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(71) Applicant: **Vuga, Stefano**
08242 Manresa (ES)

(72) Inventor: **Vuga, Stefano**
08242 Manresa (ES)

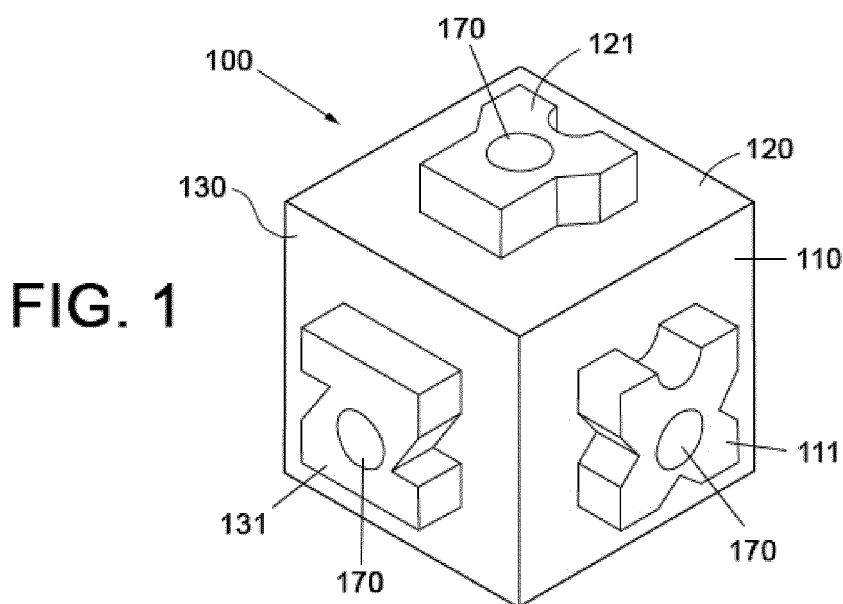
(74) Representative: **ZBM Patents - Zea, Barlocchi & Markvardsen**
Rambla Catalunya, 123
08008 Barcelona (ES)

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(54) **MODULAR GAME**

(57) The modular game comprises a number of pieces each having at least three pairs of faces arranged in different planes, each pair of faces consisting of a first face having a projection projecting outwards and a second face symmetrically opposite thereto having a recess whose shape is complementary to that of the projection

of the first face, to allow several pieces to be coupled to each other so that they are arranged in alignment on at least three different axes. The shape of the projection and the corresponding recess of each pair of faces may be different between the pairs of faces.



Description

[0001] The present disclosure relates to modular games consisting of pieces that can be coupled to each other in order to compose multiple structures in space.

BACKGROUND

[0002] There are known construction games consisting of multiple pieces configured to be coupled to each other in order to form various figures in two or three dimensions. This type of games develop in children various skills, as well as the coordination of body parts, the senses such as sight and touch, and especially the imagination.

DESCRIPTION OF THE INVENTION

[0003] A new modular game is provided herein that goes beyond the construction of figures in space, which allows to facilitate the understanding of vector space, as well as basic algebraic rules, in order to provide training for future students.

[0004] The present modular game comprises a number of pieces that can be coupled to each other. Each piece in the modular game may be three-dimensionally symmetrical, for example, they can be inscribed in a sphere. Each piece has at least three pairs of faces arranged in different planes, for example, six faces in a cube-shaped configuration, although many other geometric shapes are possible. The faces of each piece of the modular game may be flat, for example, or may be curved, forming, for example, sphere-shaped pieces, or they may have another configuration. The pieces of the present modular game may be hollow or solid, or partially hollow, as desired. Other shapes and configurations are also possible as long as they are strong pieces, whether they are fully or partially hollow.

[0005] Each pair of faces in each piece of the present modular game is formed by a first face having a projection which projects outwardly from the piece, and a second face symmetrically opposite to the first face, having a recess whose shape is complementary to that of the projection of the first face. This configuration of projections and recesses makes it possible to couple several pieces to each other by inserting the projection of one piece into the recess of another different piece. Once the pieces are coupled to each other, they are arranged in alignment on at least three different axes in space. The shape of the projection and the shape of the corresponding recess of each pair of faces may be the same or different between the pairs of faces.

[0006] The recesses formed in the faces in the pieces of the game may be more or less deep as desired. Thus, for example, the recess in at least one of the faces in the piece may extend along at least part of a dimension of the piece, for example, along a part or all of the width, height, length, or diameter of the piece, depending on

the specific geometry of the piece. It is envisaged that a recess of the piece may be formed defining a groove or female track adapted for insertion of a corresponding male projection of another face of another piece. Formation of grooves as a particular case of recesses in the pieces allows coupling of pieces to each other by performing a displacement between them until full interlocking of pieces forming a compact and stable three-dimensional structure of several pieces without gaps, i.e. without discontinuity. In some cases, it is envisaged that at least one inner projection may be formed in the groove. This inner projection may be suitably configured to retain in position pieces temporarily coupled to each other, with the possibility of being released from each other as desired. To this end, it may be advantageous for the projection to either have a suitable coupling surface, such as curved, or formed by two inclined planes, for example, for easy uncoupling of the pieces.

[0007] According to one preferred example of the modular game described herein, the projection and the recess in faces of the piece are letter-shaped. Many other shapes are possible. In particular, it is preferred that each pair of faces of a piece have a first face with a projection and a second face with a recess, with said projection and recess having a complementary shape corresponding to the letter X in a first pair, to the letter Y in a second pair, and to the letter Z in a third pair. This configuration makes it possible to couple several pieces to each other arranged aligned on at least three different axes x, y, and z in space, as stated above. In any case, the faces of each pair of faces may be arranged opposite each other on the piece. Other arrangements of the faces of each pair on the piece are possible.

[0008] With the configuration described above, three letters, that is, a letter X, Y, Z for each face, protrude from three of the faces of each piece, and recesses with shapes corresponding to said letters X, Y, Z are formed in the other three faces in the piece, either opposite or adjacent to each other. Each letter is thus repeated twice in each piece, once protruding therefrom by way of a projection and once entering therein by way of a recess or groove. In the preferred, but not the only, case where the letters are X, Y and Z, as stated above, a face of one piece can be coupled to a corresponding face of another piece, thus forming an array of pieces for different playful and demonstrative applications of vector space directions.

[0009] In the modular game described herein, faces of different pieces, whose projection and recess have the same shape to fit into one another and to couple several pieces to each other aligned on at least three axes, may have the same feature of color, or relief, or texture. That is, each face on which a single letter is provided may be assigned the same color, relief, or texture, for example, although other finishes are possible to distinguish faces with different shapes of projections and recesses. In the above example, a first color may be applied to the face having the projection with the letter X and for the face

having the recess with the letter X, a second color may be applied to the face having the projection with the letter Y and for the face having the recess with the letter Y, and a third color may be applied to the face having the projection with the letter Z and for the face having the recess with the letter Z. As stated above, relief, texture, other finishes, etc. may be used alternatively to color.

[0010] It is also envisaged that one or more holes are formed in at least one face of the piece for inserting other different pieces. Such holes may be formed, for example, in the center of each face of the piece and, in particular, in an area of at least one of the projections, such as a central area.

[0011] With the described configuration it is possible to create a series of games for carrying out a composition of pieces of a model or games with original arrangement, according to directions corresponding to three axes x, y, z in space. This arrangement allows a numerical and numerical-algebraic visualization in three-dimensional space which advantageously facilitates the understanding of vector space defined by the specific three-dimensional orientation on three axes x, y, z in space and a magnitude determined by the number of pieces coupled to each other along the same axis.

[0012] Additional objects, advantages and features of embodiments of the present modular game will become apparent to those skilled in the art upon examination of the description, or may be learned by practice thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] Non-limiting examples of the present modular game will now be described with reference to the attached drawings, wherein:

Figure 1 is a perspective view of a first example of a piece of the present modular game, from a viewpoint where three faces of the piece with respective projections are shown;

Figure 2 is a perspective view of the piece of the first example of figure 1, from another viewpoint where three other faces in the piece with respective complementary recesses are shown;

Figure 3 is a perspective view, from the viewpoint of figure 1, of the present modular game with several pieces of the first example of figures 1 and 2 coupled to each other forming a vector structure in space;

Figure 4 is a perspective view, from the viewpoint of figure 2, of the modular game of figure 3;

Figure 5 is a perspective view of a second example of a piece of the present modular game, from a viewpoint showing three faces in the piece with respective projections;

Figure 6 is a perspective view of the piece of figure 5, from another viewpoint wherein faces in the piece of the second example are shown with respective complementary grooves;

Figure 7 is a perspective view, from the viewpoint of

figure 5, of the present modular game with several pieces of the second example of figures 5 and 6 coupled to each other forming a vector structure in space;

Figure 8 is a perspective view, from the viewpoint of figure 6, of the exemplary modular game of figure 7;

Figure 9 is a perspective view of a third example of a piece of the present modular game, from a viewpoint where projections are shown;

Figure 10 is a perspective view of the piece of the third example of figure 9, from another viewpoint where respective complementary recesses are shown;

Figure 11 is a perspective view, from the viewpoint of figure 9, of the present modular game with various pieces of the third example of figures 9 and 10 coupled to each other forming a vector structure in space; and

Figure 12 is a perspective view, from the viewpoint of figure 10, of the modular game of figure 11.

DETAILED DESCRIPTION OF EXAMPLES

[0014] Figures 1-12 of the drawings show three non-limiting examples of the present modular game. In all the examples, the piece has been denoted as a whole by reference numeral 100. Many other examples of pieces 100 having shapes and configurations other than those described below are possible.

[0015] In all of the examples shown in said figures 1-12, each piece 100 may be hollow, solid, or partially hollow. In the first and second examples shown in figures 1-8, the piece 100 has a cubic geometry, with six flat faces 110, 120, 130, 140, 150, 160, three of which, 110, 120, 130 have respective outwardly projecting projections 111, 121, 131 with different shapes, and the other three opposite faces 140, 150, 160, having respective grooves 141, 151, 161 having a shape complementary to that of the projections 111, 121, 131. Thus, the projections 111, 121, 131 of one piece 100 are intended to engage grooves 141, 151, 161 of another piece 100. Despite the location described for the projections 111, 121, 131 and the recesses 141, 151, 161 in pairs of opposite faces 110-140, 120-150, 130-160 of the piece 100, both the projections 111, 121, 131 and the recesses 141, 151, 161 may be formed in adjacent faces 110, 120, 130, 140, 150, 160. In the third example of figures 9-12, the piece 100 has a substantially spherical geometry with projections 111, 121, 131 and respective grooves 141, 151, 161 having a complementary shape. This third example may be considered a particular case of pieces with infinite faces or defined by curved surfaces.

[0016] In the examples described and shown in figures 1-12, faces of different pieces whose projection 111, 121, 131 and recess 141, 151, 161 have the same shape to fit into one another in order to couple several pieces 100 to each other may have the same characteristic of color, or relief, or texture.

[0017] Also, in the examples of figures 1-12, each projection 111, 121, 131 and/or each recess 141, 151, 161 of the piece 100 has, in a substantially central part thereof, a hole 170 for receiving the projection of other pieces different from the pieces 100. For example, if the structure to be built with the pieces 100 is tree-shaped, these other types of pieces can be in the shape of leaves, insects, etc.

[0018] In the first example illustrated in figures 1-4 of the drawings, three adjacent faces 110, 120, 130 of the piece 100 have respective projections 111, 121, 131 which have the shape of letters X, Y, Z, respectively, as shown in figures 1 and 3 of the drawings. The projections 111, 121, 131 project outwardly from the respective faces 110, 120, 130 by a given distance. Correspondingly, and as shown in figures 2 and 4 of the drawings, the other three adjacent opposite faces 140, 150, 160 of the piece 100 have respective recesses 141, 151, 161 whose shape is complementary to that of the projections 111, 121, 131, respectively, formed within said respective faces 140, 150, 160 of the piece 100.

[0019] The configuration of projections 111, 121, 131 and recesses 141, 151, 161 in a complementary manner makes it possible to couple several pieces 100 to each other so that they are arranged aligned on at least three different axes x, y, z in space, as shown in figures 3 and 4 in the first example. In other words, in each piece or cube 100 there are six faces 110, 120, 130, 140, 150, 160 with projections 111, 121, 131 and recesses 141, 151, 161 having corresponding shapes according to a nomenclature +X, -X, +Y, -Y, +Z, -Z, in the first example shown in figures 1-4 of the drawings. According to such nomenclature, +X is the X-shaped projection 111 in face 110, -X is the X-shaped recess 141 in face 140, +Y is the Y-shaped projection 121 in face 120, -Y is the Y-shaped recess 151 in face 150, +Z is the Z-shaped projection 131 in face 130, and -Z is the Z-shaped recess 161 in face 160, as shown in figures 1 and 2 of the drawings. Thus, the pieces 100 of the first example can only be coupled to each other through the pairs of faces 110-140, 120-150 and 130-160 in accordance with the aforementioned nomenclature +X-X, +Y-Y, +Z-Z.

[0020] The essence of the pieces 100 of the first example shown in figures 1-4 is thus the arrangement of projections 111, 121, 131 in the form of three letters X, Y, Z projecting from three corresponding adjacent faces 110, 120, 130 of the piece 100, one letter X, Y, Z for each face 110, 120, 130. These projections 111, 121, 131 in the form of letters X, Y, Z are intended to be inserted into corresponding recesses 141, 151, 161 formed in faces 140, 150, 160 of another different piece 100. Each letter X, Y, Z is therefore repeated twice in the same piece 100, once protruding therefrom, as a projection 111, 121, 131, and once entering therein, as a recess 141, 151, 161. In this way, it is possible to couple different pieces 100 to each other aligned on three different axes x, y, z in space forming a matrix of pieces 100 for different playful and demonstrative applications of vector space, defined by orientations and modules.

[0021] In said first example illustrated in figures 1-4, each face 110, 120, 130, 140, 150, 160 on which there is a single letter X, Y, Z may be assigned a color. Thus, a first color may be applied for the face 110 having the projection 111 with the letter X and the same color for the face having the recess 141 with the letter X, a second color for the face 120 having the projection 121 with the letter Y and the same color for the face 150 having the recess 151 with the letter Y, and a third color for the face 130 having the projection 131 with the letter Z and the same color for the face 160 having the recess 161 with the letter Z.

[0022] In a second example shown in figures 5-8 of the drawings, the shapes of the projections 111, 121, 131 are different from letters, and have side notches 190 curved in shape or configured by two inclined planes, as shown in figures 5 and 6, for receiving a corresponding projection 180; 180' which will be described below with reference to figure 6. For their part, in this second example, the recesses are configured as grooves 141, 151, 161, two of which 141, 161 are formed in respective edges of corresponding faces 140, 160 of the piece 100, and the third groove 151 is formed in a central portion of the corresponding face 150, as shown in figure 6. The shape of the grooves 141, 151, 161 is such as to allow them to receive respective bosses 111, 121, 131 of another piece 100, moving inside them until the pieces 100 are coupled to each other. In order to releasably lock two different pieces 100 in position at least the side grooves 141, 161 include an inner projection 180; 180', as stated above and as shown in figure 6. In particular, and according to the example shown in figure 6, one side groove 141 has an inner projection 180 shaped as a triangular prism with two inclined planes 181, 182, and the other side groove 161 has an inner projection 180' shaped as a half-cylinder with a curved surface 183. Such configuration of the inner projections 180 and 180' is complementary to the corresponding notches 190 formed in the projections 111, 121, 131, as stated above with reference to figure 5. Such configuration of projections 111, 121, 131 with notches 190 and side grooves 141, 161 with inner projections 180 and 180' facilitates releasable coupling between pieces 100.

[0023] In a third example shown in figures 9-12, the piece 100 has a substantially spherical geometry with projections 111, 121, 131 and opposing recesses 141, 151, 161 having a complementary shape in the form of letters X, Y, Z. The projections 111, 121, 131 of one piece 100 project outwardly from the sphere by a given distance to fit within the recesses 141, 151, 161 of another piece 100, as shown in figures 11 and 12 of the drawings.

[0024] With the described configuration it is possible to create a number of games for carrying out activities for composition of pieces of a model or games with original arrangement, strictly according to three axes x, y, z in space, facilitating the understanding of vector space through the orientation determined by said axes x, y, z in space and the magnitude determined by the number

of pieces 100 coupled to each other along the same axis x, y, z.

[0025] In one exemplary game, each player has a number of pieces 100 at the beginning of the game, for example, seven. The game may continue until all players complete their rounds. The game can be played in teams if the number of players is even. If a face 110, 120, 130, 140, 140, 150, 160 of a piece 100 cannot be attached to another face 110, 120, 130, 140, 150, 160 of another piece 100, then the player looks for another piece 100 with a face 110, 120, 130, 140, 150, 160 of the same color or with a projection 111, 121, 131 or a recess 141, 151, 161 of the same shape as that of the piece 100 where it is to be attached. If not, then it is the next person's turn. The goal thus is to build a structure using all the pieces 100 while avoiding being blocked or eliminated by another player, so that the first player to run out of pieces 100 wins.

[0026] Although only particular examples of the invention have been disclosed herein, it will be understood by those skilled in the art that other alternative embodiments and/or uses are possible, as well as obvious modifications and equivalent elements. Furthermore, the present description covers all possible combinations of the particular examples described. The scope of this description should not be limited by particular examples, but should be determined only by a fair reading of the claims that follow.

Claims

1. A modular game comprising a number of pieces, each piece having at least three pairs of faces arranged in different planes, each pair of faces consisting of a first face having a projection projecting outwards from the piece, and a second face symmetrically opposite to the first face and having a recess whose shape is complementary to the shape of the projection of the first face, to allow several pieces to be coupled to each other so that they are arranged in alignment on at least three different axes.
2. The game of claim 1, wherein the shape of the projection and the corresponding recess of each pair of faces is different between the pairs of faces.
3. The game of claim 1 or 2, wherein the recess of at least one of the faces extend along at least part of a dimension of the piece, defining a groove.
4. The game of claim 3, wherein said groove extends along the whole of said dimension of the piece.
5. The game of claim 3 or 4, wherein said groove has at least an inner projection suitable for retaining in position a corresponding projection of another piece
6. The game of claim 5, wherein said projection protrudes from the inside of the groove according to a concave surface.
7. The game of claim 5, wherein said projection protrudes from the interior of the groove according to two inclined planes.
8. The game of any of claims 1-7, wherein the pieces are three-dimensionally symmetrical.
9. The game of any of claims 1-8, wherein at least some of the faces in the piece are formed by flat surfaces.
10. The game of any of claims 1-9, wherein the pieces are cubic.
11. The game of any of claims 1-8, wherein in that at least some of the faces in the piece are formed by curved surfaces.
12. The game of claim 11, wherein the pieces are spherical.
13. The game of any of claims 1-12, wherein the pieces are hollow.
14. The game of any of claims 1-12, wherein the pieces are solid.
15. The game of any of claims 1-14, wherein the projection and the recess of the faces are letter-shaped.
16. The game of claim 15, wherein each pair of faces in the piece comprises a first face with a projection and a second face with a recess, which projection and recess have a complementary shape corresponding to the letter X in a first pair, to the letter Y in a second pair, and to the letter Z in a third pair, so that several pieces can be coupled each other arranged in alignment on at least three different axes X, Y, Z.
17. The game of any of claims 1-16, wherein faces of different pieces, whose projection and recess have the same shape to fit into one another and thus to couple several pieces to each other arranged in alignment on at least three axes, have the same characteristic of color, or relief, or texture.
18. The game of any of claims 1-17, wherein at least one face of the piece has one or more holes for inserting other pieces.

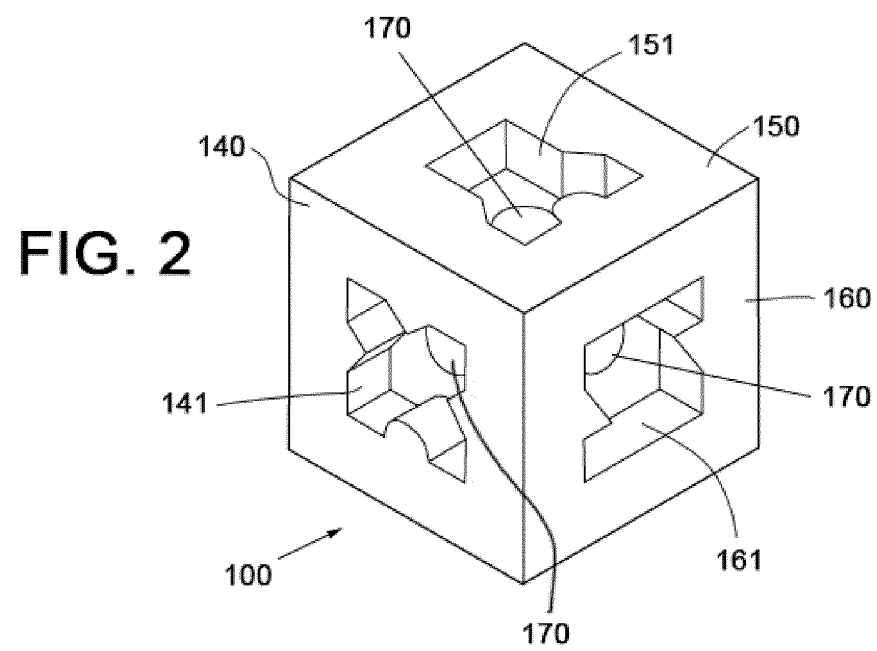
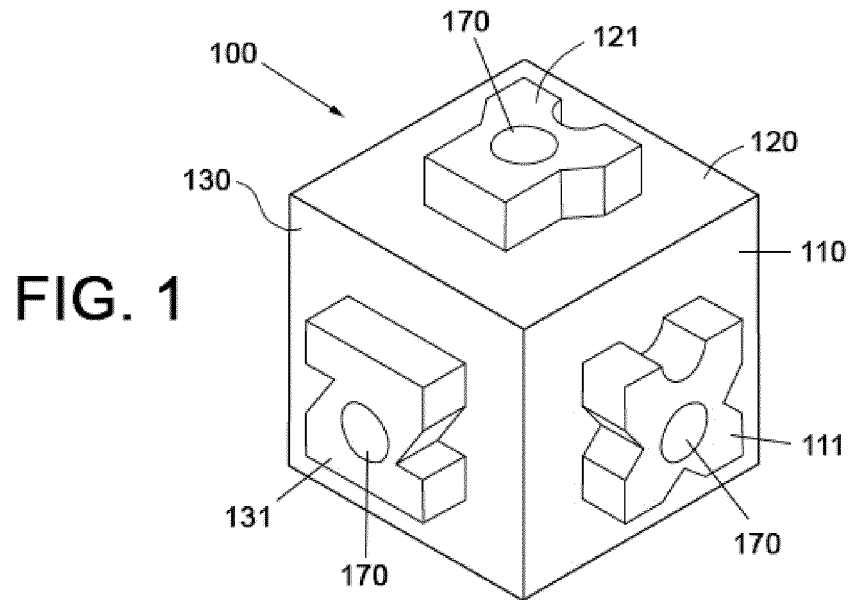


FIG. 3

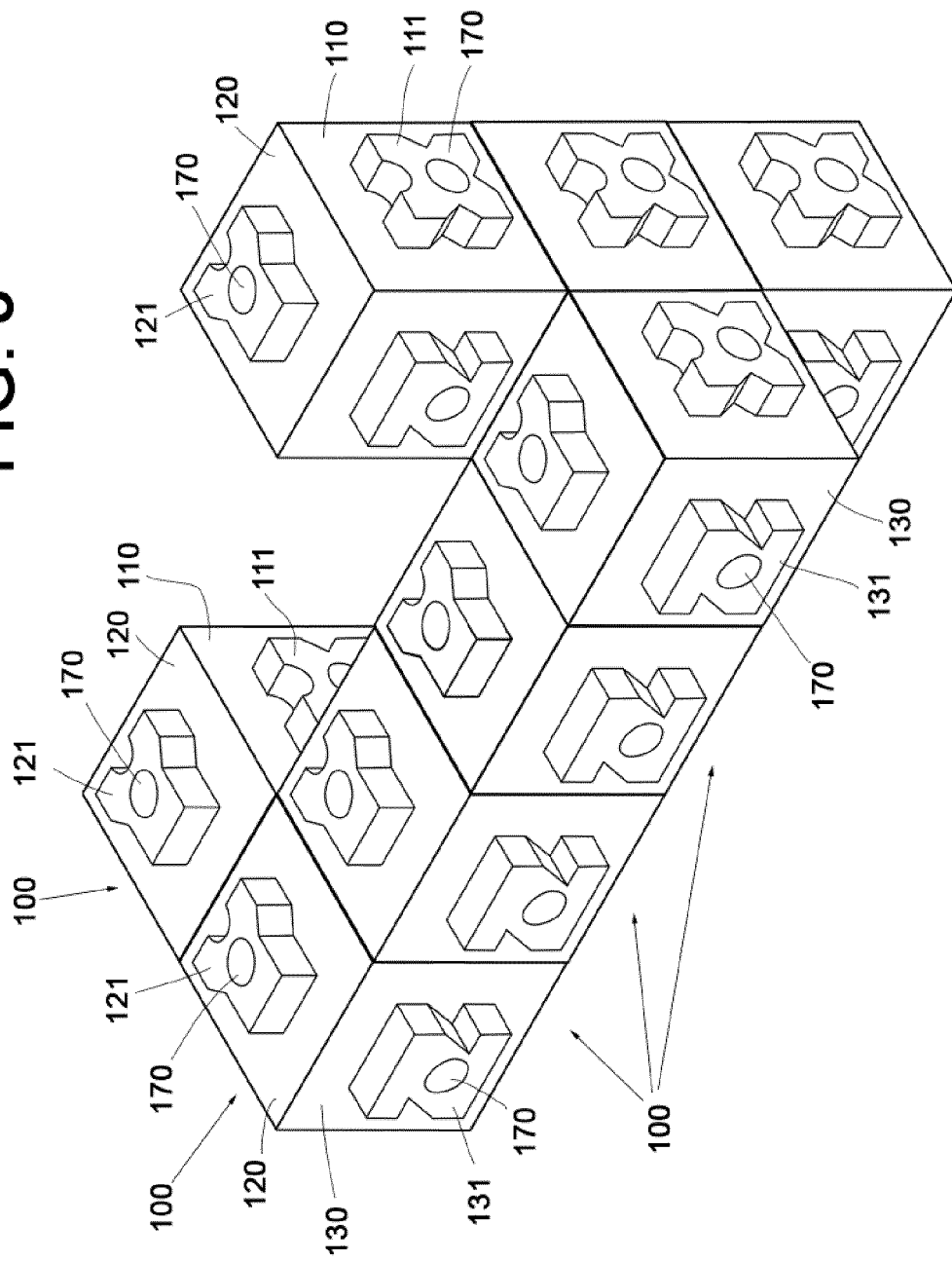


FIG. 4

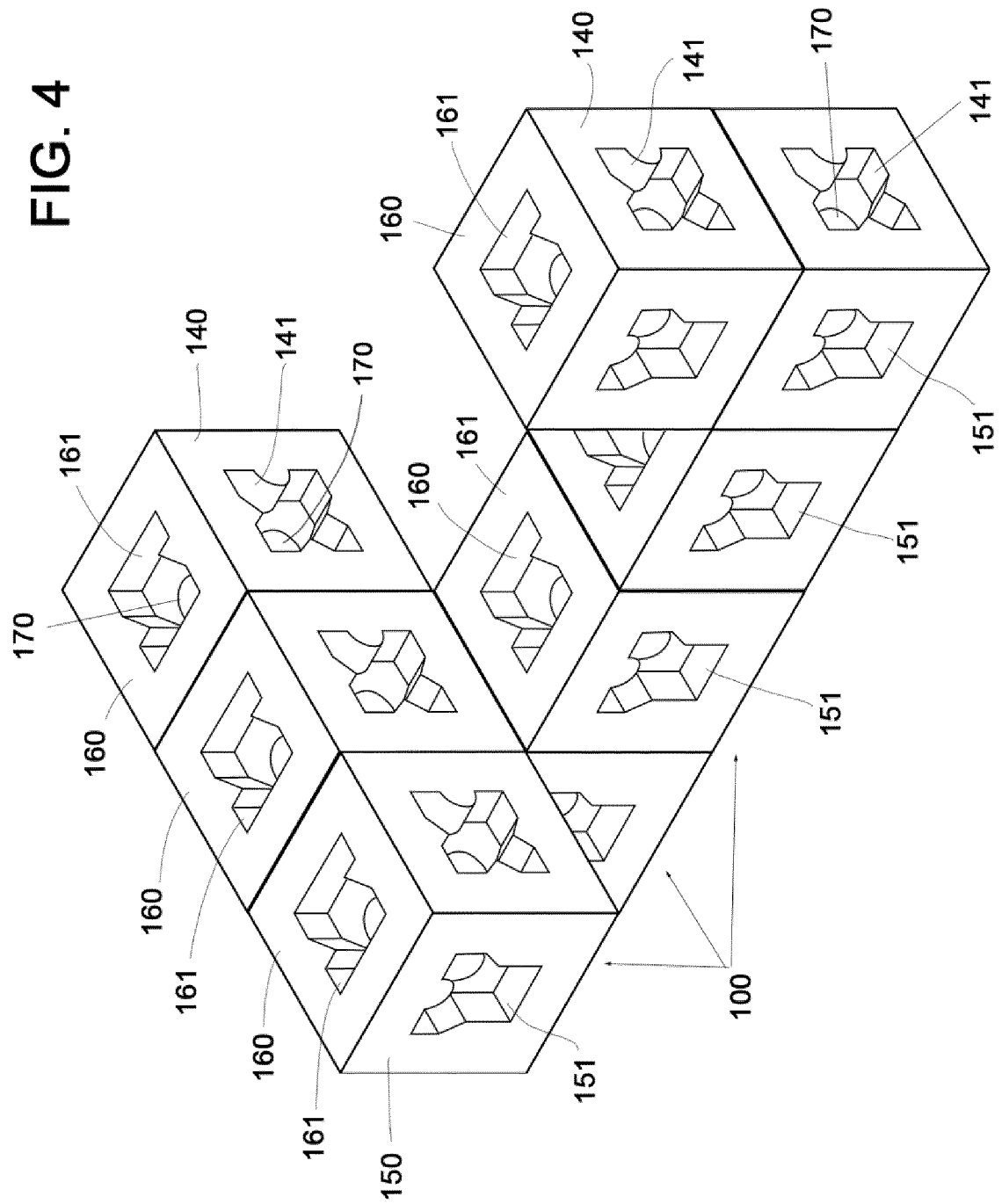


FIG. 5

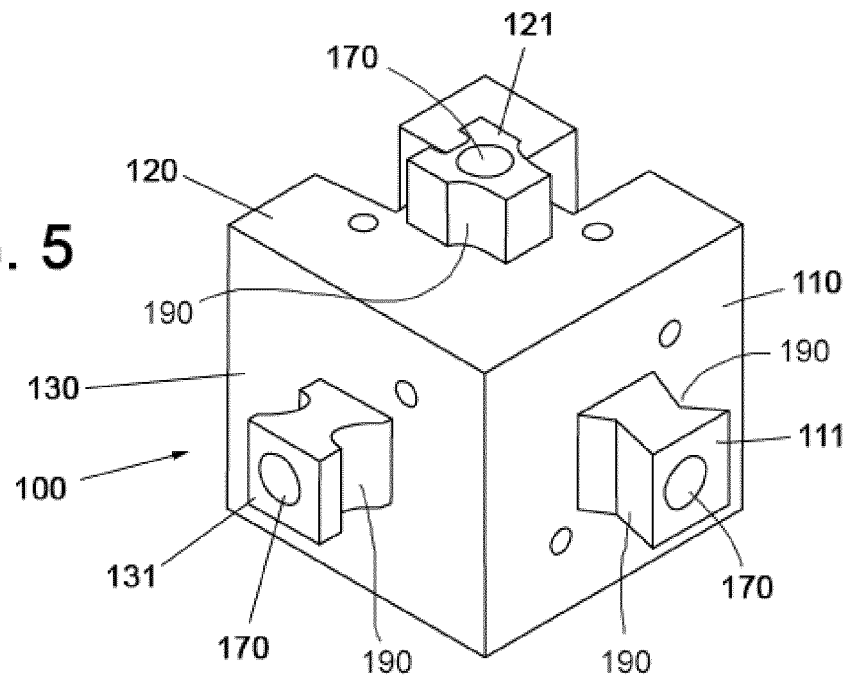


FIG. 6

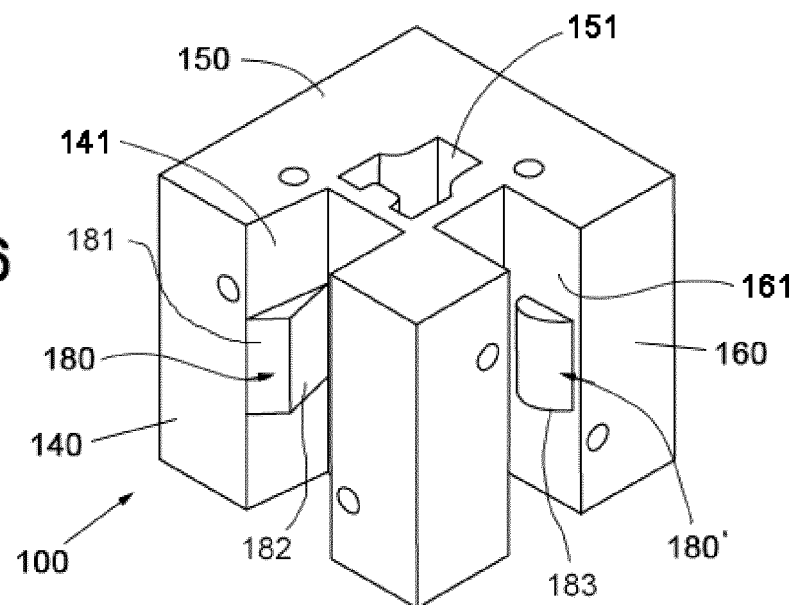
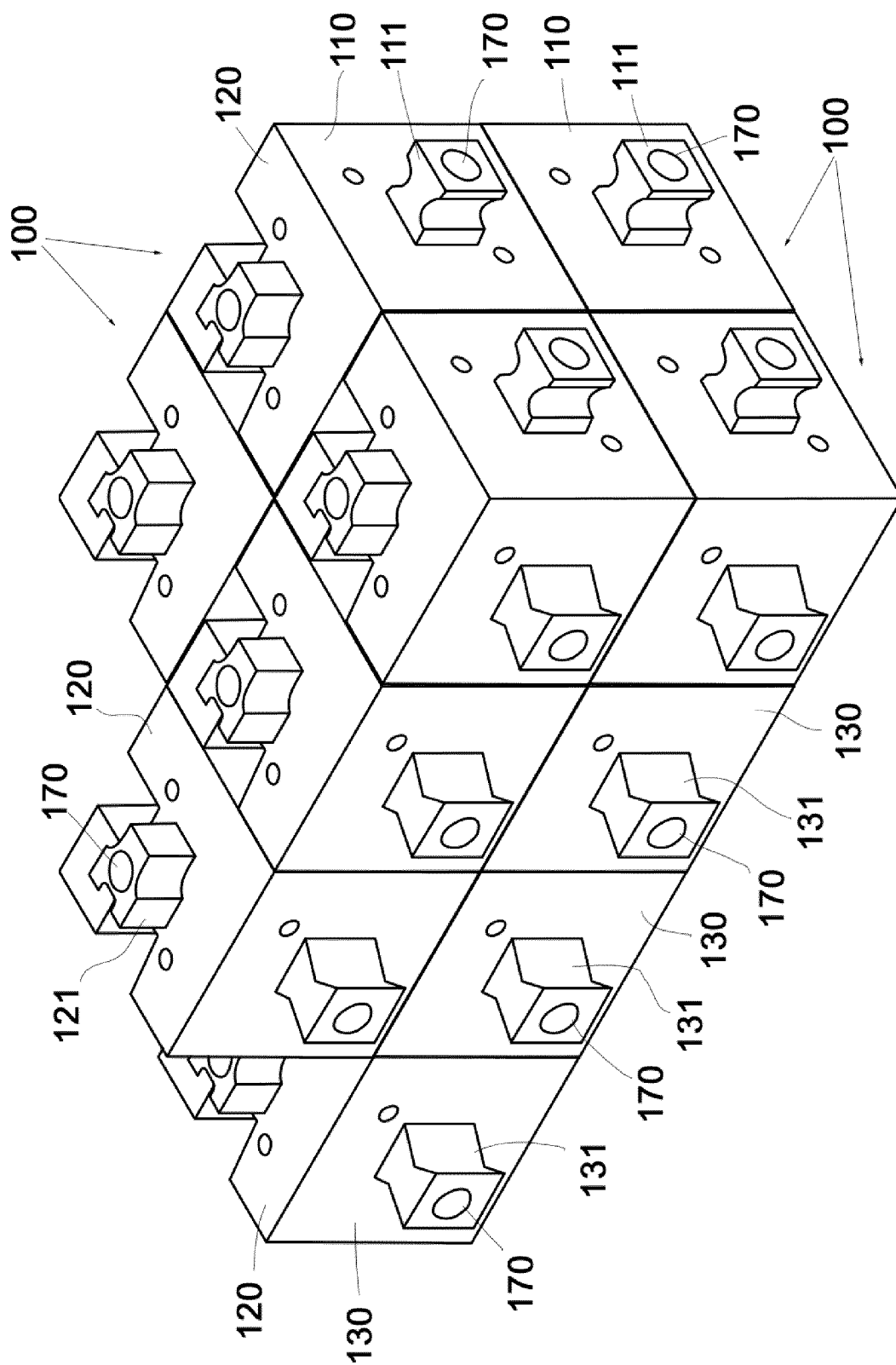


FIG. 7



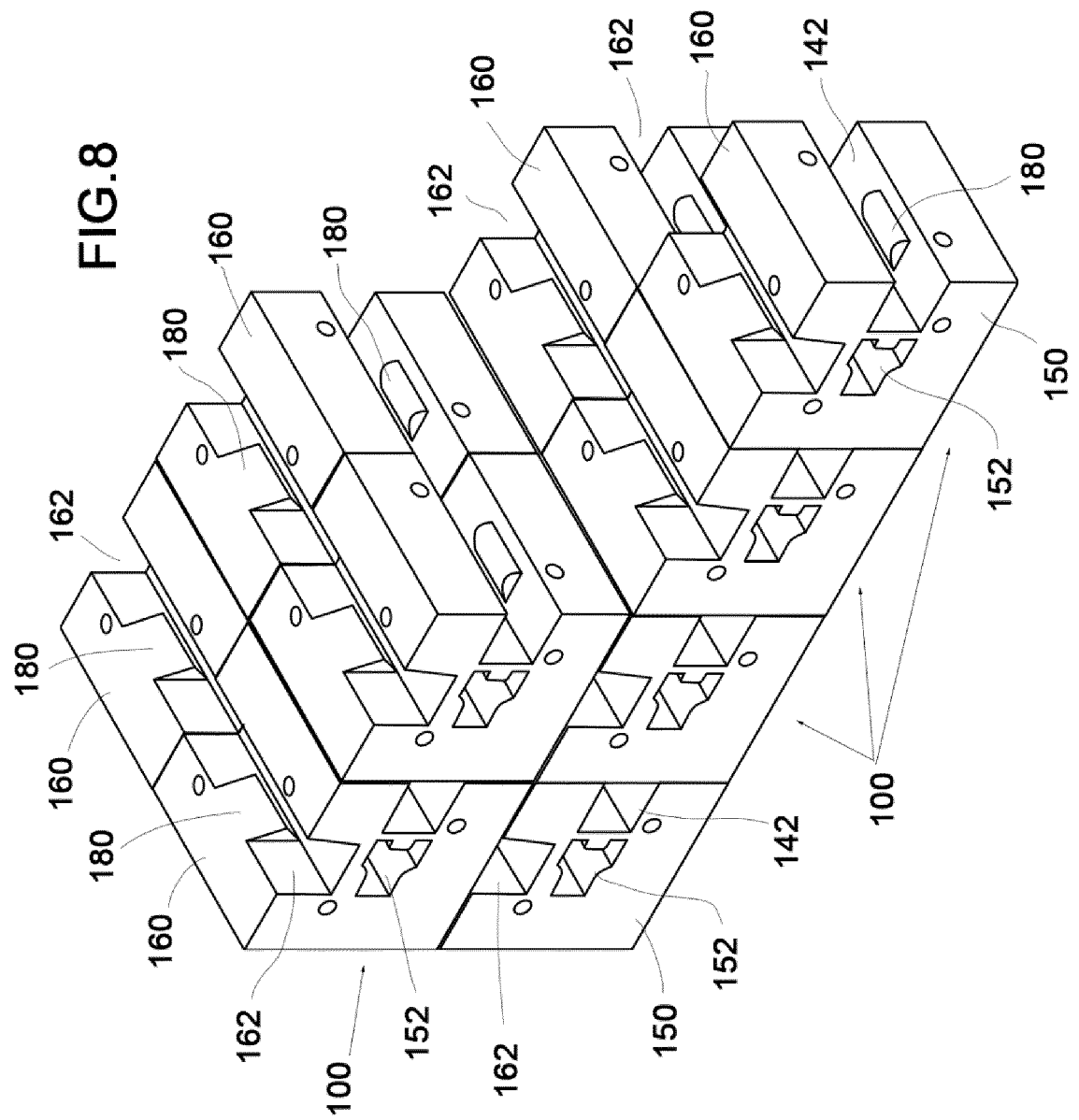


FIG. 9

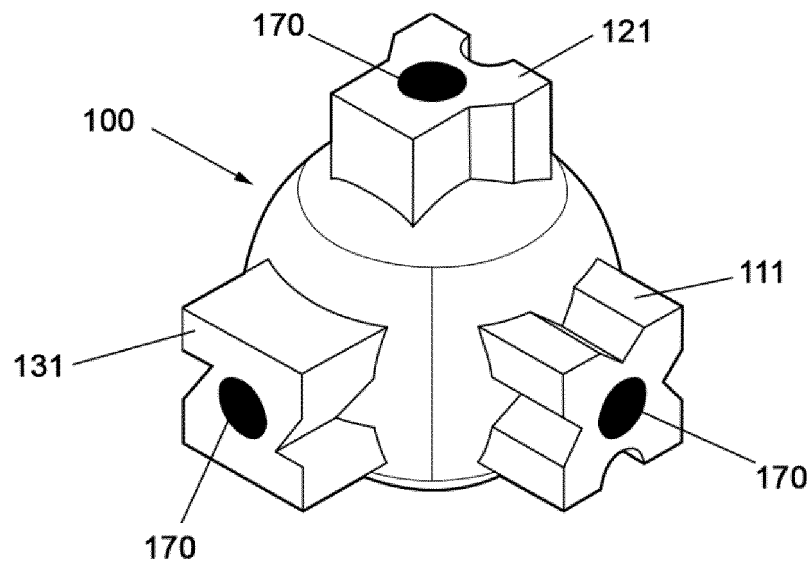


FIG. 10

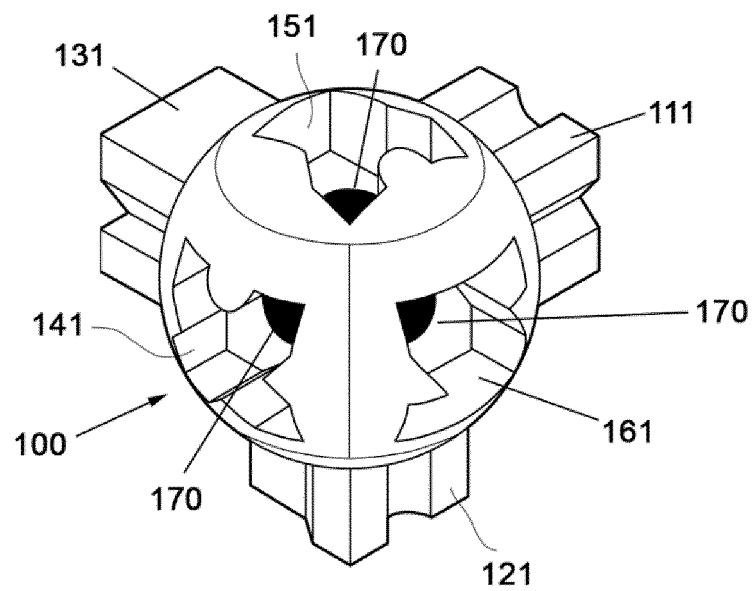
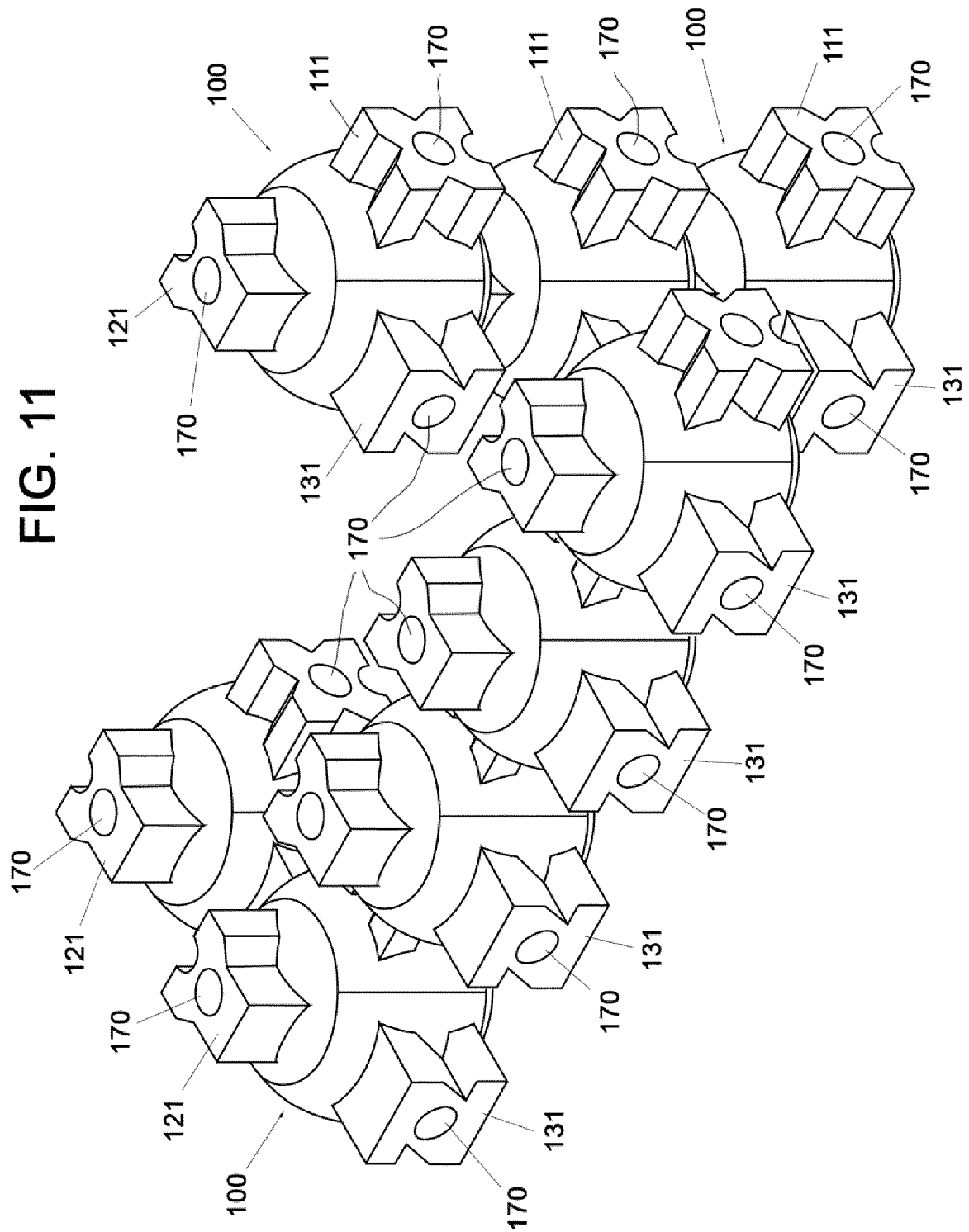


FIG. 11



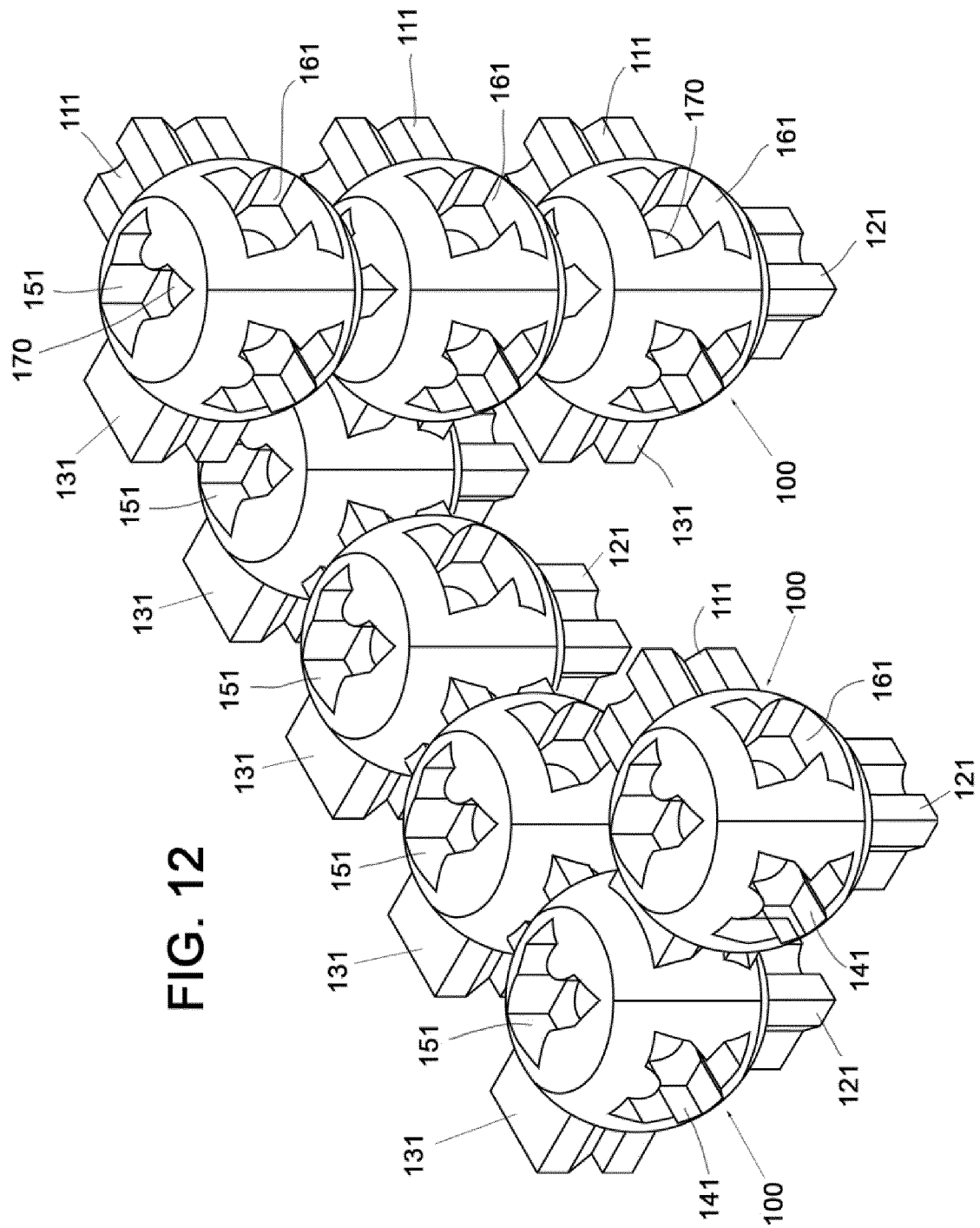


FIG. 12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2019/070664

A. CLASSIFICATION OF SUBJECT MATTER

See extra sheet

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)
A63F, A63H

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.
X	WO 2018027272 A1 (TRIMITI MOEBIUS DESIGN PTY LTD) 15/02/2018, page 1, line 29 – page 7, line 28; figures 5 - 7, 12-19.	1
Y		2-18
Y	GB 2479073 A (HASANI WASIF ET AL.) 28/09/2011, page 1, line 5 - page 6, line 30; figures.	2-18
X		1
X	WO 2014121453 A1 (ZHEJIANG BOWISE TECHNOLOGY DEV CO LTD) 14/08/2014, the whole document.	1-3, 8-10, 15-17
X	WO 0047302 A1 (SOERENSEN SOEREN CHRISTIAN) 17/08/2000, column 1, line 23 - column 6, line 56; figures 2B - 11.	1, 3-4, 8-10, 13-17

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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Date of the actual completion of the international search
03/12/2019

Date of mailing of the international search report
(10/12/2019)

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Authorized officer
M. Pérez Quintana

OFICINA ESPAÑOLA DE PATENTES Y MARCAS
Paseo de la Castellana, 75 - 28071 Madrid (España)
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2019/070664

C (continuation).	DOCUMENTS CONSIDERED TO BE RELEVANT	
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X	WO 2009008691 A1 (MONGE RODRIGUEZ ERNESTO) 15/01/2009, description; figures.	1, 3-5, 8-9, 13

Form PCT/ISA/210 (continuation of second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2019/070664

CLASSIFICATION OF SUBJECT MATTER

A63F9/08 (2006.01)

A63F9/12 (2006.01)

A63H33/08 (2006.01)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2019/070664

Information on patent family members

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