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(54) **BUILDING BLOCKS AND SPLICING STRUCTURE THEREOF**

(57) A building block and connecting structures thereof. A surface of the building block is a first connecting surface (1), and the rest of the surfaces of the building block are second connecting surfaces (2). The first connecting surface (1) is provided with protrusions (12) and grooves (11). The second connecting surface (2) is provided with grooves (11). The protrusion (12) can be connected to the grooves (11) on the first connecting surface

(1) and the second connecting surface. Based on the above-mentioned structure and extensions thereof, the building block can be divided into at least six types with different structures. The building block and the connecting structures thereof have wide application range, are easy to popularize and use, provide great entertainment, and appeal to children.

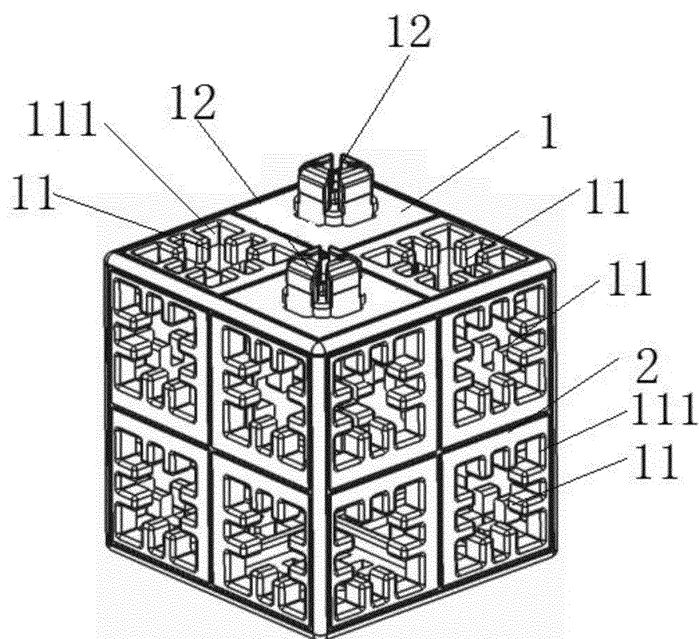


FIG. 1

Description

Technical Field

[0001] The present invention relates to the technical field of building block toys, particularly to a building block and connecting structures thereof.

Background

[0002] Building blocks are usually cubic solid toys made of wood or plastic. Generally, each surface is decorated with letters or drawings, allowing for different arrangements or building activities. There are various styles of building blocks that can be used to build houses, animals, etc. to develop children's intelligence.

[0003] Building blocks help to develop intelligence and help to train hand-eye coordination abilities of children. The arrangement, connection, looping, and symmetry of building blocks are all good for children's intelligence. While connecting the building blocks, children must be involved in issues such as proportion and symmetry, which is conducive to the early development of children's mathematical concepts.

[0004] Building blocks are conducive to help children exert imagination, using a variety of different types of building blocks together to build physical objects which is conducive to the cultivation of children's imagination and creativity.

[0005] The building blocks in the prior art have disadvantages such as a single connecting mode, lack interest, etc. The present invention is designed to solve these technical problems.

Summary

[0006] The technical problem to be solved by the present invention is to provide a building block with various connecting ways and a good interest and connecting structures thereof.

[0007] To solve the above-mentioned technical problem, an embodiment of the present invention provides a building block, one surface of the building block is a first connecting surface, the rest surfaces of the building block are second connecting surfaces. The first connecting surface is provided with protrusions and grooves. The second connecting surfaces are provided with grooves. The protrusions can be connected to the grooves on the first connecting surface and the second connecting surfaces.

[0008] Preferably, the above-mentioned building block includes a first type building block with a regular hexahedral structure, which is divided into a first connecting surface and five second connecting surfaces. Two opposite corners of the first connecting surface are provided with first type protrusions. The other two opposite corners are provided with first type grooves.

[0009] Each of the second connecting surfaces is uniformly distributed with four first type grooves.

[0010] The first type protrusions can be connected to the first type grooves on the first connecting surface and the second connecting surface.

[0011] Four corners of each of the first type grooves is provided with a first type inserting groove.

[0012] The above-mentioned building blocks may also include a second type building block with a regular hexahedral structure, which is divided into a first connecting surface and five second connecting surfaces. Compared with the first and second connecting surfaces of the first type building block, each of the first and second connecting surfaces of the second type building block is additionally provided with a circular through hole at the center position.

[0013] The above-mentioned building blocks may also include a third type building block with a regular hexahedral structure, which is divided into a first connecting surface and five second connection surfaces. Compared with the first connecting surface of the first type building block, the first connecting surface of the third type building block is additionally provided with a first type inserting groove at each of the four corners of each first type protrusion. The second connecting surfaces of the third type building block is the same as those of the first type building block.

[0014] The above-mentioned building blocks may also include a fourth type building block with a regular hexahedral structure, which is divided into a first connecting surface and five second connecting surfaces. Two opposite corners of the first connecting surface are provided with fourth type protrusions. The other two opposite corners are provided with fourth type grooves.

[0015] Each of the second connecting surfaces is uniformly distributed with four fourth type grooves.

[0016] The fourth type protrusions can be connected to the fourth type grooves on the first connecting surface and the second connecting surface.

[0017] The fourth type protrusion and the first type inserting groove can be connected to each other.

[0018] The above-mentioned building blocks may also include a fifth type building block with a regular hexahedral structure, which is divided into a first connecting surface and five second connecting surfaces. Compared with the first and second connecting surfaces of the fourth type building block, each of the first and second connecting surfaces of the fifth type building block is additionally provided with a fifth type groove at the center position.

[0019] The fifth type groove and the first type protrusion can be connected to each other.

[0020] The above-mentioned building block may also include a sixth type building block with a regular hexahedral structure, which is divided into a first connecting surface and five second connecting surfaces. Compared with the first and second connecting surfaces of the fourth type building block, each of the first and second connecting surfaces of the sixth type building block is additionally provided with a sixth type through a hole at the center position.

[0021] The sixth type through hole and the first type protrusion can be connected to each other.

[0022] The embodiment of the present invention also provides connecting structures of the above-mentioned building blocks, including the following types:

Connecting Structure One: The first connecting surface of any of the first type building blocks, the second type building blocks and the third type building blocks completely coincides with the second connecting surface of another building block selected from the first type building blocks the second type building blocks and the third type building blocks. The first type protrusion on the first connecting surface is inserted in the first type groove on the second connecting surface.

[0023] Connecting Structure Two: The first connecting surface of any of the first type building blocks, the second type building blocks and the third type building blocks completely coincides with the first connecting surface of another building block selected from the first type building blocks the second type building blocks and the third type building blocks. On the two first connecting surfaces, the first type protrusions are correspondingly inserted into the first type grooves.

[0024] Connecting Structure Three: Any two building blocks of the first type building blocks, second type building blocks and third type building blocks are placed side by side. Two adjacent first type grooves that do not belong to a same one building block are correspondingly inserted into two first type protrusions on the first connecting surface of another building block selected from the first type building blocks the second type building blocks and the third type building blocks.

[0025] Connecting Structure Four: Six connecting surfaces of any of the first type building blocks, the second type building blocks and third type building blocks can be correspondingly connected to six building blocks of any of the first type building blocks, the second type building blocks and the third type building blocks at the same time.

[0026] The connecting structures of the above building blocks may also include the following types:

Connecting Structure Five: The first connecting surface of any of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks is completely coincident with the second connecting surface of another building block selected from the fourth type building blocks, the fifth type building blocks and the sixth type building blocks. The fourth type protrusion on the first connecting surface is inserted into the fourth type groove on the second connecting surface.

[0027] Connecting Structure Six: The first connecting surface of any of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks completely coincides with the first connecting surface of another building block selected from the fourth type building blocks, the fifth type building blocks and the sixth type building blocks. On the two first connecting surface, the fourth type protrusions correspondingly inserted into the

fourth type grooves.

[0028] Connecting Structure Seven: Any two building blocks of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks are placed side by side. Two adjacent fourth type grooves that do not belong to a same building block are correspondingly connected to two fourth protrusions on the first connecting surface of another building block selected from the fourth type building blocks, the fifth type building blocks and the sixth type building blocks.

[0029] Connecting Structure Eight: Six connecting surfaces of any of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks can be correspondingly connected to six building blocks of any of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks at the same time.

[0030] The connecting structures of the above-mentioned building blocks may also include the following types:

Connecting Structure Nine: Two fourth type protrusions on the first connecting surface of any one of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks are inserted into two first type inserting grooves arranged at the opposite corners of any connecting surface of any one of the first type building block, the second type building block and the third type building block.

[0031] Connecting Structure Ten: Any two building blocks of the first type building blocks, the second type building blocks and the third type building blocks are placed side by side. Two adjacent first type inserting grooves arranged at the opposite corners that do not belong to a same building block are connected to two fourth type protrusions on the first connecting surface of any one of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks.

[0032] Connecting Structure Eleven: The fifth type groove on any second connecting surface of the fifth type building block is connected to a first type protrusion on the first connecting surface of any of the first type building block, the second type building block and the third type building block.

[0033] Connecting Structure Twelve: The fifth type groove on the first connecting surface of the fifth type building block is connected to a first type protrusion on the first connecting surface of the third type building block.

[0034] Connecting Structure Thirteen: The sixth type through hole on any second connecting surface of the sixth type building block is connected to a first type protrusion on the first connecting surface of any of the first type building block, the second type building block and the third type building block.

[0035] Connecting Structure Fourteen: The sixth type through hole on the first connecting surface of the sixth type building block is connected to a first type protrusion on the first connecting surface of the third type building

block.

[0036] The beneficial effects of the above-mentioned technical solution of the present invention are as follows: In the present invention, the building block and the connecting structure thereof have wide application range, and high entertainment value, which are easy to popularize and use.

[0037] The present invention will be describe in detailed with reference to the drawings and the specific embodiments below, but not to limit the present invention.

Brief Description of the Drawings

[0038]

FIG. 1 is a structural schematic view of a first type building block in the present invention.

FIG. 2 is a structural schematic view of a second type building block in the present invention.

FIG. 3 is a structural schematic view of a third type building block in the present invention;

FIG. 4 is a structural schematic view of a fourth type building block in the present invention.

FIG. 5 is a structural schematic view of a fifth type building block in the present invention.

FIG. 6 is a structural schematic view of a sixth type building block in the present invention.

FIG. 7 is a structural schematic view of Connecting Structure One in the present invention.

FIG. 8 is a structural schematic view of Connecting Structure Two in the present invention.

FIG. 9 is a structural schematic view of Connecting Structure Three in the present invention.

FIG. 10 is a structural schematic view of Connecting Structure Four in the present invention.

FIG. 11 is a structural schematic view of Connecting Structure Five in the present invention.

FIG. 12 is a structural schematic view of Connecting Structure Six in the present invention.

FIG. 13 is a structural schematic view of Connecting Structure Seven in the present invention.

FIG. 14 is a structural schematic view of Connecting Structure Eight in the present invention.

FIG. 15 is a structural schematic view of Connecting Structure Nine in the present invention.

FIG. 16 is a structural schematic view of Connecting Structure Ten in the present invention.

FIG. 17 is a structural schematic view of Connecting Structure Eleven in the present invention.

FIG. 18 is a structural schematic view of Connecting Structure Twelve in the present invention.

FIG. 19 is a structural schematic view of Connecting Structure Thirteen in the present invention.

FIG. 20 is a structural schematic view of Connecting Structure Fourteen in the present invention.

FIG. 21 is a structural schematic view of a building block in the present invention as an equilateral triangular prism.

FIG. 22 is a structural schematic view of a building block in the present invention as an isosceles right triangular prism.

FIG. 23 is a structural schematic view of a building block in the present invention as a cuboid.

FIG. 24 is a structural schematic view of a building block in the present invention as a rectangular concave triangular prism.

FIG. 25 is a structural schematic view of a building block in the present invention as a quarter cylinder.

FIG. 26 is a structural schematic view of a building block in the present invention as an L-shaped patch.

FIG. 27 is a structural schematic view of a building block in the present invention as a straight patch.

FIG. 28 is a structural schematic view of a building block in the present invention as a hemispheroid.

FIG. 29 is a structural schematic view of a building block in the present invention as a first bottom plate.

FIG. 30 is a structural schematic view of a building block in the present invention as a second bottom plate.

FIG. 31 is a structural schematic view of a building block in the present invention as a first joint.

FIG. 32 is a structural schematic view of a building block in the present invention as a second joint.

FIG. 33 is a structural schematic view of a building block in the present invention as an axle.

FIG. 34 is a structural schematic view of a building block in the present invention as a rotating member.

FIG. 35 is a structural schematic view of a building block in the present invention as a first wheel.

FIG. 36 is a structural schematic view of a building block in the present invention as a second wheel.

[0039] The reference numerals of the drawings:

- 1, first connecting surface;
- 2, second connecting surface;
- 11, first type groove; 111, first type inserting groove;
- 12, first type protrusion;
- 13, circular through hole;
- 14, fourth type protrusion;
- 15, fourth type groove;
- 16, fifth type groove;
- 17, sixth type through hole.

Best Implementations of the Present Invention

[0040] The technical solution of the present will be described in detail to further understand the purpose, solution and effect of the present invention, but not to limit the protection scope of the appended claims of the present invention.

[0041] In view of the problems that the existing connecting method is simple and not entertaining, the present invention provides a building block and connecting structures thereof.

[0042] According to an embodiment of the present in-

vention, a building block is provided. One surface of the building block is a first connecting surface, and the rest of the surfaces of the building block are second connecting surfaces. The first connecting surface is provided with protrusions and grooves. The second connecting surface is provided with grooves. The protrusions can be connected to the grooves on the first connecting surface and the second connecting surface.

[0043] A first type building block as shown in FIG. 1 is a regular hexahedral structure, which is divided into a first connecting surface 1 and five second connecting surfaces 2. Two opposite corners of the first connecting surface 1 are provided with first type protrusions 12. The other two opposite corners are provided with first type grooves 11.

[0044] Each of the second connecting surfaces 2 is uniformly distributed with four first type grooves 11.

[0045] The first type protrusions 12 can be connected to the first type grooves 11 on the first connecting surface 1 and the second connecting surface 2.

[0046] Each of the four corners of each first type groove 11 is provided with a first type inserting groove 111.

[0047] A second type building block as shown in FIG. 2 is a regular hexahedral structure, which is divided into a first connecting surface 1 and five second connecting surfaces 2. Compared with the first and second connecting surfaces of the first type building block, each of the first and second connecting surfaces of the second type building block is provided with a circular through hole 13 at the center position.

[0048] A third type building block as shown in FIG. 3 is a regular hexahedral structure, which is divided into a first connecting surface 1 and five second connecting surfaces 2. Compared with the first connecting surface of the first type building block, the first connecting surface of the third type building block is additionally provided with a first type inserting groove 111 at each of the four corners of first type protrusion 12. The second connecting surface thereof is the same as the second connecting surface of the first type building block.

[0049] A fourth type building block as shown in FIG. 4 is a regular hexahedral structure, which is divided into a first connecting surface and five second connecting surfaces. Two opposite corners of the first connecting surface are provided with fourth type protrusions 14. The other two opposite corners are provided with fourth type grooves 15.

[0050] Each of the second connecting surfaces is uniformly distributed with four fourth type grooves 15.

[0051] The fourth type protrusions 14 can be connected to the fourth type grooves 15 on the first connecting surface and the second connecting surface.

[0052] The fourth type protrusion 14 and the first type inserting groove 111 can be connected to each other.

[0053] A fifth type building block as shown in FIG. 5 is a regular hexahedral structure, which is divided into a first connecting surface and five second connecting surfaces. Compared with the first and second connecting

surfaces of the fourth type building block, each of the first and second connecting surfaces of the fifth type building block is additionally provided with a fifth type groove 16 at the center position.

[0054] The fifth type groove 16 and the first type protrusion 12 can be connected to each other.

[0055] A sixth type building block as shown in FIG. 6 is a regular hexahedral structure, which is divided into a first connecting surface and five second connecting surfaces. Compared with the first and second connecting surfaces of the fourth type building block, each of the first and second connecting surfaces of the sixth type building block is additionally provided with a sixth type through hole 17 at the center position.

[0056] The sixth type through hole 17 and the first type protrusion 12 can be connected to each other.

[0057] The embodiment of the present invention also provides connecting structures of the building blocks, including the following types:

20 Connecting Structure One as shown in FIG. 7: The first connecting surface of any of the first type building blocks, the second type building blocks and the third type building blocks completely coincides with the second connecting surface of another building block selected from the first type building blocks, the second type building blocks and the third type building blocks. The first type protrusion on the first connecting surface is inserted in the first type groove on the second connecting surface.

[0058] **30 Connecting Structure Two** as shown in FIG. 8: The first connecting surface of any of the first type building blocks, the second type building blocks and the third type building blocks completely coincides with the first connecting surface of another building block selected from the first type building blocks, the second type building blocks and the third type building blocks. On the two first connecting surfaces, the first type protrusions are correspondingly inserted into the first type grooves.

[0059] **40 Connecting Structure Three** as shown in FIG. 9: Any two building blocks of the first type building blocks, second type building blocks and third type building blocks are placed side by side. Two adjacent first type grooves that do not belong to the same building block are correspondingly inserted into two first type protrusions on the first connecting surface of another building block selected from the first type building blocks, the second type building blocks and the third type building blocks.

[0060] **45 Connecting Structure Four** as shown in FIG. 10: Six connecting surfaces of any one of the first type building blocks, the second type building blocks and third type building blocks can be correspondingly connected to six building blocks of any of the first type building blocks, the second type building blocks and the third type building blocks at the same time.

[0061] **55 Connecting Structure Five** as shown in FIG. 11: The first connecting surface of any of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks completely coincides with the second connecting surface of another building block selected

from the fourth type building blocks, the fifth type building blocks and the sixth type building blocks. The fourth type protrusion on the first connecting surface is inserted into the fourth type groove on the second connecting surface.

[0062] Connecting Structure Six as shown in FIG.12: The first connecting surface of any of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks completely coincides with the first connecting surface of another building block selected from the fourth type building blocks, the fifth type building blocks and the sixth type building blocks. On the two first connecting surface, the fourth type protrusions are correspondingly inserted into the fourth type grooves.

[0063] Connecting Structure Seven as shown in FIG. 13: Any two building blocks of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks are placed side by side. Two adjacent fourth type grooves that do not belong to a same building block are correspondingly connected to two of the fourth protrusions on the first connecting surface of another building block selected from the fourth type building blocks, the fifth type building blocks and the sixth type building blocks.

[0064] Connecting Structure Eight as shown in FIG.14: Six connecting surfaces of any of the fourth type building block, the fifth type building block and the sixth type building block can be correspondingly connected to six building blocks of any of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks at the same time.

[0065] Connecting Structure Nine as shown in (a), (b), (c) and (d) of FIG.15: Two of the fourth type protrusions on the first connecting surface of any of the fourth type building block, the fifth type building block and the sixth type building block are connected into two first type inserting grooves arranged at any opposite corners on any connecting surface of any of the first type building block, the second type building block and the third type building block.

[0066] Connecting Structure Ten as shown in FIG.16: Any two building blocks of the first type building block, the second type building block and the third type building block are placed side by side. Two adjacent first type inserting grooves arranged at the opposite corners that do not belong to a same building block are connected to two fourth type protrusions on the first connecting surface of any of the fourth type building block, the fifth type building block and the sixth type building blocks.

[0067] Connecting Structure Eleven as shown in FIG. 17: The fifth type groove on any second connecting surface of the fifth type building block is connected to a first type protrusion on the first connecting surface of any of the first type building block, the second type building block and the third type building block.

[0068] Connecting Structure Twelve as shown in FIG. 18: The fifth type groove on the first connecting surface of the fifth type building block is connected to a first type protrusion on the first connecting surface of the third type

building block.

[0069] Connecting Structure Thirteen as shown in FIG. 19: The sixth type through hole on any second connecting surface of the sixth type building block is connected to a first type protrusion on the first connecting surface of any of the first type building block, the second type building block and the third type building block.

[0070] Connecting Structure Fourteen as shown in FIG.20: The sixth type through hole on the first connecting surface of the sixth type building block is connected to one first type protrusion on the first connecting surface of the third type building block.

[0071] Except for the regular hexahedral structure exemplified above, the building blocks of the present embodiment may also be converted into various shapes such as an equilateral triangular prism (FIG. 21), an isosceles right triangular prism (FIGS. 22a and 22b), a cuboid (FIG. 23), a rectangular concave triangular prism (FIG. 24), a quarter cylinder (FIGS. 25a and 25b), an L-shaped patch (FIG. 26), a straight patch (FIG. 27), a hemispheroid (FIGS. 28a and 28b), a first bottom plate (FIG. 29), a second bottom plate (FIGS. 30a and 30b), a first joint (FIG. 31), a second joint (FIG. 32), an axle (FIGS. 33a and 33b), a rotating member (FIGS. 34a and 34b), a first wheel (FIG. 35), or a second wheel (FIG. 36). In addition, various accessories matched with the building block can be added on the basis

[0072] Certainly, at a particular time, a protrusion or a plurality of protrusions may be arranged on the first connecting surface, and a groove or a plurality of grooves may be arranged on the second connecting surface.

[0073] Certainly, the present invention may have other various embodiments. For those skilled in the art, various corresponding changes and variations may be derived without departing from the spirit and essence of the present invention. But these corresponding changes and variations shall belong to the protection scope of the appended claims of the present invention.

Industrial Applicability:

[0074] The building block and connecting structures thereof are wide in application range, easy to popularize and use, and are appealing to children.

Claims

1. A building block, wherein a surface of the building block is a first connecting surface and the rest of the surfaces of the building block are second connecting surfaces, the first connecting surface is provided with protrusions and grooves, the second connecting surface is provided with the grooves, the protrusion is able to be interconnected to the grooves on the first connecting surface and the second connecting surface.

2. The building block of claim 1, further comprising:

a first type building block with a regular hexahedral structure, the first type building block is divided into one first connecting surface and five second connecting surfaces, two opposite corners of the first connecting surface are provided with first type protrusions, the other two opposite corners are provided with first type grooves; each of the second connecting surfaces is uniformly distributed with four first type grooves; the first type protrusions are able to be connected to the first type grooves on the first connecting surface and the second connecting surface; each of the four corners of each first type groove is provided with a first type inserting groove.

3. The building block of claim 2, further comprising:

a second type building block with the regular hexahedral structure, the second type building block is divided into one first connecting surface and five second connecting surfaces; compared with the first connecting surface and the second connecting surfaces of the first type building block, each of the first connecting surface and the second connecting surfaces of the second type building block is additionally provided with a circular through hole at a center position.

4. The building block of claim 2, further comprising:

a third type building block with the regular hexahedral structure, the third type building block is divided into one first connecting surface and five second connecting surfaces; compared with the first connecting surface of the first type building block, the first connecting surface of the third type building block is additionally provided with one first type inserting groove at each of the four corners of the first type protrusion; the second connecting surfaces of the third type building block are the same as the second connecting surfaces of the first type building block.

5. The building block of claim 2, further comprising:

a fourth type building block with the regular hexahedral structure, the fourth type building block is divided into one first connecting surface and five second connecting surfaces; two opposite corners of the first connecting surface are provided with fourth type protrusions; the other two opposite corners are provided with fourth type grooves; each of the second connecting surfaces is uniformly distributed with the four fourth type grooves; the fourth type protrusions are able to be connected to the fourth type grooves on the first connecting surface and the second connecting

surface;

the fourth type protrusion and the first type inserting groove are able to be connected to each other.

6. The building block of claim 5, further comprising:

a fifth type building block with the regular hexahedral structure, the fifth type building block is divided into one first connecting surface and five second connecting surfaces; compared with the first connecting surface and the second connecting surfaces of the fourth type building block, each of the first connecting surface and the second connecting surfaces of the fifth type building block is additionally provided with a fifth type groove at a center position; the fifth type groove and the first type protrusion are able to be connected to each other.

7. The building block of claim 5, further comprising:

a sixth type building block with the regular hexahedral structure, the sixth type building block is divided into one first connecting surface and five second connecting surfaces; compared with the first connecting surface and the second connecting surfaces of the fourth type building block, each of the first connecting surface and the second connecting surfaces of the sixth type building block is additionally provided with a sixth type through hole at a center position; the sixth type through hole and the first type protrusion are able to be connected to each other.

8. Connecting structures of the building block of any of claims 2 to 7, comprising the following types:

Connecting Structure One: the first connecting surface of any of the first type building blocks, the second type building blocks and the third type building blocks completely coincides with the second connecting surface of another building block selected from the first type building blocks, the second type building blocks and the third type building blocks, the first type protrusion on the first connecting surface is inserted into the first type groove on the second connecting surface;

Connecting Structure Two: the first connecting surface of any of the first type building blocks, the second type building blocks and the third type building blocks completely coincides with the first connecting surface of another building block selected from the first type building blocks, the second type building blocks and the third type building blocks, on the two first connecting surface, the first type protrusions are corre-

spondingly inserted into the first type grooves;
 Connecting Structure Three: any two building blocks of the first type building blocks, second type building blocks and third type building blocks are placed side by side; two adjacent first type grooves that do not belong to a same building block are correspondingly inserted into two first type protrusions on the first connecting surface of another building block selected from the first type building blocks, the second type building blocks and the third type building blocks;
 Connecting Structure Four: six connecting surfaces of any of the first type building blocks, the second type building blocks and third type building blocks are able to be correspondingly connected to six building blocks of any of the first type building blocks, the second type building blocks and the third type building blocks at a same time.

9. The connecting structures of the building block of claim 8, further comprising:

Connecting Structure Five: the first connecting surface of any of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks completely coincides with the second connecting surface of another building block selected from the fourth type building blocks, the fifth type building blocks and the sixth type building blocks, the fourth type protrusion on the first connecting surface is inserted into the fourth type groove on the second connecting surface;

Connecting Structure Six: the first connecting surface of any of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks completely coincides with the first connecting surface of another building block selected from the fourth type building blocks, the fifth type building blocks and the sixth type building blocks, on the two first connecting surface, the fourth type protrusions are correspondingly inserted into the fourth type grooves;

Connecting Structure Seven: any two building blocks of any of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks are placed side by side, two adjacent fourth grooves that do not belong to a same building block are correspondingly connected to two fourth protrusions on the first connecting surface of another building block selected from the fourth type building blocks, the fifth type building blocks and the sixth type building blocks;

Connecting Structure Eight: six connecting surfaces of any of the fourth type building blocks, the fifth type building blocks and the sixth type

building blocks are able to be correspondingly connected to six building blocks of any of the fourth type building blocks, the fifth type building blocks and the sixth type building blocks at the same time.

10. The connecting structures of the building block of claim 8, further comprising:

Connecting Structure Nine: two of the fourth type protrusions on the first connecting surface of any of the fourth type building block, the fifth type building block and the sixth type building block are inserted into any two first type inserting grooves arranged at any opposite corners on any connecting surface of any of the first type building block, the second type building block and the third type building block;

Connecting Structure Ten: any two building blocks of the first type building block, the second type building block and the third type building block are placed side by side, two adjacent first type inserting grooves arranged at the opposite corners that do not belong to a same building block are connected to two fourth type protrusions on the first connecting surface of any of the fourth type building block, the fifth type building block and the sixth type building blocks;

Connecting Structure Eleven: the fifth type groove on any second connecting surface of the fifth type building block is connected to one first type protrusion on the first connecting surface of any of the first type building block, the second type building block and the third type building block;

Connecting Structure Twelve: the fifth type groove on the first connecting surface of the fifth type building block is connected to one first type protrusion on the first connecting surface of the third type building block;

Connecting Structure Thirteen: the sixth type through hole on the first connecting surface of the sixth type building block is connected to one first type protrusion on the first connecting surface of any of the first type building block, the second type building block and the third type building block;

Connecting Structure Fourteen: the sixth type through hole on the first connecting surface of the sixth type building block is connected to one first type protrusion on the first connecting surface of the third type building block.

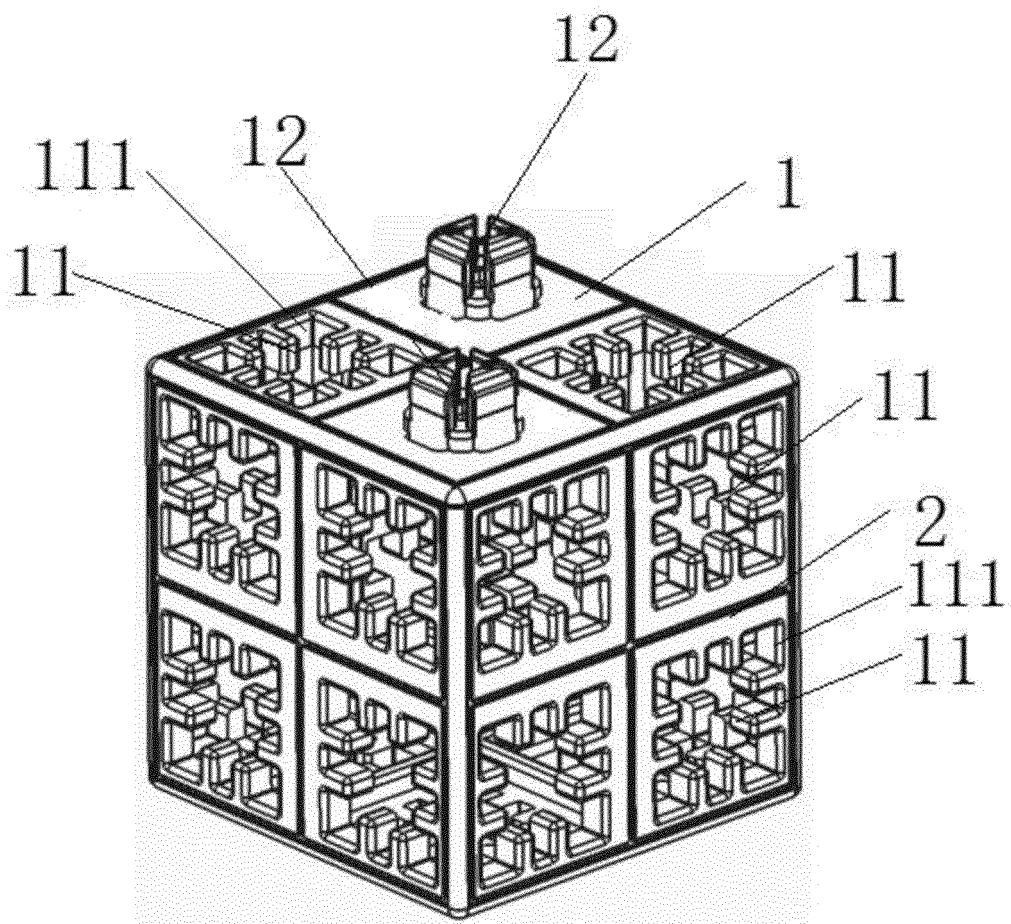


FIG. 1

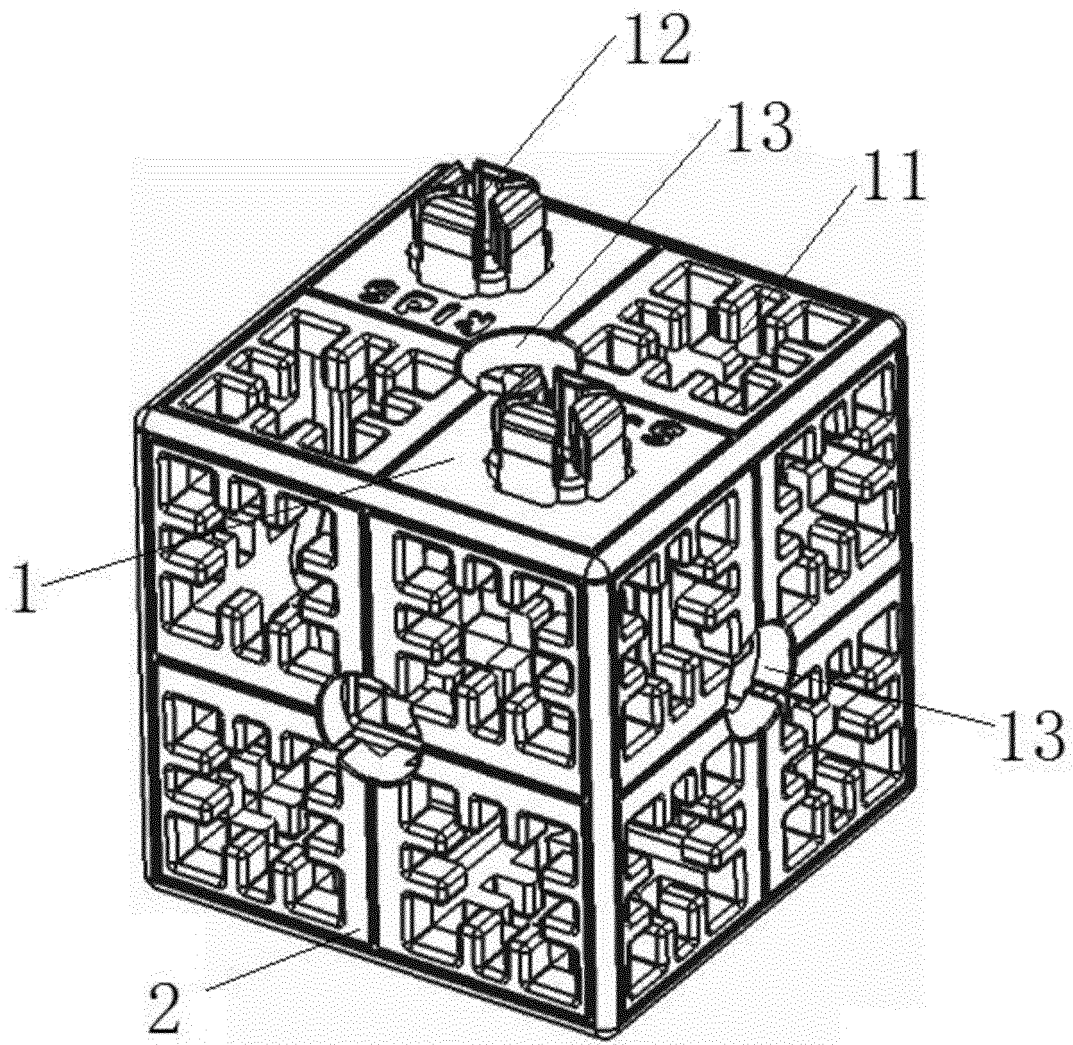


FIG. 2

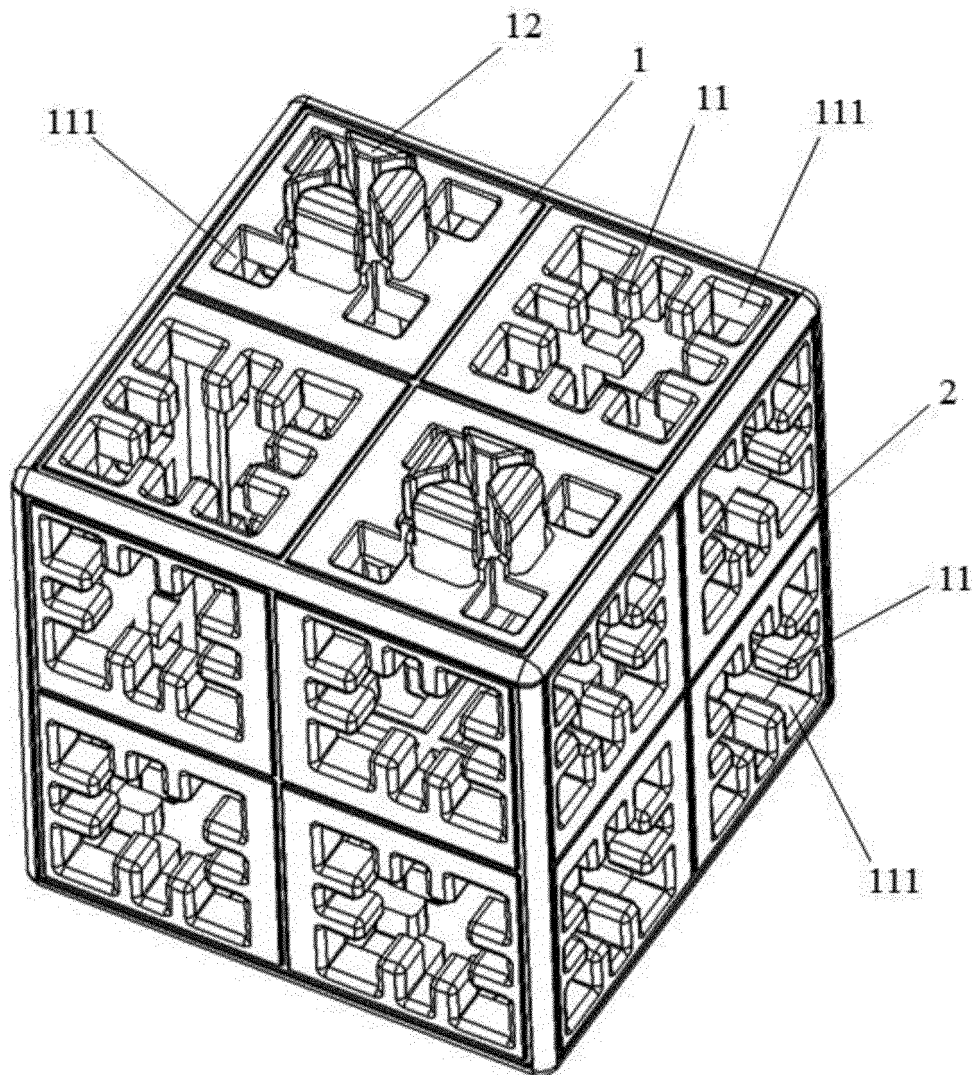


FIG. 3

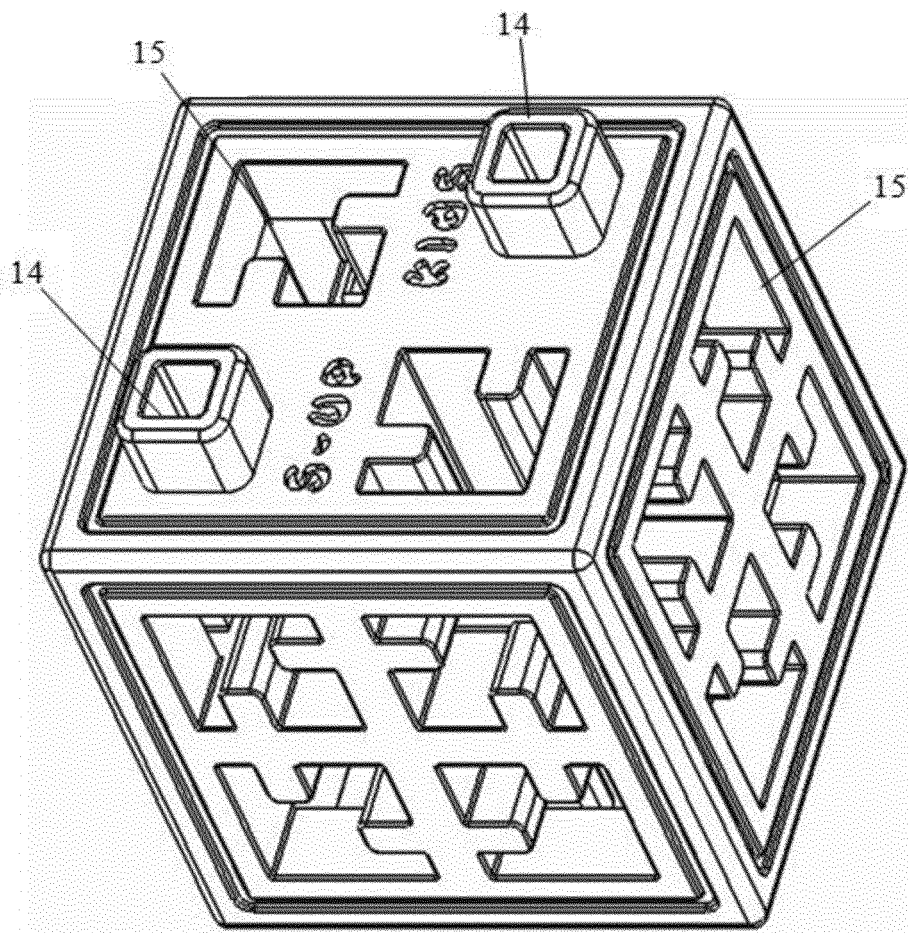


FIG. 4

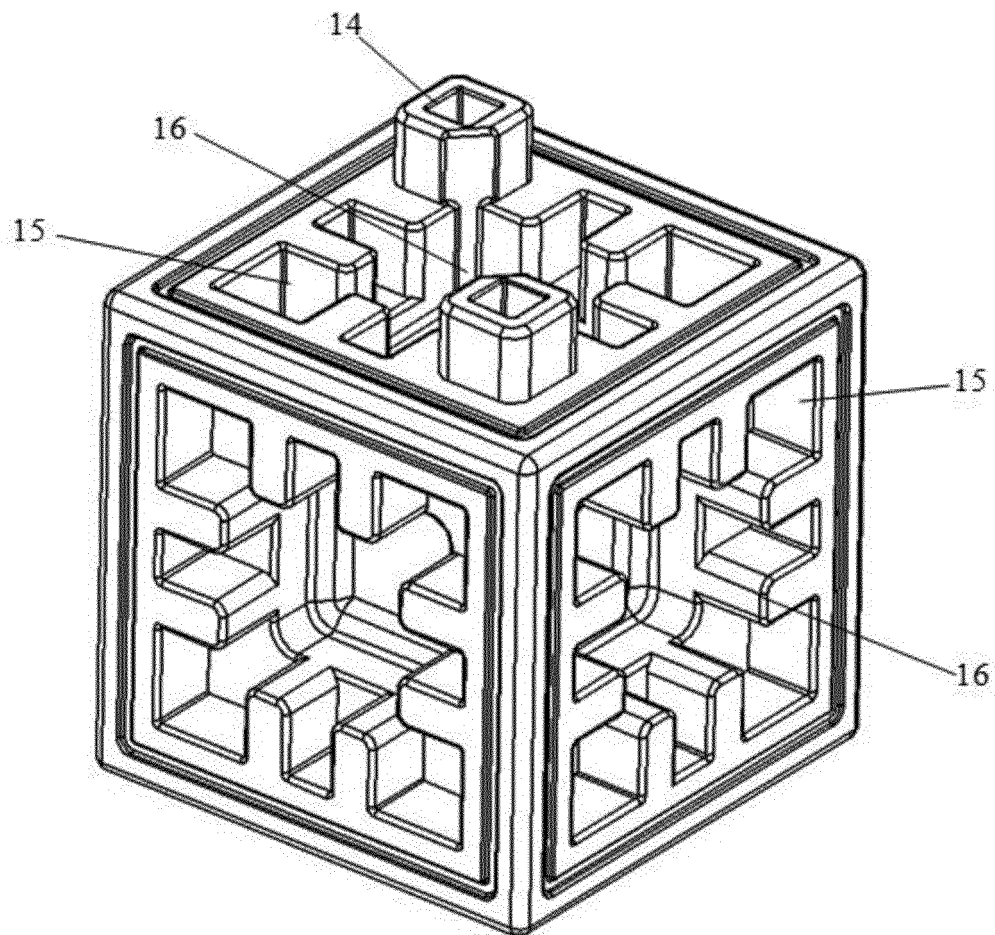


FIG. 5

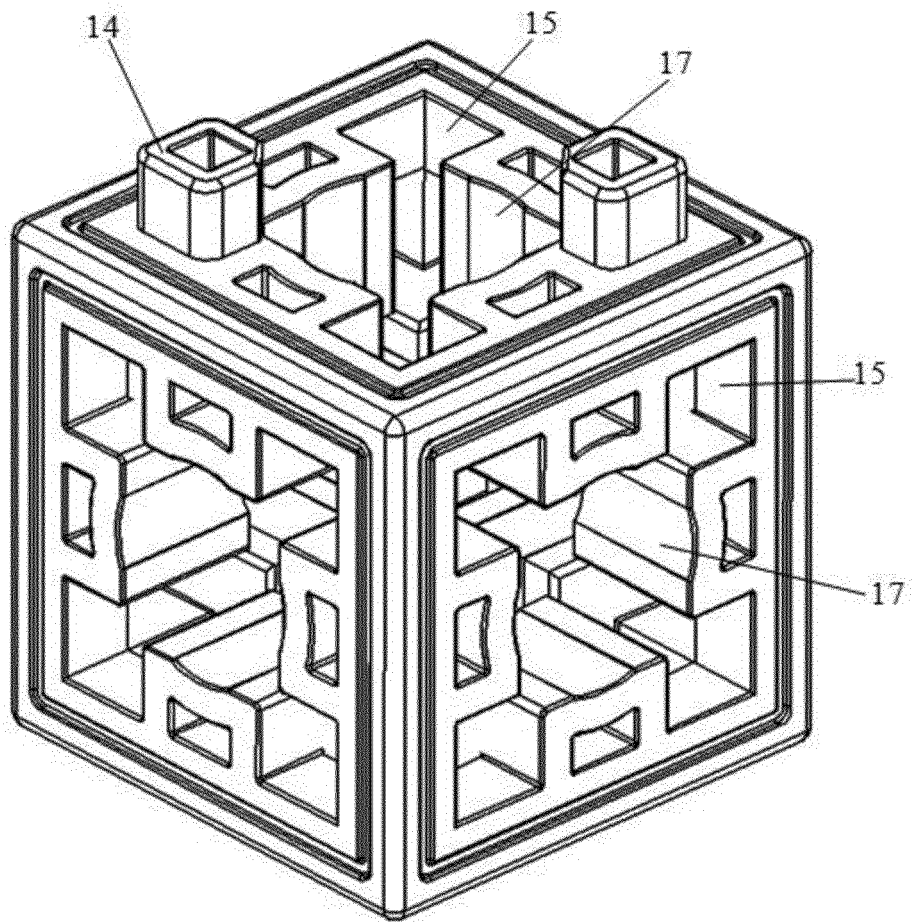


FIG. 6

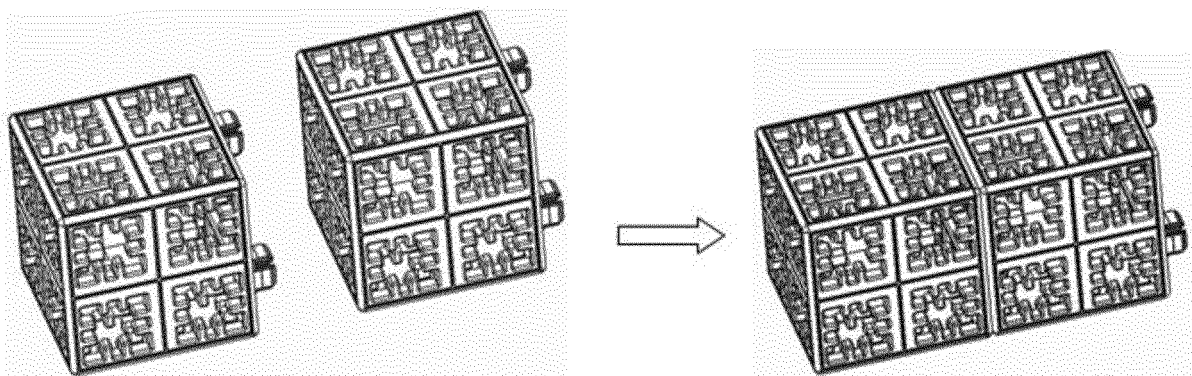


FIG. 7

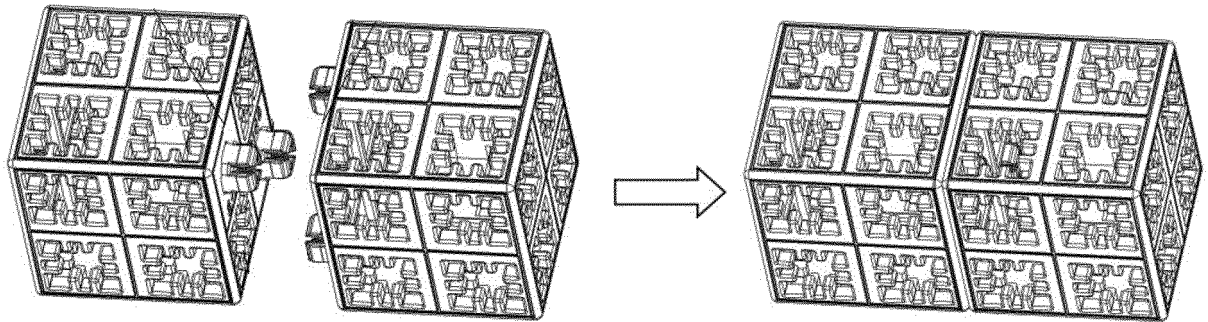


FIG. 8

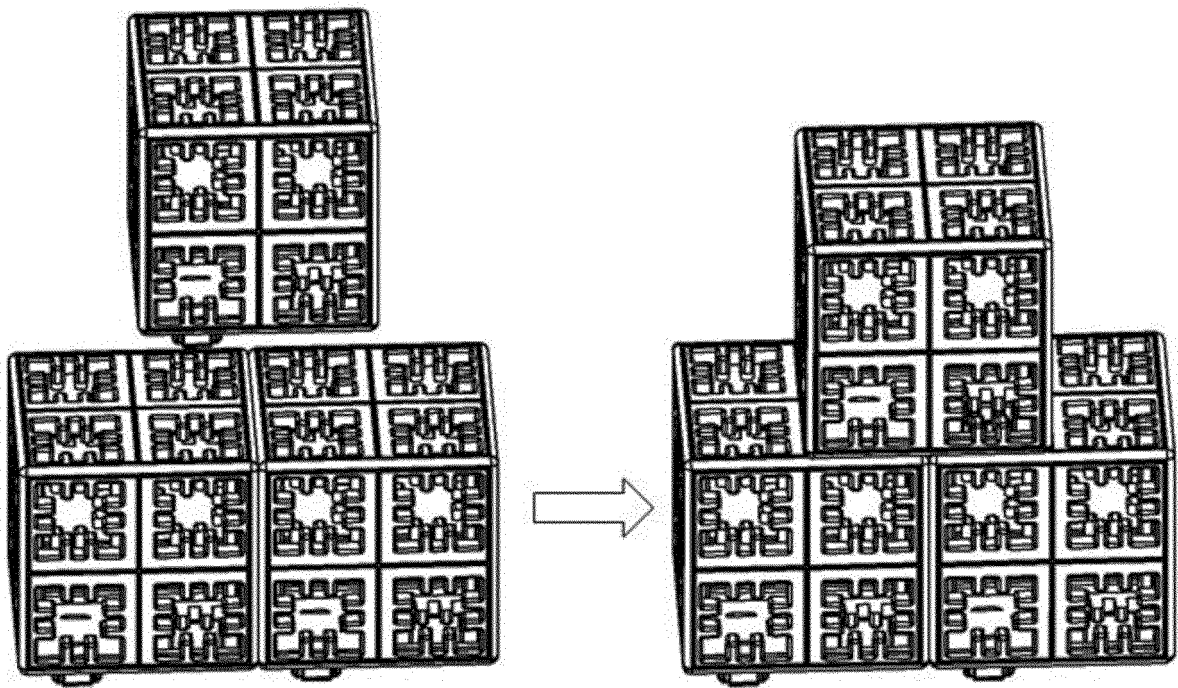


FIG. 9

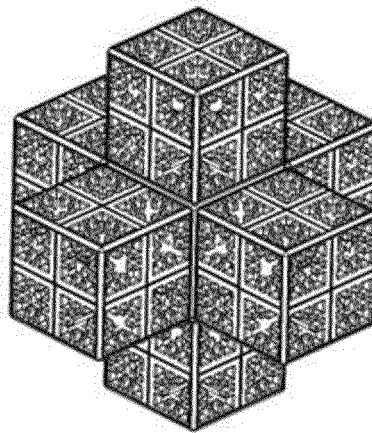
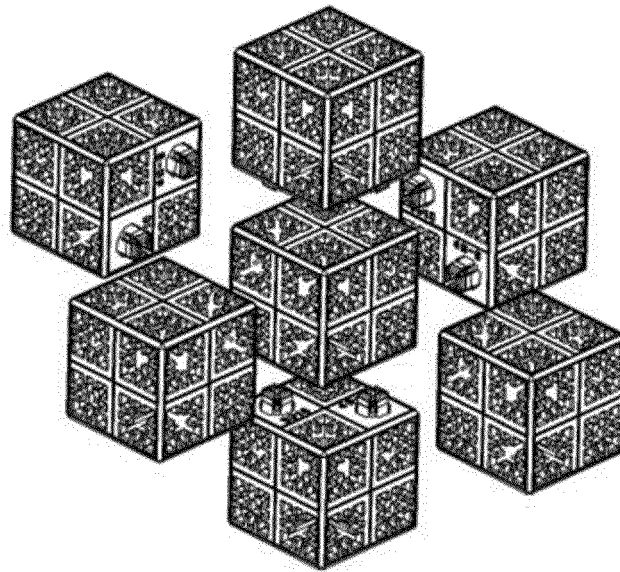


FIG. 10

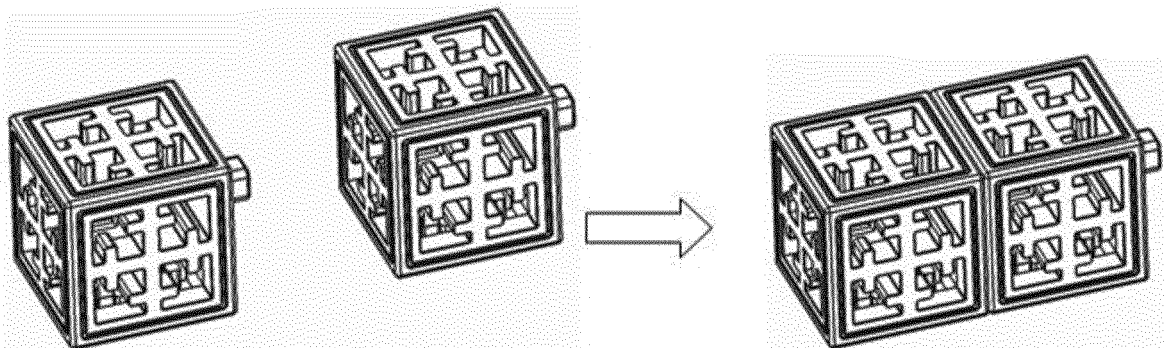


FIG. 11

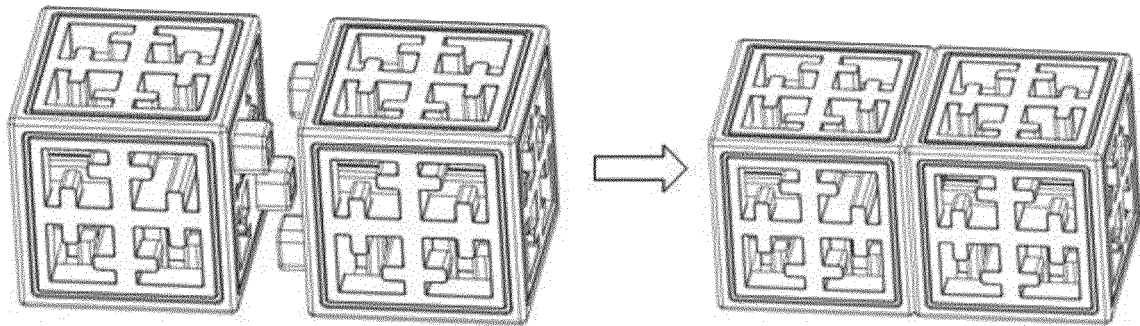


FIG. 12

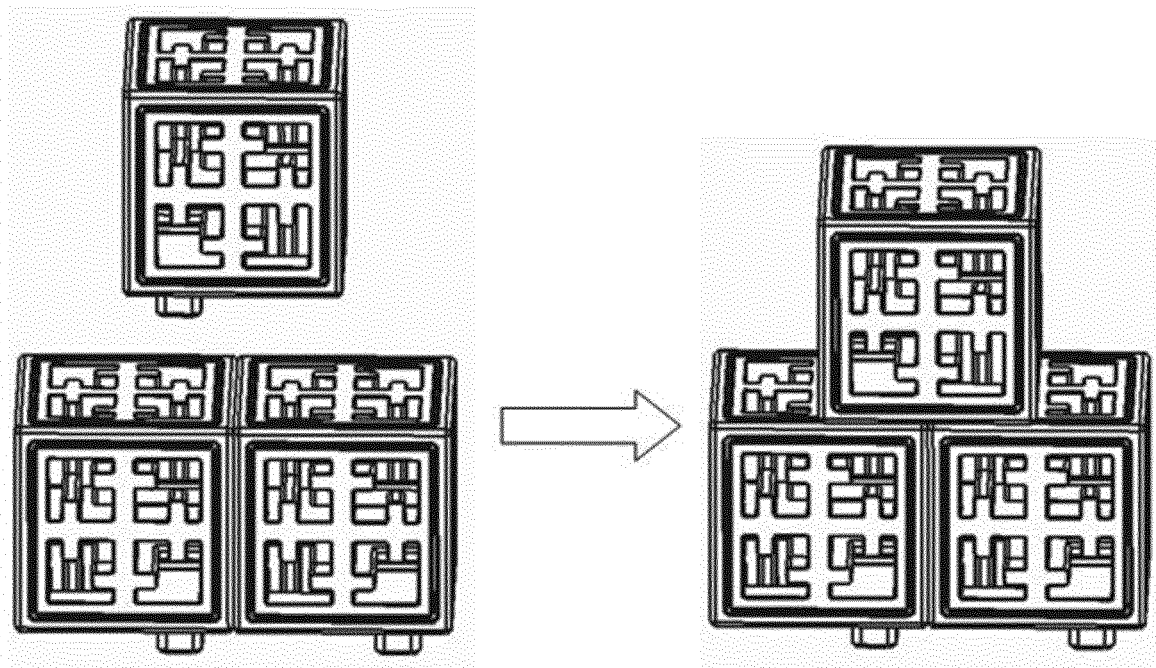


FIG. 13

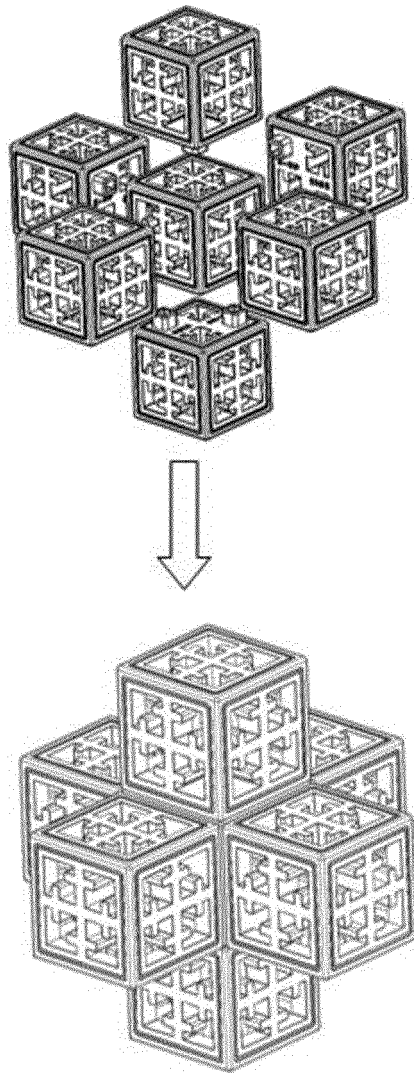


FIG. 14

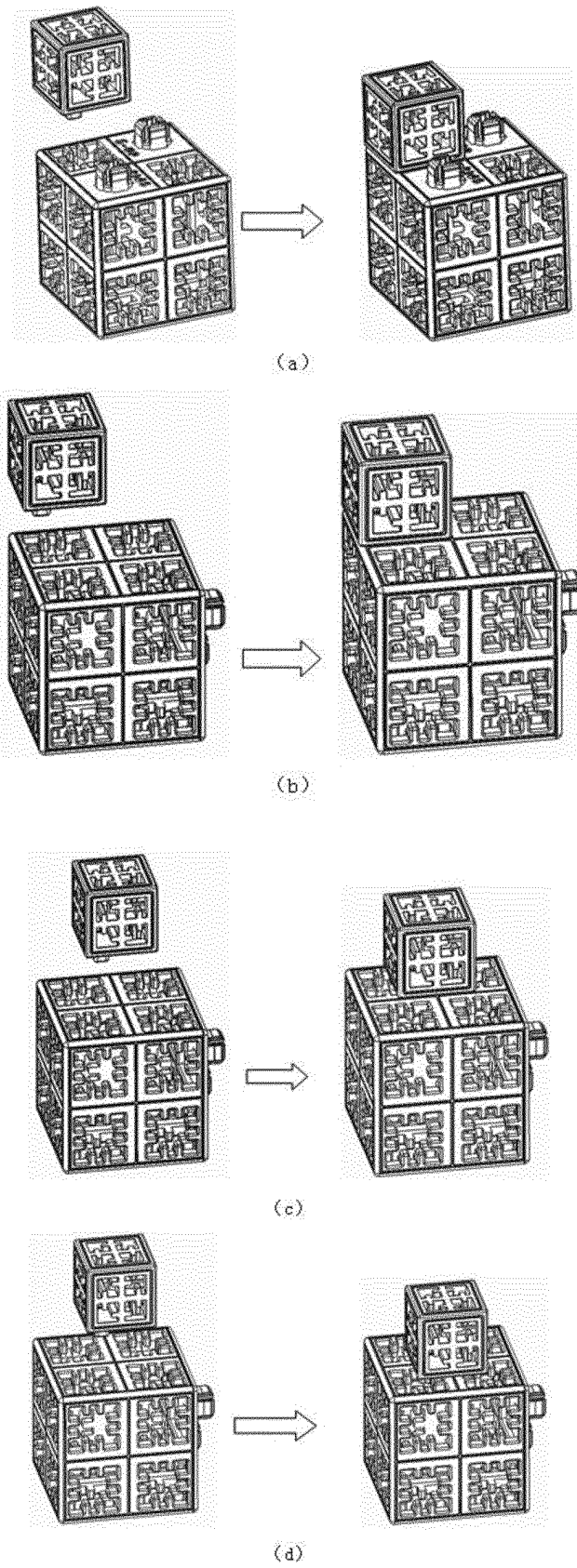


FIG. 15

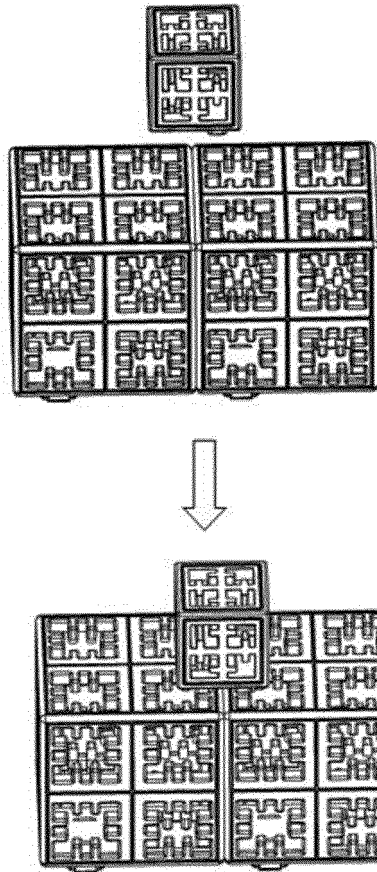


FIG. 16

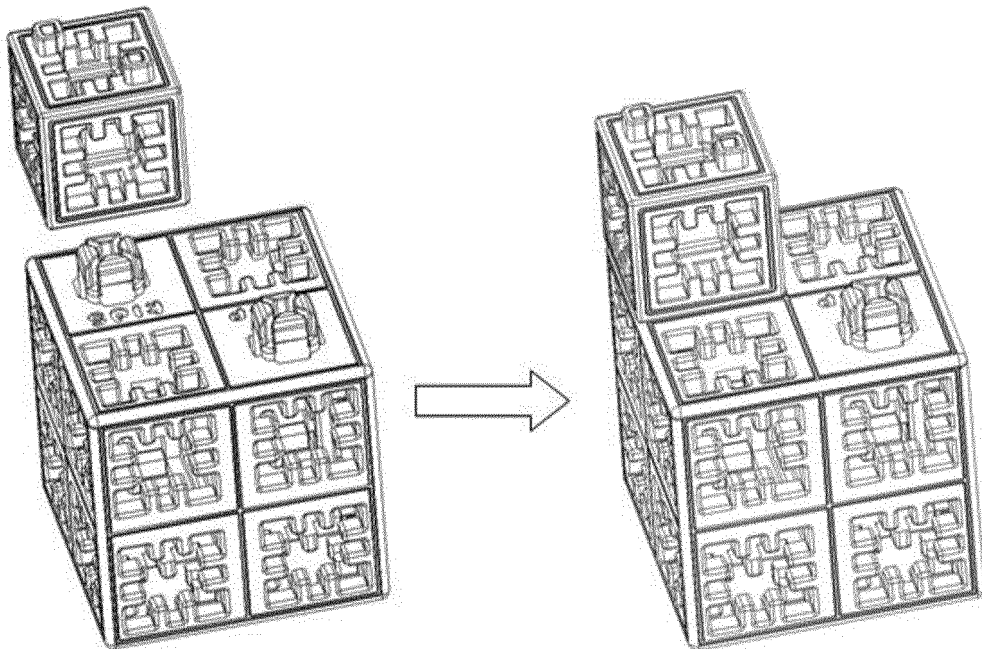


FIG. 17

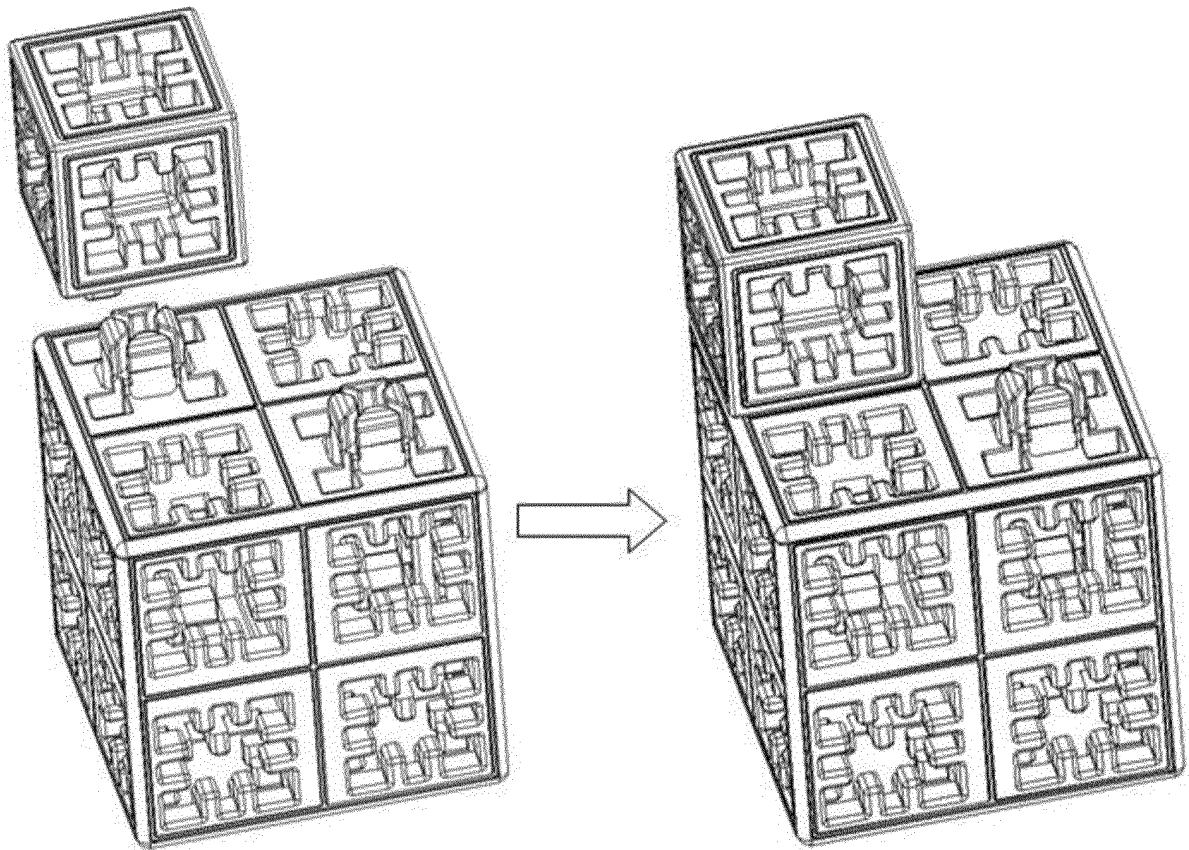


FIG. 18

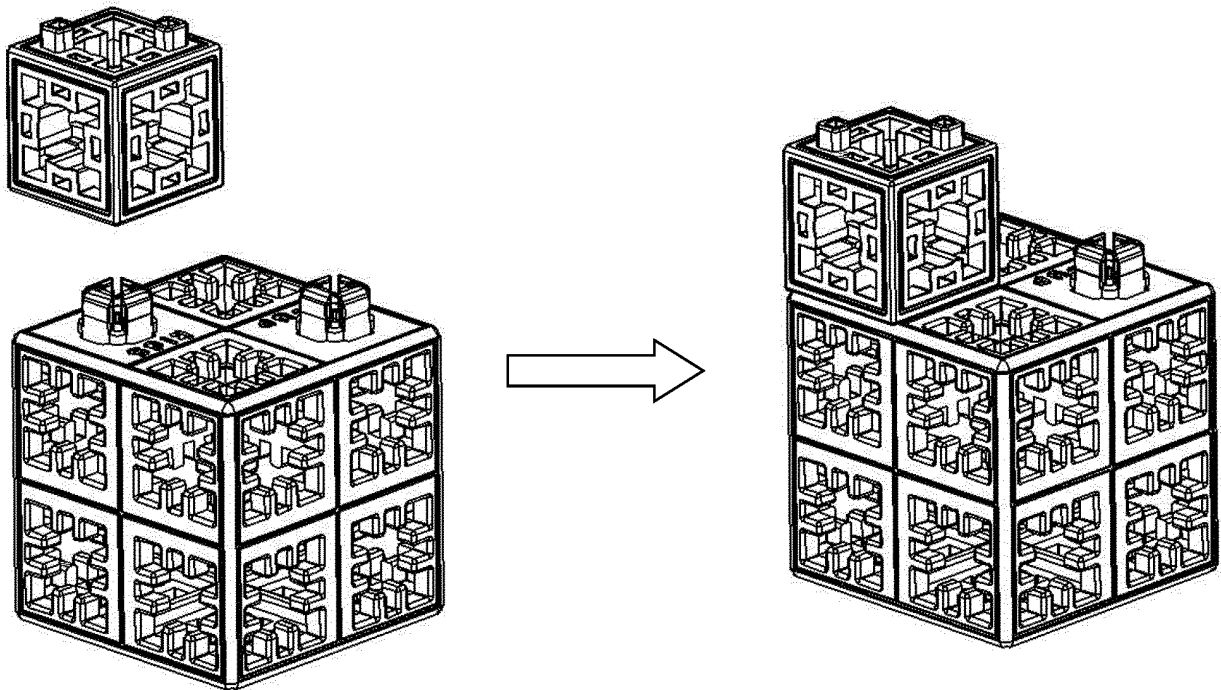


FIG. 19

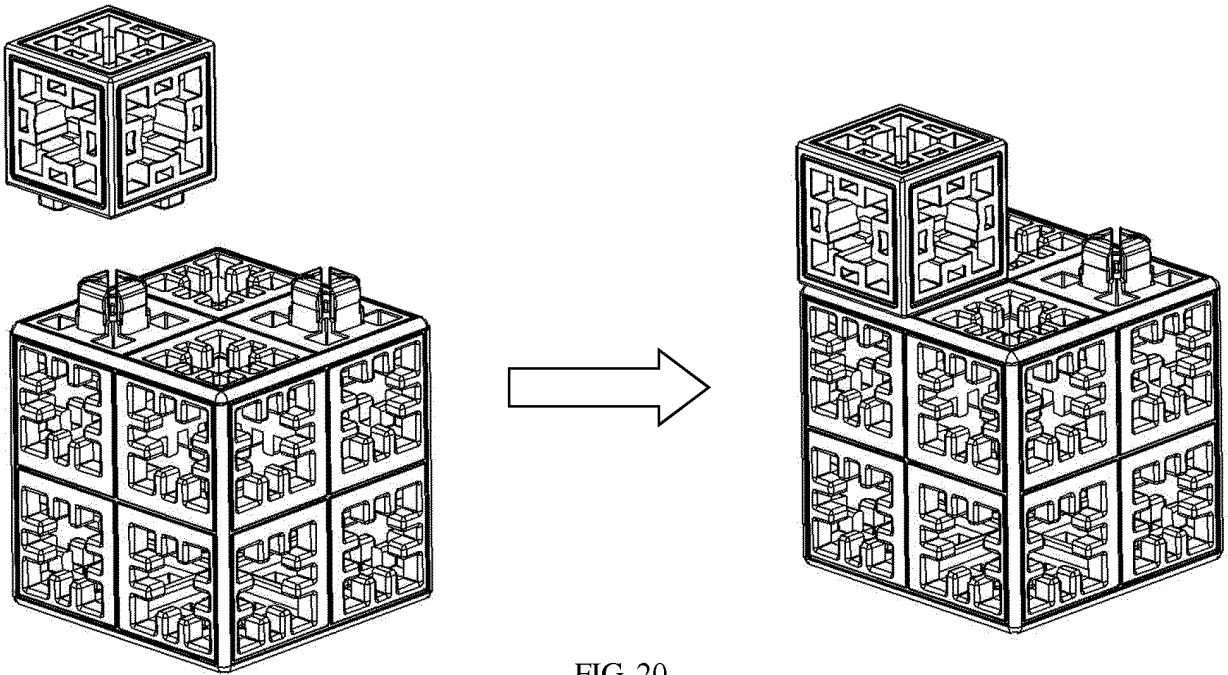


FIG. 20

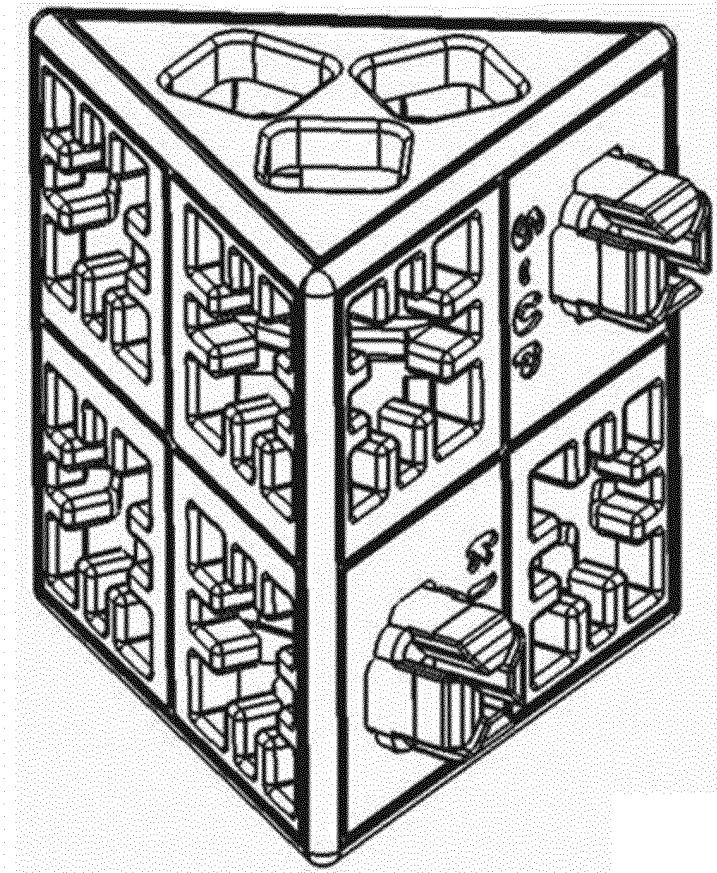


FIG. 21

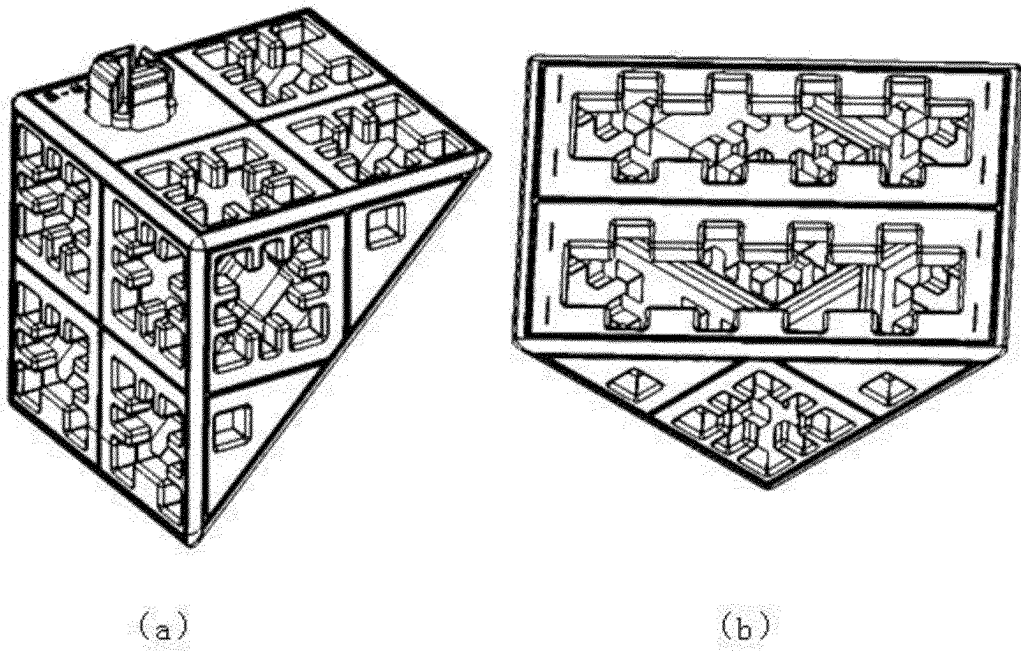


FIG. 22

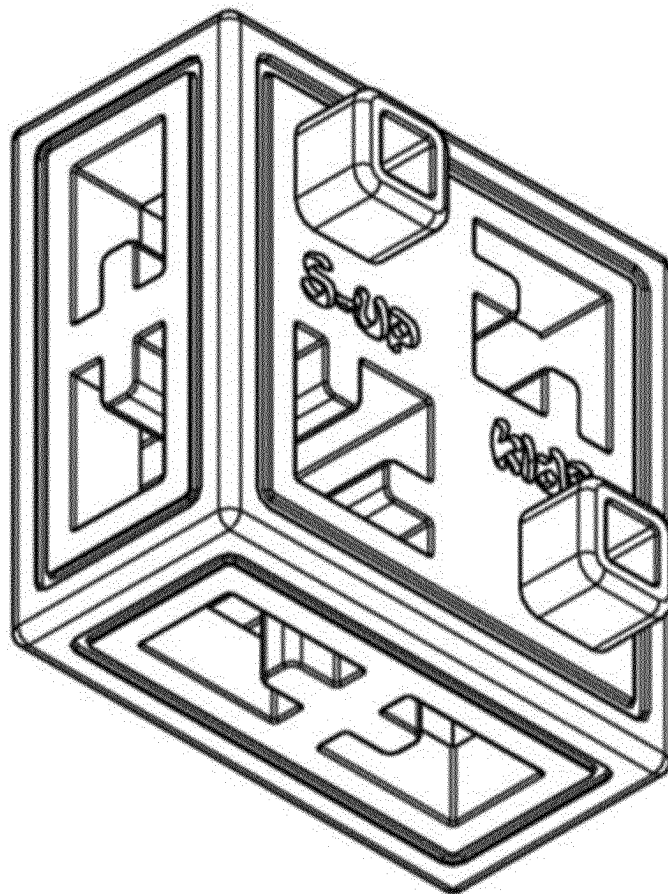


FIG. 23

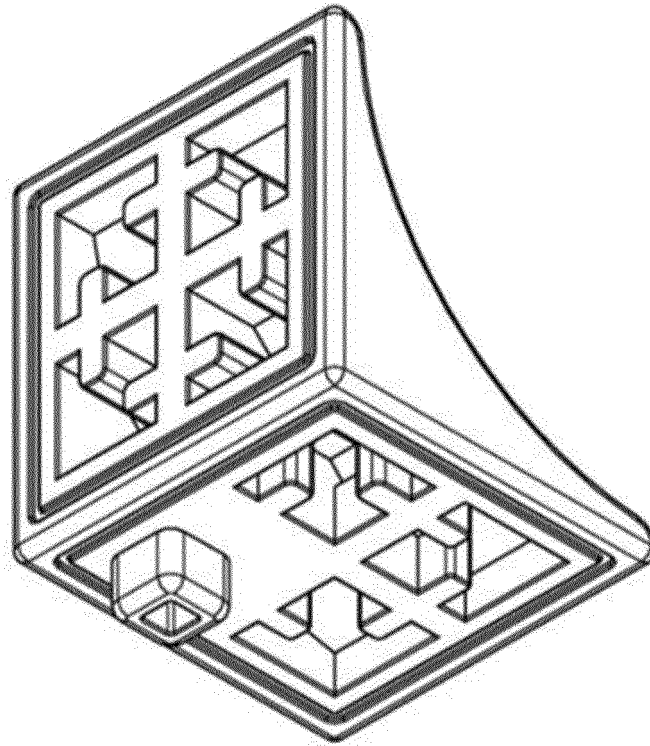


FIG. 24

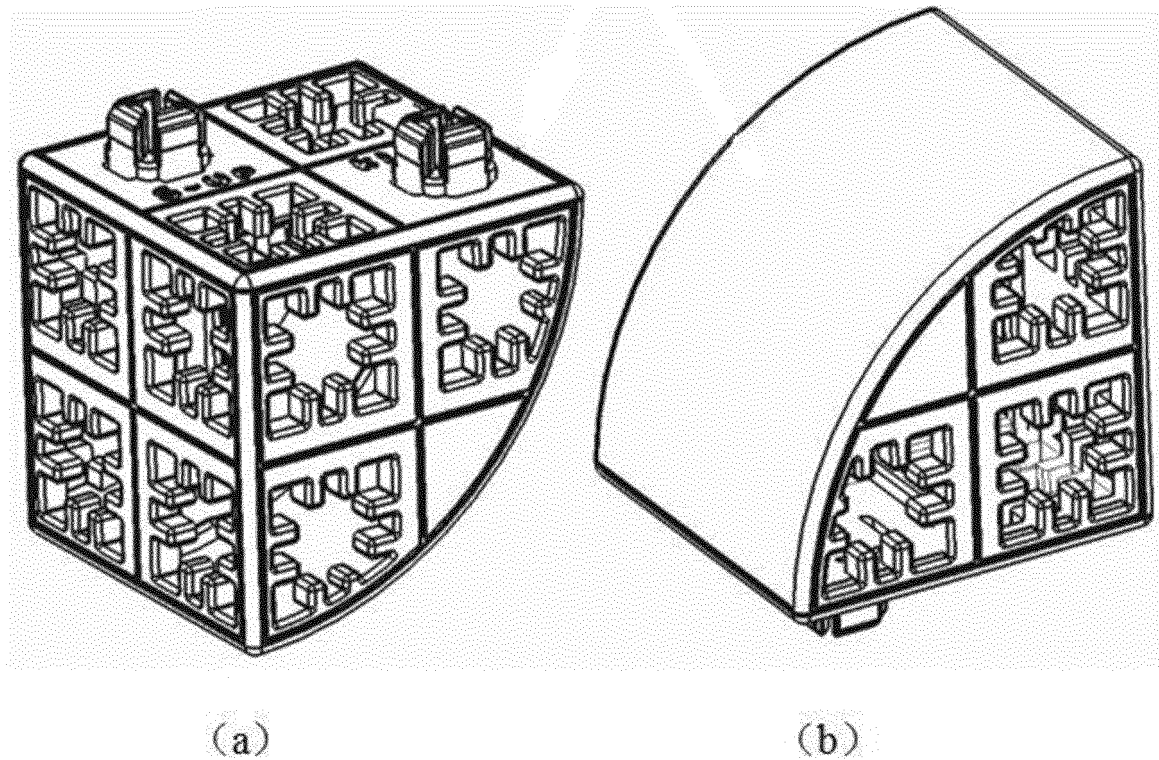


FIG. 25

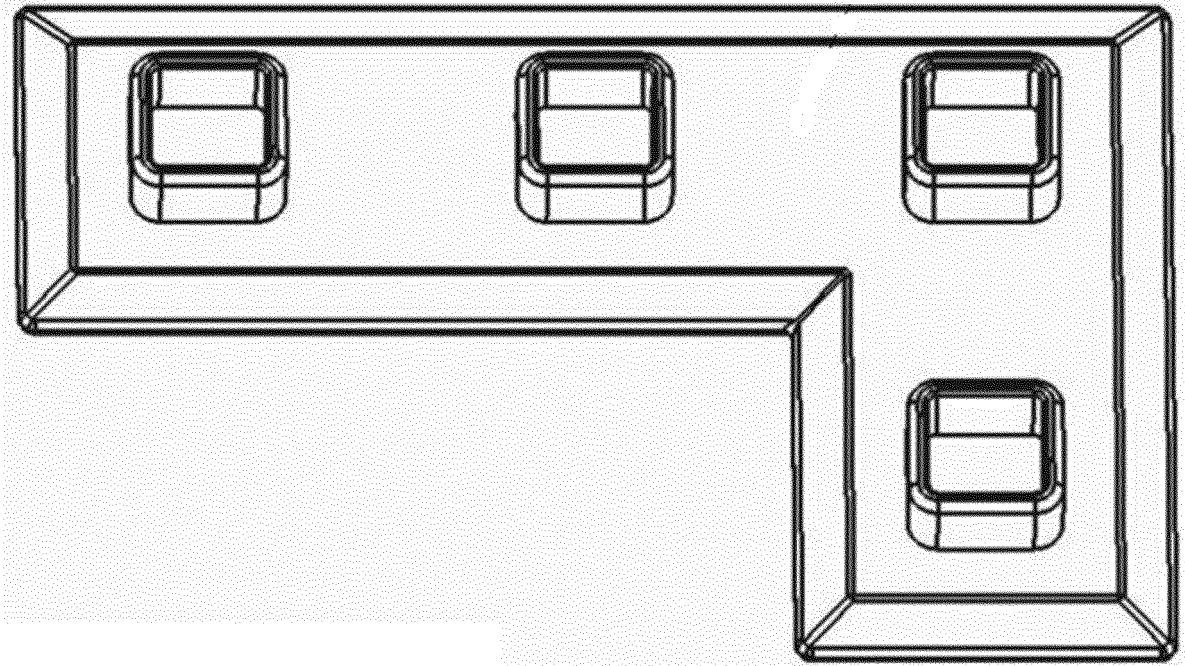


FIG. 26

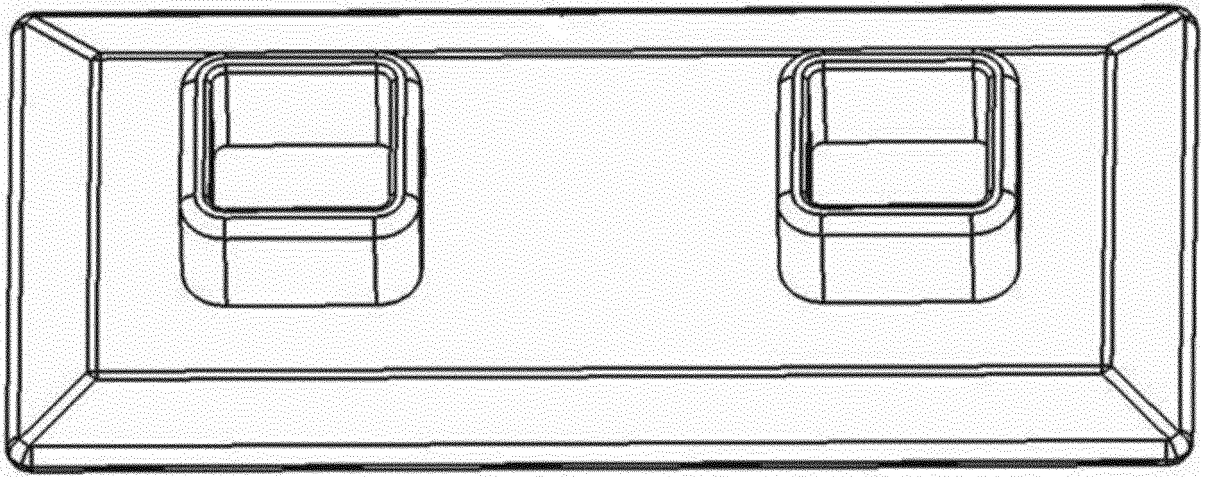


FIG. 27

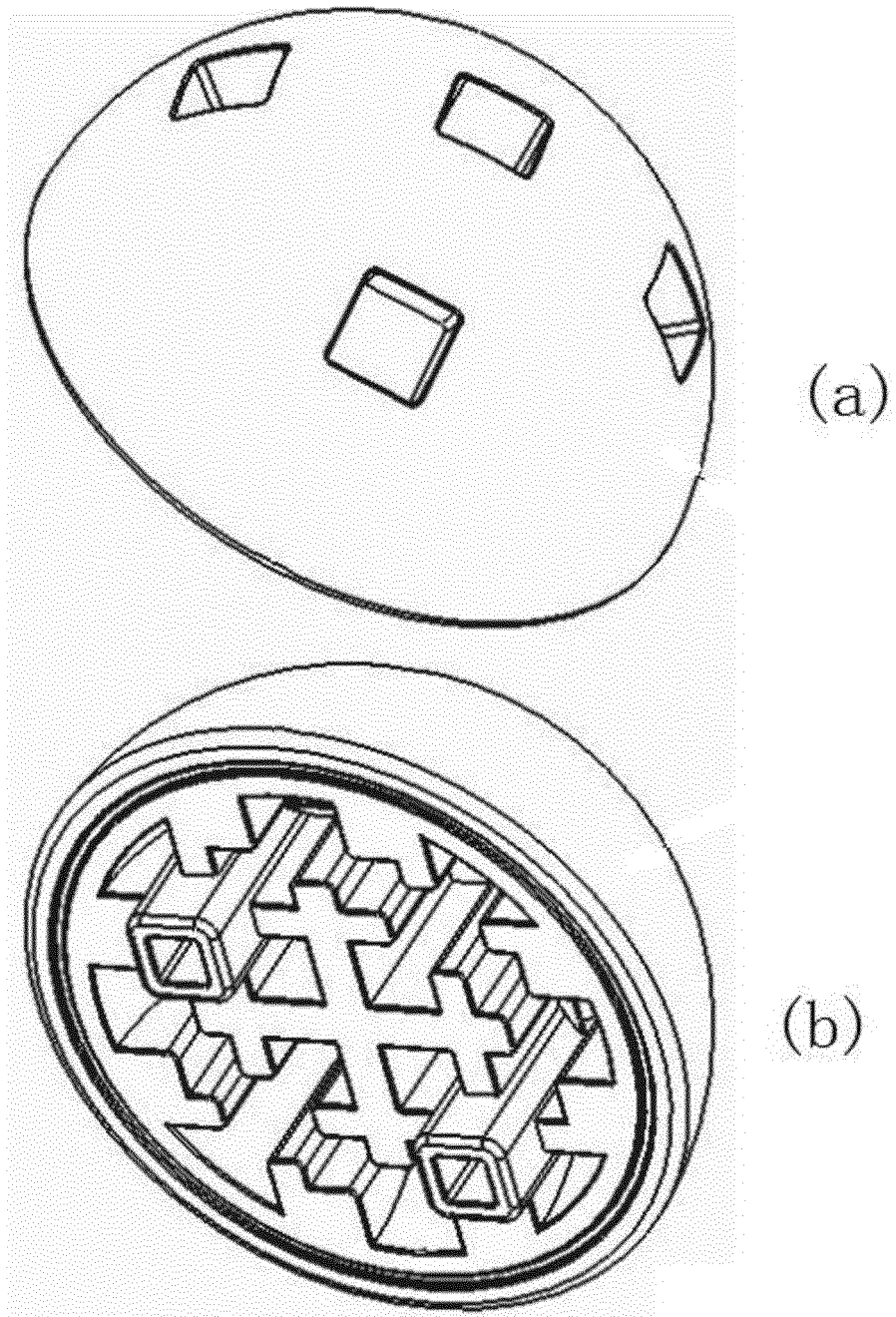


FIG. 28

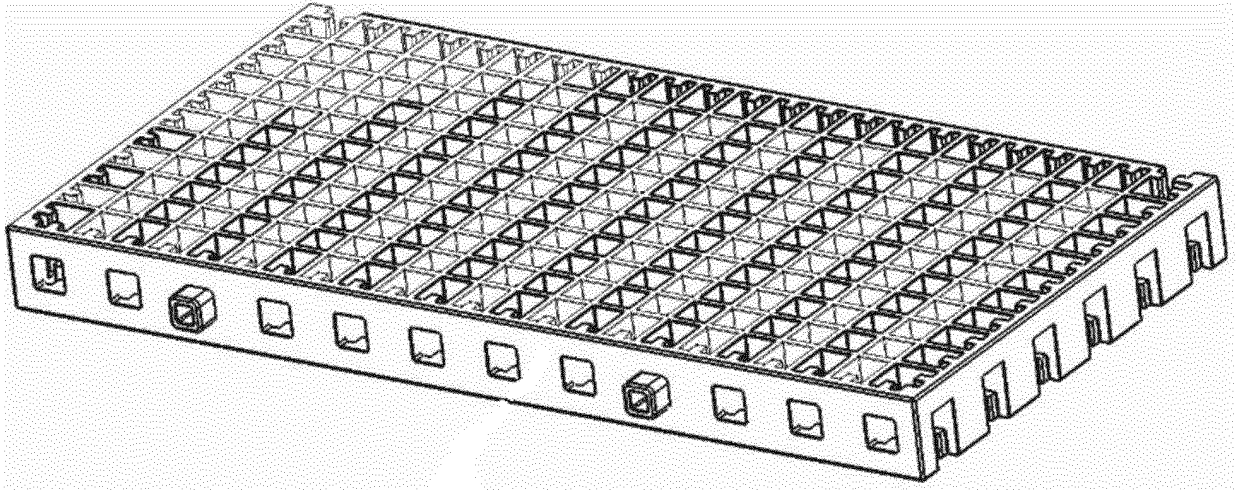


FIG. 29

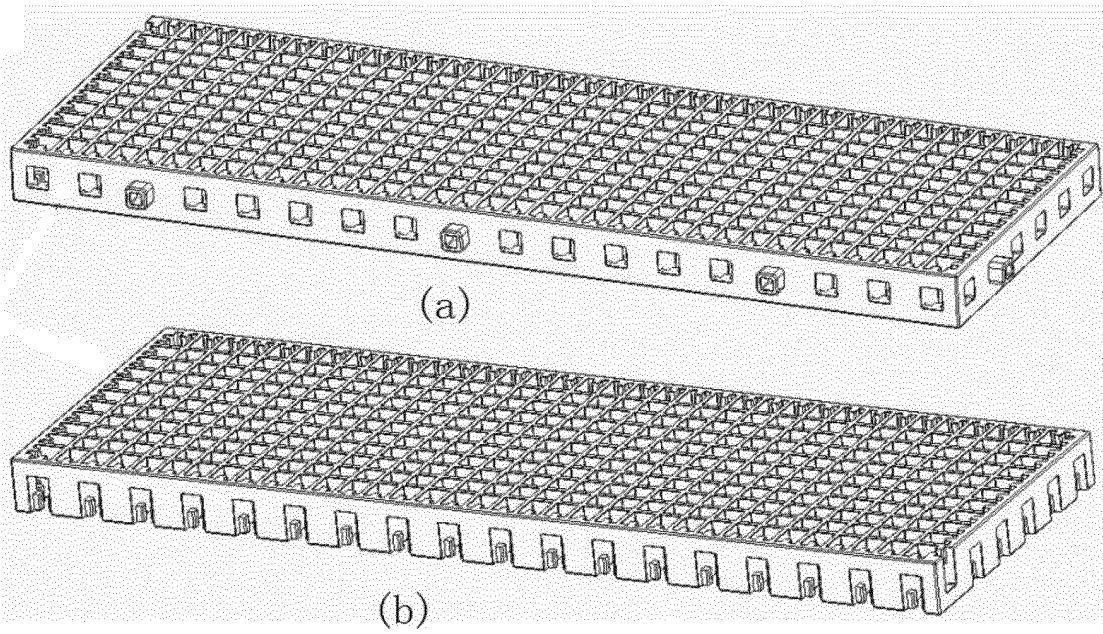


FIG. 30

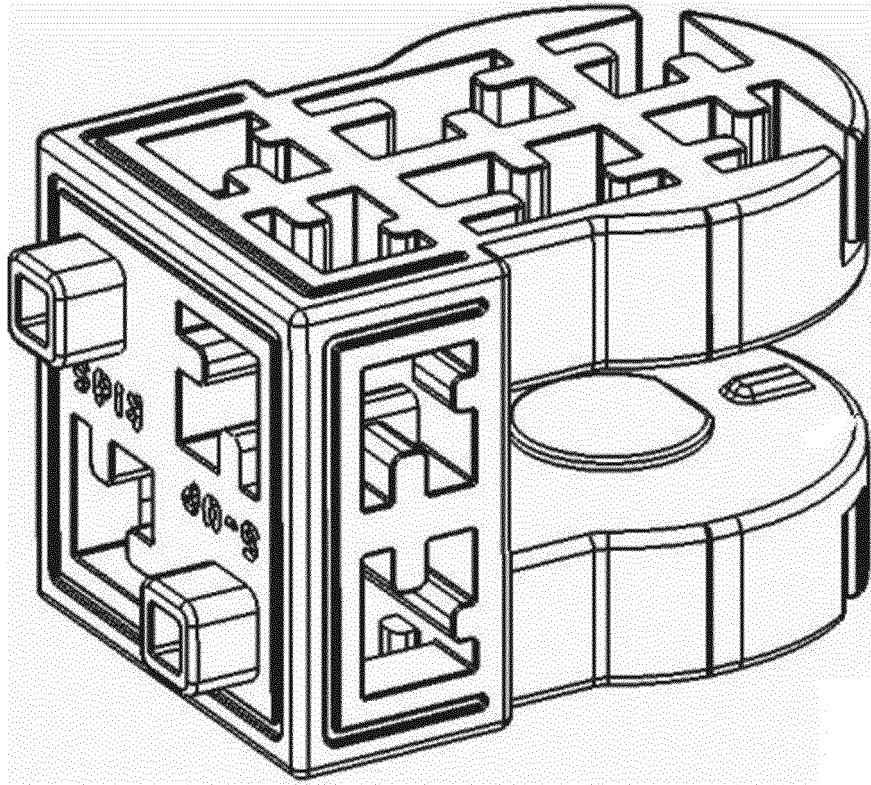


FIG. 31

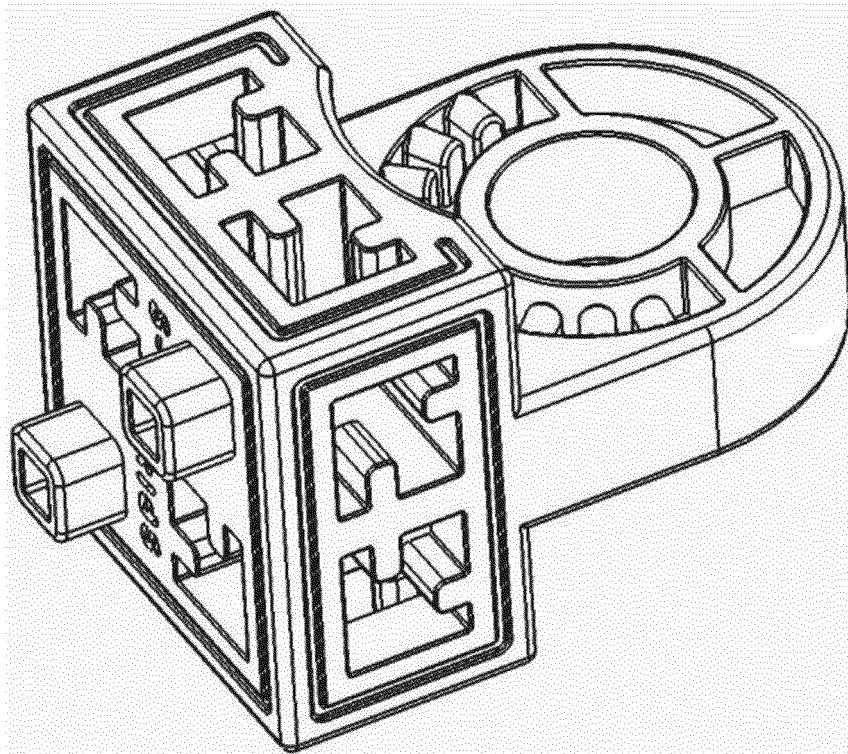


FIG. 32

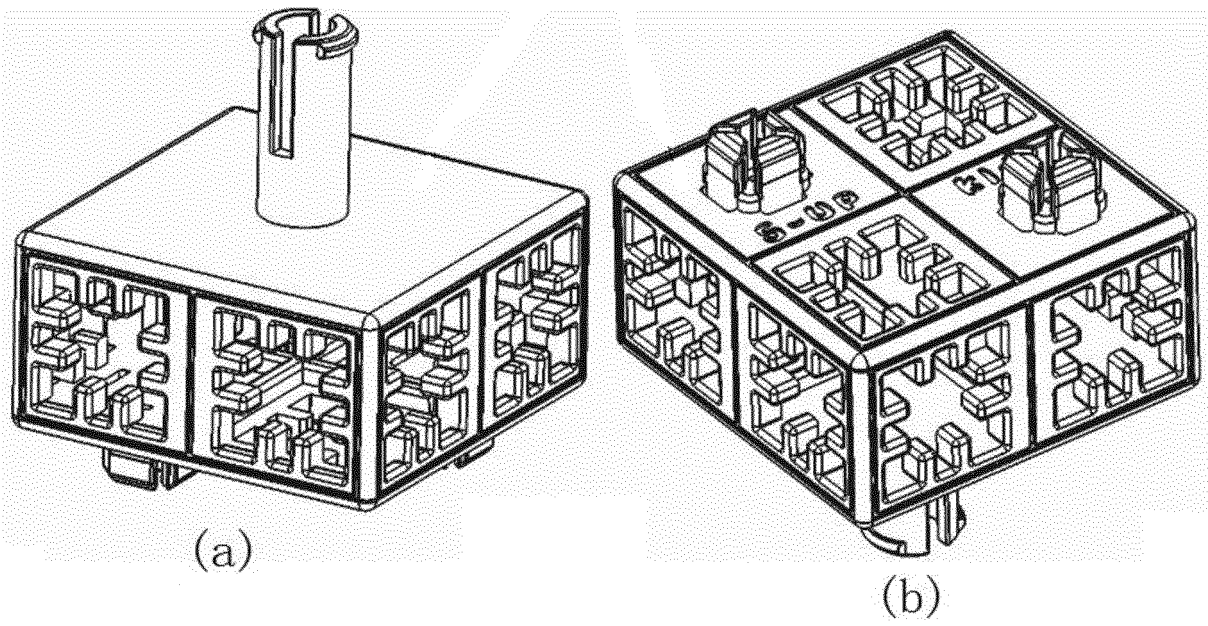


FIG. 33

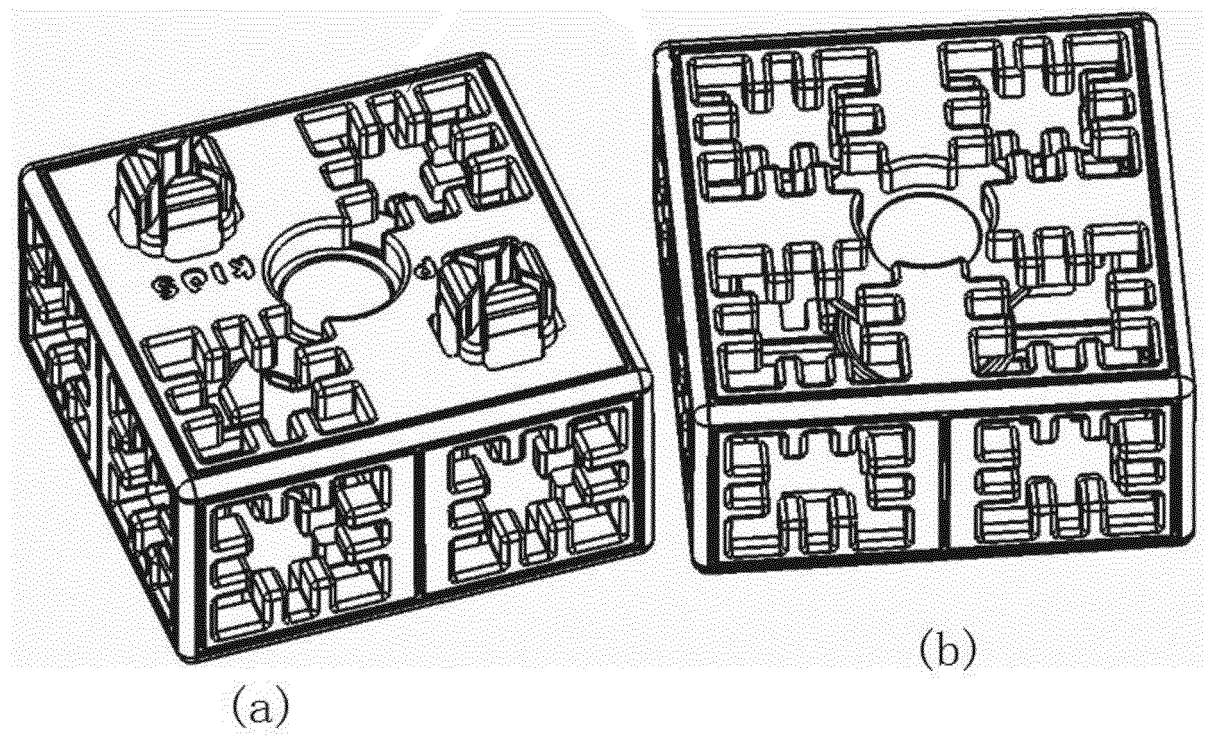


FIG. 34

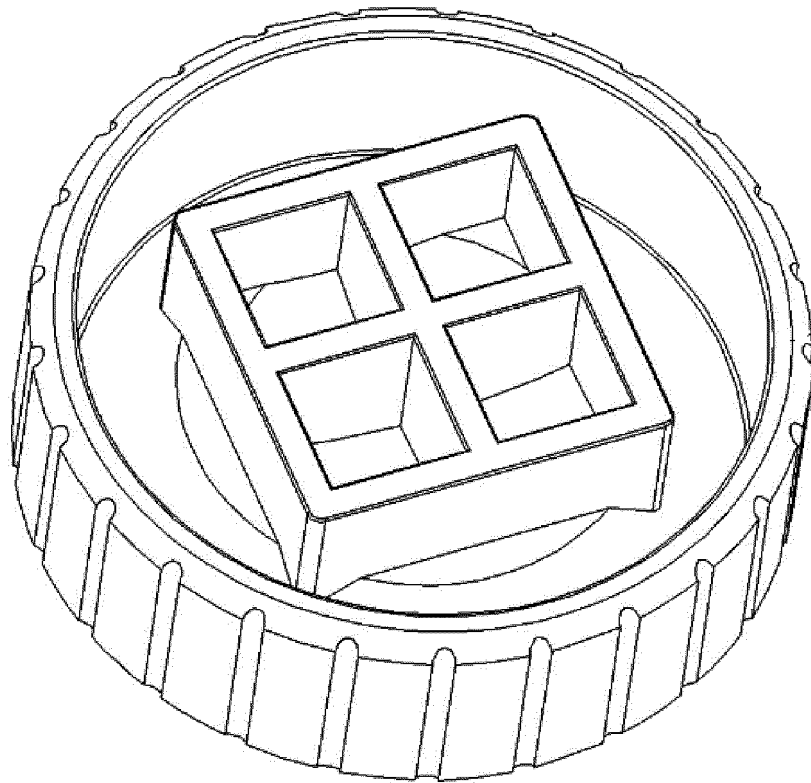


FIG. 35

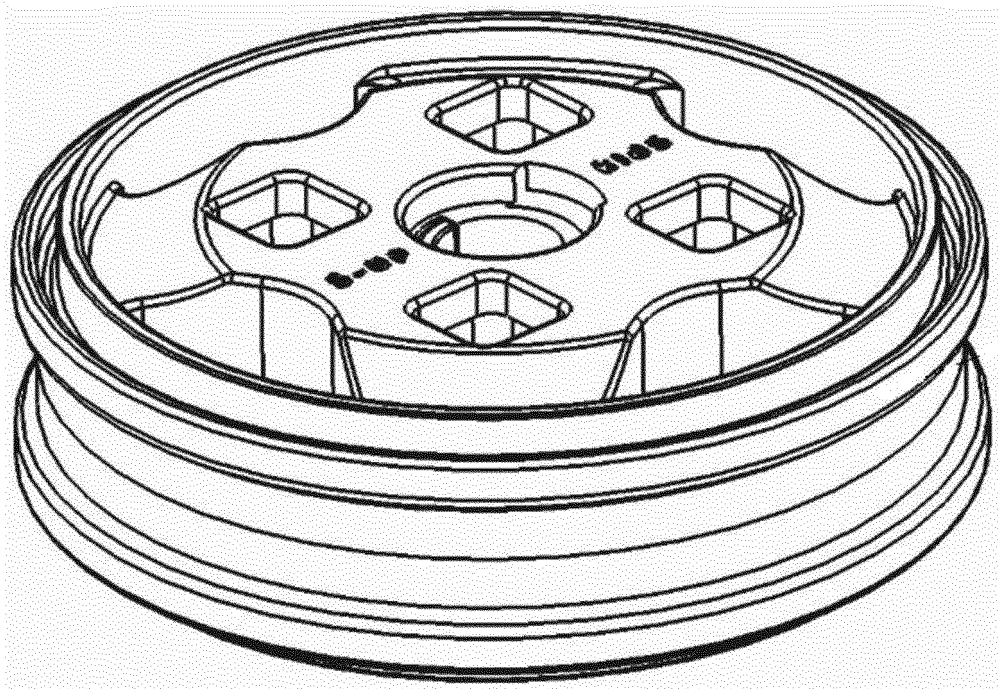


FIG. 36

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2016/087403

A. CLASSIFICATION OF SUBJECT MATTER

A63H 33/08 (2006.01) i

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)

A63H; 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)

WPI, EPODOC, CPRS, CNKI: concave, groove, plug, cavity, hole?, convex, plug w in, connect+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 203123589 U (LUO, Yunzhang), 14 August 2013 (14.08.2013), description, page 2, paragraphs [0015]-[0021], and figure 1	1
Y	CN 203123589 U (LUO, Yunzhang), 14 August 2013 (14.08.2013), description, page 2, paragraphs [0015]-[0021], and figure 1	2-3, 8
Y	CN 1045287 A (BEERENS, C.J.M.), 12 September 1990 (12.09.1990), description, page 4, lines 13-20, and figures 1-3	2-3, 8
X	US 2006048475 A1 (LIN, F.C.), 09 March 2006 (09.03.2006), description, paragraphs [0023]-[0027], and figures 7-15	1
A	US 2006048475 A1 (LIN, F.C.), 09 March 2006 (09.03.2006), description, paragraphs [0023]-[0027], and figures 7-15	2-10
A	US 2014308872 A1 (PETILLO, W.P.), 16 October 2014 (16.10.2014), the whole document	1-10

☐ 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
"A" document defining the general state of the art which is not considered to be of particular relevance	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
11 November 2016 (11.11.2016)

Date of mailing of the international search report
30 November 2016 (30.11.2016)

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Authorized officer
HAN, Bing
Telephone No.: (86-10) **62084871**

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/CN2016/087403

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 203123589 U	14 August 2013	None	
CN 1045287 A	12 September 1990	US 5098328 A	24 March 1992
		EP 0379389 B1	01 December 1993
		DE 69004814 T2	28 April 1994
		EP 0379389 A1	25 July 1990
		JP H0347290 A	28 February 1991
		DE 69004814 D1	13 January 1994
		CN 1028489 C	24 May 1995
		AT 97829 T	15 December 1993
US 2006048475 A1	09 March 2006	None	
US 2014308872 A1	16 October 2014	None	

Form PCT/ISA/210 (patent family annex) (July 2009)