrahedron built by means of six profiles. Figure 1 of said antecedent illustrates a perspective view, following the sequence of the invention, of how the basic reticulated stereo module is generated since its essential component elements to arrive to the assembly of a living space. The basic elements of the tetrahedron are shown in (I). Afterward, the tetrahedron with the aggregate, in a pair of its vertexes, of two tensioners (11) and (12), can be observed in (II). In (III), half floor panel (13) fixed from the end of the tensioner (11) and of the vertexes (9) and (10) is added. In (IV) the floor of the unit is completed with another half floor panel (14) using another tensioner (12) to keep it in position with the same vertexes (9) and (10). The floor is supported in the vertexes matching the ends of the tensioners and the horizontal bar matching the floor, being the quadrangle (a)-(b)-(c)-(d) completed.

[0008] Therefore, the floor quadrangular plate of each module is set with two half panels that are supported in ends of the tensioners and horizontal bar of the tetrahedron. In contrast with the present invention, wherein the floor is set, attaching two modules with a quadrangular plate supported in horizontal bars of shorter length than the tetrahedron, which requires less material.

PURPOSE OF THE INVENTION

[0009] The present invention refers to a reticulated stereo module for the construction of buildings of the type that uses elements of reticulated stereo octahedral type and quadrangular panels for the construction of walls, floors and ceilings, which consists of 4 upper diagonal bars, 4 lower diagonal bars, 4 horizontal bars in the center in a crosswise direction, and 1 strut bar placed between the lower vertex and the central node and/or 1 tension bar placed between the upper vertex and the central node.

[0010] The purpose of the invention is to solve the problem of excess of material necessary in a floor plate since it turns out to be of a smaller surface with regards to the ones matching the horizontal edges of the octahedron. This way, its purposes is also to solve the problem of the excess of material required by the horizontal bars or beams, which can be built with less material as they are of a shorter length than the horizontal bars of the octahedron and receive less load than the floor plates.

DESCRIPTION OF THE FIGURES

[0011] In the interest of clarity and ease of understanding of the purpose of the present invention, several schematic figures have been prepared, wherein:

Figure I represents perspective views and side and upper view of the structural module of the invention.

Figure II is another perspective partial view following the assembly sequence of the two juxtaposed modules to obtain an enclosure with quadrangular walls and floors.

Figure III is a partial perspective of a modules skeleton of two floors following the partial sequence of assembly of quadrangular floors and walls.

Figure IV corresponds to a partial perspective of a multiplicity of juxtaposed modules illustrated herein for two floors and a perspective view of an enclosure without ceiling equipped with a door and a window.

References in the Figures:

[0012]

(B1) Diagonal Bar 1

(B2) Diagonal Bar 2

(B3) Diagonal Bar 3

(B4) Diagonal Bar 4

(B5) Diagonal Bar 5

(B6) Diagonal Bar 6

(B7) Diagonal Bar 7

(B8) Diagonal Bar 8

(H1) Horizontal Bar 1

(H2) Horizontal Bar 2

(H3) Horizontal Bar 3

(H4) Horizontal Bar 4

(P) Strut Bar

(V1) Vertex 1

(V2) Vertex 2

(V3) Vertex 3

(V4) Vertex 4

(V5) Vertex 5

(V6) Vertex 6

(L) Central Node

DESCRIPTION OF THE INVENTION

[0013] The invention presents a modular structure with a bar arrangement in conjunction with the edges of a regular octahedron, except for the horizontal edges, to which four horizontal bars are added included within the quadrangular median plane of the octahedron, matching with halves of the diagonals of the square, supported in an end in the vertexes of the square and the ends matching the diagonals crossing supported in a strut, that is at the same time supported in the lower vertex of the octahedron and/or supported by a tensioner that, at the same time, hangs from the upper vertex of the octahedron; the floor quadrangular plates are supported over these horizontal bars as beams, matching the diagonals of the medium square of the octahedron.

[0014] The horizontal juxtaposition of modules of this type of modular structure allows the generation of a floor continuous surface due to the complementation of the median planes of each module with the adjacent ones, wherein the floor plates, beside supporting the loads of the use of people, furniture, etc., have the same function as the suppressed horizontal bars of the octahedron to strengthen the bars octahedral structure.

[0015] The module of the invention may incorporate a vertical bar between its lower vertex and the central node (as strut) and/or may incorporate a vertical bar between its upper vertex and the central node (as tensioner), which move the loads due to predominantly axial stresses, equally to the diagonal bars of the octahedron, whereby the structural skeleton absorbs the total loads due to predominantly axial stresses that are the ones that require less material in the structures as the bending stress are reduced.

[0016] The module allows configuring with the structures of similar octahedral modules juxtaposed in horizontal succession, medium vertexes coplanar regarding the adjacent ones, arranging floor quadrangular plates over the horizontal bars of each module, that with the horizontal juxtaposition form a rigid diaphragm to absorb horizontal wind and earthquake forces that act over the building.

[0017] The invention allows the interlocking in the structural module of quadrangular vertical plates as walls, orthogonal with each other, in each of which the base matches a side of the floor plate, and its diagonal matches an inclined edge of the octahedron.

[0018] Furthermore, the invention allows the linkage of abutting quadrangular enclosures, and with the outside, with doors and windows included in the vertical quadrangular plates at both sides of the diagonal bar of the octahedron.

[0019] Finally, the invention allows the obtention of different constructions or configurations of buildings of several levels with the juxtaposition of octahedral modules and horizontal and vertical quadrangular plates, in theoretically infinite repetitive series.

EXAMPLES OF EMBODIMENTS

[0020] For the present invention, the following example of embodiment is chosen:

A reticulated stereo module for the construction of buildings of the type that uses elements of reticulated stereo octahedral type and quadrangular panels for the construction of walls, floors and ceilings, characterized because it includes:

- 4 diagonal bars placed between its medium vertexes (V2), (V3), (V4) and (V5) and its upper vertex (V1);
- 4 diagonal bars placed between its medium vertexes (V2), (V3), (V4) and (V5) and its lower vertex (V6);
- 4 horizontal bars placed between each one of its 4 medium vertexes (V2), (V3), (V4) and (V5) and its central node (L); and
- 1 strut bar placed between its lower vertex (V6) and its central node (L).

Said module can be appreciated in Figure I, wherein the basic elements have been represented; the vertex (V1) is common to the edges or bars (B1), (B2), (B3) and (B4); and the vertex (V6) is common to the edges or bars (B5), (B6), (B7) and (B8);

The joint of vertex (V2) with vertex (V4) determines the bars (H2) and (H4). The joint of vertex (V3) with vertex (V5) determines the bars (H1) and (H3); the joint of vertex (V6) with the common end of the bars (H1), (H2), (H3) and (H4) determines the vertical or strut bar (P).

[0021] Figure I-B shows an upper view of the module, Figure I-C shows a three-dimensional view of the module, and Figure I-D shows a side view of the module.

[0022] In Figure II-B, the module (Z1) of Figure II-A can be observed juxtaposed to another similar module (Z2); in such a way that vertex (V4) of module (Z1) matches vertex (V3) of module (Z2) and vertex (V5) of module (Z1) matches vertex (V2) of module (Z2).

[0023] In the following Figure II-C, the floor quadrangular plate (M1) is added supported to the horizontal bars (H2) and (H3) of module (Z1) and the horizontal bars (H1) and (H4) of module (Z2), and which vertexes are (L) of (Z1); (L) of (Z2); (V4) of (Z1) matching (V3) of (Z2); and (V5) of (Z1) matching (V2) of (Z2).

[0024] Following with Figure II-D, a quadrangular wall plate (C1) is incorporated, coplanar to the bar (B3) of (Z1), which base matches the side of the floor plate supported in the bar (H3) of (Z1).

[0025] In the following Figure II-E, the quadrangular

wall plate (C2) is incorporated, coplanar to the bar (B2) of (Z1), which base matches the side of the floor plate supported in the bar (H2) of (Z1).

[0026] Following with Figure II-F, the quadrangular wall plate (C3) is incorporated, coplanar to the bar (B1) of (Z2), which base matches the side of the floor plate supported in the bar (H1) of (Z2).

[0027] In the following Figure II-G, the quadrangular wall plate (C4) is incorporated, coplanar to the bar (B4) of (Z2), which base matches the side of the floor plate supported in the bar (H4) of (Z2).

[0028] In Figure III-A, the octahedral module (Z3) is added, in such a way that the vertex (V2) of (Z3) matches the vertex (V1) of (Z1); and the vertex (V5) of (Z3) matches the vertex (V1) of (Z2).

[0029] In the following Figure III-B, the octahedral module (Z4) is added, in such a way that the vertex (V3) of (Z4) matches the vertexes (V2) of (Z3) and (V1) of (Z1); and the vertex (V4) of (Z4) matches the vertexes (V1) of (Z2) and (V5) of (Z3); and the vertex (V6) of (Z4) matches the vertexes (V2) of (Z2) and (V5) of (Z1).

[0030] Following with Figure III-C, the quadrangular floor plate (M2) has been incorporated, one of which vertexes matches the vertexes (V1) of (Z1), (V3) of (Z4) and (V2) of (Z3); another of its vertexes matches the vertexes (V1) of (Z2), (V5) of (Z3) and (V4) of (Z4); another of its vertexes matches the point (L) of (Z4); and the other of its vertexes matches the point (L) of (Z3).

[0031] In Figure III-D, the quadrangular wall plate (C5) is incorporated, coplanar to the bar (B1) of (Z4), which base matches the side of the floor plate supported in the bar (H1) of (Z4).

[0032] Following with Figure III-E, the quadrangular wall plate (C6) is incorporated, coplanar to the bar (B4) of (Z3), which base matches the side of the floor plate supported in the bar (H4) of (Z3).

[0033] Following with Figure III-F, the quadrangular wall plate (C6) is incorporated, coplanar to the bar (B4) of (Z3), and which base matches the side of the floor plate supported in the bar (H4) of (Z3).

[0034] In Figure III-F the quadrangular wall plate (C7) is incorporated, coplanar to the bar (B3) of (Z3) and which base matches the side of the floor plate supported in the bar (H3) of (Z3).

[0035] Following with Figure IV-A, the quadrangular wall plate (C8) is incorporated, coplanar to the bar (B4) of (Z4) and which base matches the side of the floor plate supported in the bar (H2) of (Z4).

[0036] Figure IV-B shows a perspective partial view of a plurality of juxtaposed modules, that allow the construction of buildings of very different types of at least two levels.

[0037] Figure IV-C shows a wall quadrangular plate with a door and window, that may correspond to any inner or outer wall of the building.

[0038] There follow 4 claims.

Claims

1. A reticulated stereo module for the construction of buildings of the type that uses elements of reticulated stereo octahedral type and quadrangular panels for the construction of walls, floors and ceilings, characterized because it includes:
 - 4 diagonal bars placed between its medium vertexes (V2), (V3), (V4) and (V5) and its upper vertex (V1);
 - 4 diagonal bars placed between its medium vertexes (V2), (V3), (V4) and (V5) and its upper vertex (V6);
 - 4 horizontal bars placed between each one of its 4 medium vertexes (V2), (V3), (V4) and (V5) and its central node (L); and
 - 1 vertical bar placed between its lower vertex (V6) and its central node (L) and/or 1 vertical bar placed between its upper vertex (V1) and its central node (L).
2. The reticulated stereo module of claim 1, characterized because it preferably includes only 1 strut bar placed between its lower vertex (V6) and its central node (L).
3. The reticulated stereo module of claim 1, characterized because it preferably includes only 1 tension bar placed between its upper vertex (V1) and its central node (L).
4. The reticulated stereo module of claim 1, characterized because it preferably includes 1 bar placed between its upper vertex (V1) and its central node (L) and 1 bar placed between its lower vertex (V6) and its central node (L).

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FIG. 1

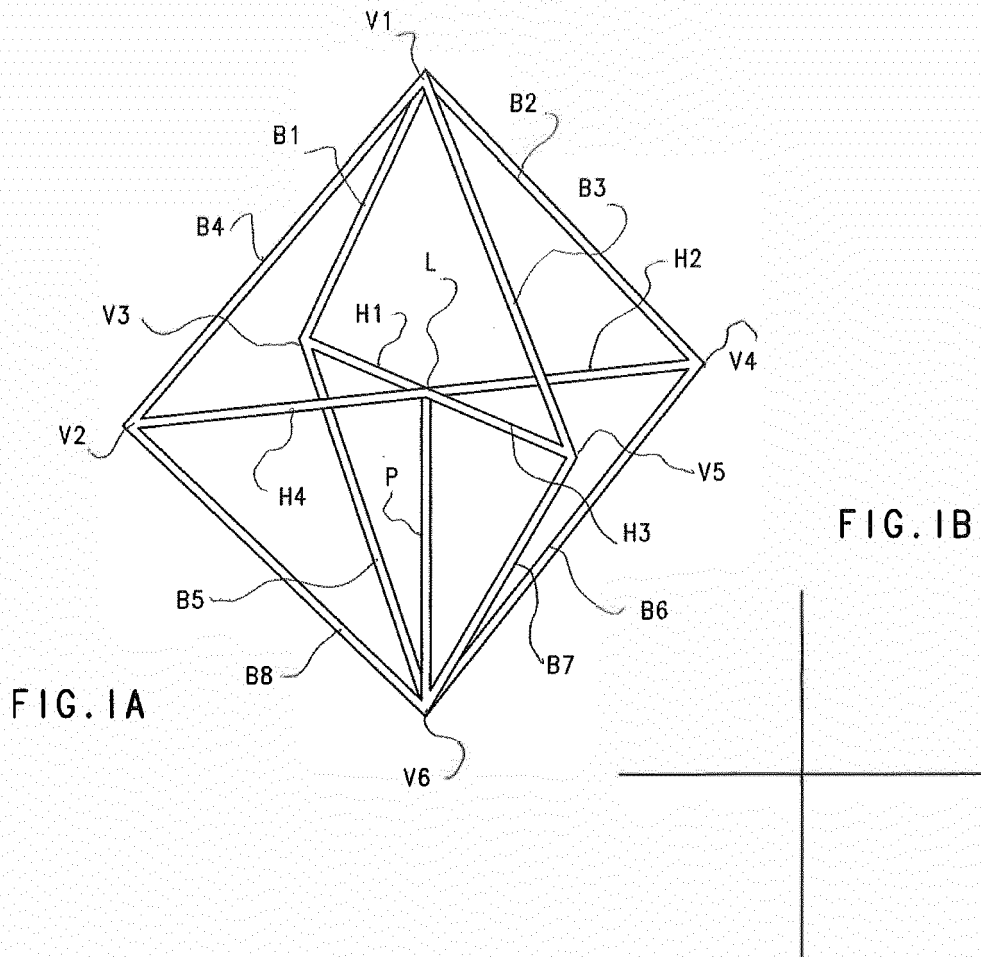


FIG. 1C

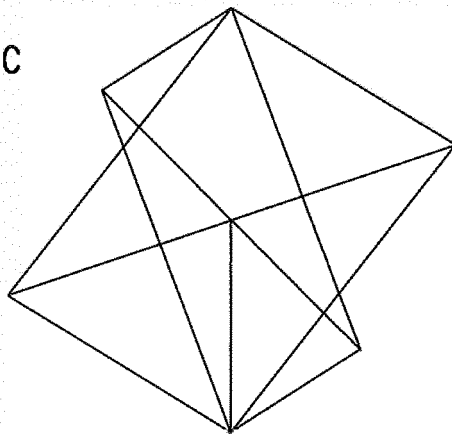
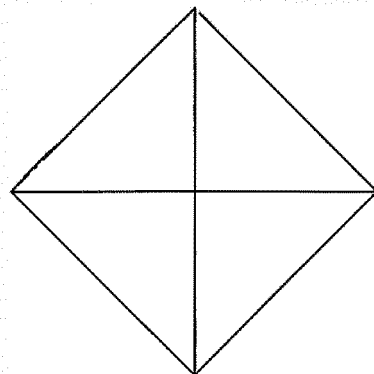


FIG. 1D



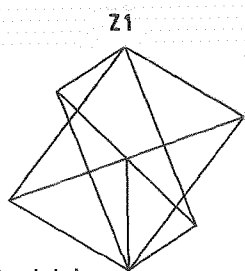


FIG. IIA

FIG. II

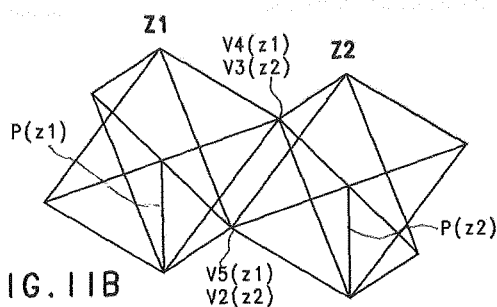


FIG. IIB

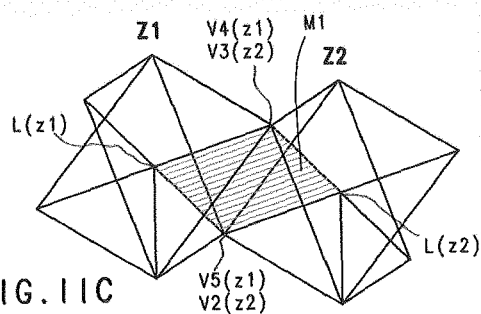


FIG. IIC

V5(z1)
V2(z2)
C1

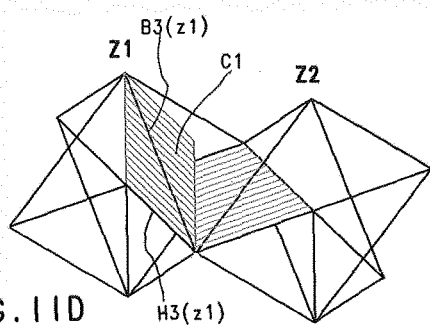


FIG. IID

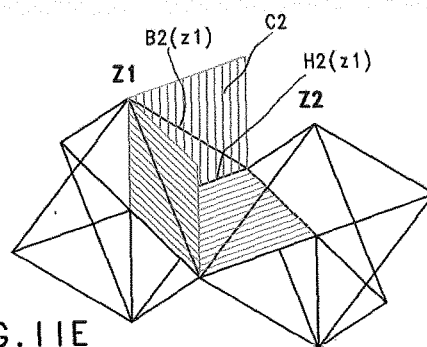


FIG. IIE

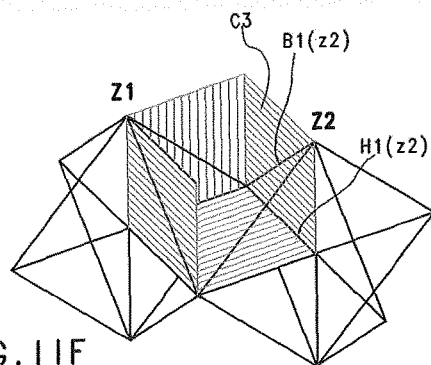


FIG. IIF

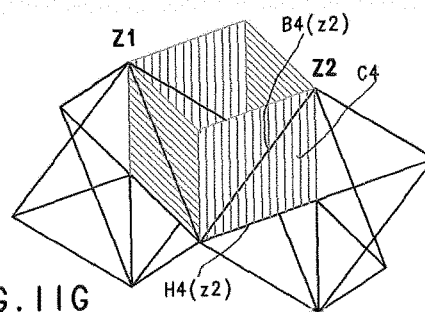


FIG. IIG

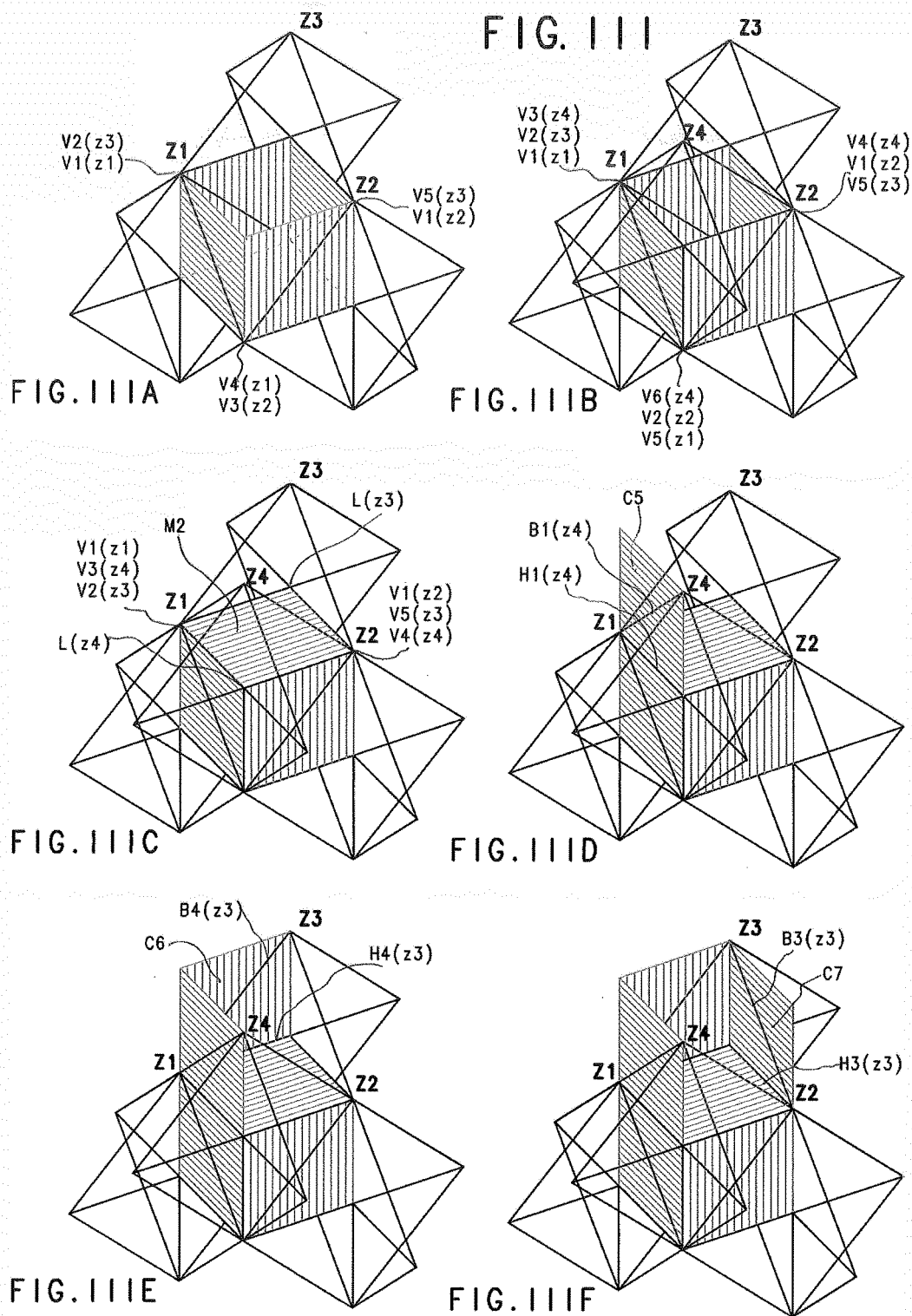
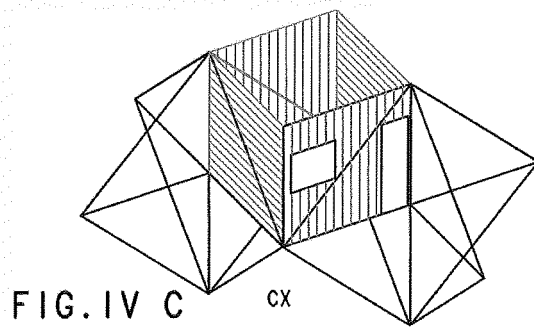
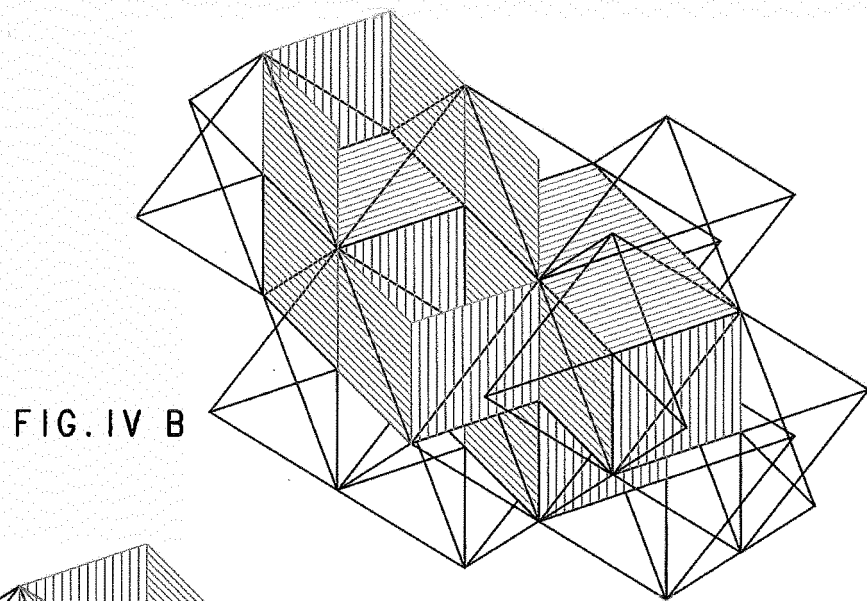
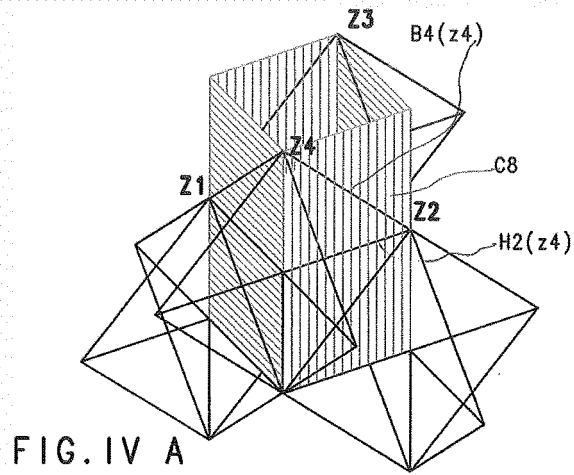


FIG. IV



INTERNATIONAL SEARCH REPORT

International application No.

PCT/MX2021/050082

A. CLASSIFICATION OF SUBJECT MATTER

E04B1/348 (2006.01)

E04B1/342 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 0244487 A1 (BARJA LOPEZ GERVASIO ET AL.) 06/06/2002, page 4, line 19 - 31; abstract; figures 3 -9.	1-4
Y	CN 1258790 A (WANG BINBING) 05/07/2000, Abstract DataBase EPODOC/ EPOQUE; figures 2, 7, 11.	1-4

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

24/03/2022

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/MX2021/050082

Information on patent family members

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
WO0244487 A1	06.06.2002	AU2195802 A AR026905 A1	11.06.2002 05.03.2003
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REFERENCES CITED IN THE DESCRIPTION

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- AR 026905 A1 [0004]
- MX 2012008417 A [0007]