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(54) **FRAMELESS PUZZLE**  
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**Description**

## 1. Field of the Invention

5 **[0001]** The present invention relates to a jigsaw puzzle, especially to a jigsaw puzzle with a pattern on edges thereof but without any frame.

## 2. Description of the Prior Arts

10 **[0002]** A jigsaw puzzle is one of the brain games and includes a plurality of puzzle pieces and these puzzle pieces can be interlocked and from a pattern together. The conventional jigsaw puzzle may be mounted in a frame after the pattern is formed via being interlocked completely and clamped between a backboard and a transparent board. Then, the applicant of the subject patent application has invented a jigsaw puzzle without any frame as shown in China patent No. 206715281U. As said patent disclosed, the thickness of the outmost puzzle pieces of the jigsaw puzzle is larger  
15 than usual so that side surfaces of said puzzle pieces have larger areas, and thus these puzzle pieces can be utilized as a frame. Therefore, the jigsaw puzzle may not comprise another frame. Besides, because the side surfaces of the outmost puzzle pieces have a certain area, the pattern can be printed on said side surfaces, and thereby the pattern can extend to sides of the jigsaw puzzle.

**[0003]** Precisely, in said China patent, each one of the outmost puzzle pieces (hereinafter referred to as outer puzzle pieces) includes a top section (main body) and a side section. The top section has a connecting portion (e.g. first pole, second pole, etc.) protruding downward from a bottom surface of the top section. A side of the side section is tiltably connected to a side of the top section, and the side section is capable of being tilted so that the inner wall surface of the side section is interlocked to a side surface of the connecting portion of the top section or the outer wall surface of the side section is parallel to a top surface of the top section, which facilitates ease in printing or coating a continuous pattern  
20 on the top surface of the top section and the outer wall surface of the side section. However, said outer puzzle piece has defects as follows:

First, the connecting portion of the top section protrudes downward, but a length of the connecting portion should be long enough so that the side section may have enough area to connect. Thus, the entire outer puzzle piece becomes too thick, which makes the outer puzzle piece hard to be fixed and manufactured, and thereby the outer puzzle piece  
25 cannot be produced easily.

**[0004]** Second, the outer puzzle piece may be marked with numbers to facilitate convenience in assembly for a user, but, because the outer puzzle piece is too thick, it is not easy to mark on an inner side surface of the side section via printing or coating.

**[0005]** Third, also because the outer puzzle piece is too thick in comparison with inner puzzle pieces formed in a normal flake shape, the user may be hard to assemble the puzzle pieces.  
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**[0006]** Fourth, the current outer puzzle piece only comprises tabs or blanks on two opposite sides of the top section for being interlocked to a lateral side of a top section of another outer puzzle piece, but two opposite sides of the side section of said outer puzzle piece are straight such that said side section cannot be interlocked to the side section of said another outer puzzle piece. Therefore, when the outer puzzle pieces are arranged in a line and the side sections of said outer puzzle pieces are tiled upward for coating or painting a pattern, the adjacent two side sections may not align to each other in height position because they are not interlocked to each other, which makes the pattern formed via coating or painting not flat or staggered.  
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**[0007]** To overcome the shortcomings, the present invention provides a jigsaw puzzle without a frame to mitigate or obviate the aforementioned problems.

40 **[0008]** The main objective of the present invention is to provide a jigsaw puzzle without a frame that lowers the thickness of the puzzle pieces which are located outmost to facilitate ease in manufacturing and assembling.

**[0009]** To achieve aforesaid purpose, the jigsaw puzzle without a frame has:

a fixing structure comprising:

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an upper joining ring slot concaved on a top surface of the fixing structure; and  
a lower engaged surrounding groove concaved on a bottom surface of the fixing structure;

a puzzle main body comprising:

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a plurality of outer puzzle pieces mounted on the fixing structure; the outer puzzle pieces connected with each other as a loop thereby enclosing an inner space; each one of the outer puzzle pieces comprising:

a top section comprising:

an upper engaging portion protruding from a bottom surface of the top section; the upper engaging portion mounted through and interlocked into the upper joining ring slot of the fixing structure; and at least one upper mating portion on a verge of the top section; the top sections of each two adjacent ones of the outer puzzle pieces interlocked to each other via the upper mating portions;

at least one side section tiltably connected to the verge of the top section, each one of the at least one side section comprising:

an inner wall surface and an outer wall surface opposite each other; the at least one side section being capable of being tilted so that the outer wall surface of the at least one side section is parallel to a top surface of the top section and the inner wall surface of the at least one side section abuts a side surface of the fixing structure;

at least one bottom section tiltably connected to the at least one side section; the top section and the at least one bottom section located on two opposite sides of the at least one side section; each one of the at least one bottom section comprising:

an inner wall surface and an outer wall surface opposite each other; the at least one bottom section being capable of being tilted so that the outer wall surface of the at least one bottom section is parallel to the outer wall surface of the at least one side section;

a lower engaging portion protruding from the inner wall surface of the at least one bottom section; the at least one bottom section being capable of being tilted so that the lower engaging portion of the at least one bottom section is mounted through and interlocked into the lower engaged surrounding groove of the fixing structure;

a plurality of inner puzzle pieces mounted within the inner space enclosed by the outer puzzle pieces; the inner puzzle pieces interlocked to each other and some of the inner puzzle pieces interlocked to the outer puzzle pieces;

wherein a pattern is formed on the top surfaces of the top sections of the outer puzzle pieces, the outer wall surfaces of the side sections of the outer puzzle pieces, and top surfaces of the inner puzzle pieces.

**[0010]** The advantages of the present invention are that: with the outer puzzle pieces assembled on the fixing structure and the side section or bottom section of the outer puzzle piece interlocked to the side surface or bottom surface of the fixing structure, the outer puzzle piece may not form any protruding structure on the bottom surface of the top section for being interlocked by the side section but, instead, the outer puzzle piece may have an engaging structure on the bottom surface of the top section of the outer puzzle piece for interlocking the upper engaging portion of the fixing structure. Or, the inner puzzle pieces located outmost may be further assembled on the fixing structure, then the outer puzzle pieces are assembled on the inner puzzle pieces so that the outer puzzle pieces are interlocked to the fixing structure, and the outer puzzle piece may not have any engaging structure on the bottom surface of the top section. As a result, the thickness of the top sections of the outer puzzle pieces may be lowered significantly, and thereby the outer puzzle pieces are easy to be manufactured and processed. Besides, because of the lower thickness, to paint or coat on the inner wall surface of the side section of the outer puzzle piece becomes easier, and the user may assemble the puzzle pieces with more convenience. Therefore, the purpose of the present invention is achieved.

**[0011]** Preferably, in the jigsaw puzzle without a frame, the fixing structure comprises: a pressing surrounding groove on the bottom surface of the fixing structure and adjacent to the lower engaged surrounding groove; the lower engaged surrounding groove surrounding the pressing surrounding groove.

**[0012]** Preferably, in the jigsaw puzzle without a frame, the upper engaging portion of the top section of each one of the outer puzzle pieces is shaped like a flake.

**[0013]** Preferably, in the jigsaw puzzle without a frame:

the fixing structure comprises:

a first engaged portion protruding from an edge of an opening of the lower engaged surrounding groove of the fixing structure;

the at least one bottom section of each one of the outer puzzle pieces comprises:

a second engaged portion protruding from the lower engaging portion of the at least one bottom section;  
when the lower engaging portion is mounted through and interlocked into the lower engaged surrounding groove,  
the second engaged portion is engaged with the first engaged portion.

**[0014]** Preferably, in the jigsaw puzzle without a frame, the at least one side section of each one of the outer puzzle pieces forms:

at least one side mating portion on a verge of the at least one side section; the side sections of each two adjacent ones of the outer puzzle pieces interlocked to each other via the side mating portions.

**[0015]** Preferably, in the jigsaw puzzle without a frame, the fixing structure forms a loop.

**[0016]** Preferably, in the jigsaw puzzle without a frame, the fixing structure comprises:

a plurality of connecting segments; and

a plurality of connecting components; the connecting segments and the connecting components arranged staggered and forming the loop.

**[0017]** Preferably, in the jigsaw puzzle without a frame, each one of the connecting segments comprises:

an inner space; and

two end openings; two ends of each one of the connecting components mounted through and interlocked to two of the connecting segments respectively.

#### In the drawings:

**[0018]**

Fig. 1 is a perspective view of a first embodiment in accordance with the present invention;

Fig. 2 is another perspective view of the first embodiment in accordance with the present invention;

Figs. 3 to 5 are serial assembling views of the first embodiment in accordance with the present invention;

Figs. 6 and 7 are serial and sectional assembling views of the first embodiment in accordance with the present invention;

Fig. 8 is an exploded view of a fixing structure of the first embodiment in accordance with the present invention;

Fig. 9 is a perspective view of a corner connecting component of the first embodiment in accordance with the present invention;

Fig. 10 is another perspective view of the corner connecting component of the first embodiment in accordance with the present invention;

Fig. 11 is a perspective view of a side outer puzzle piece of the first embodiment in accordance with the present invention;

Fig. 12 is another perspective view of the side outer puzzle piece of the first embodiment in accordance with the present invention;

Fig. 13 is a perspective view of a corner outer puzzle piece of the first embodiment in accordance with the present invention;

Fig. 14 is another perspective view of the corner outer puzzle piece of the first embodiment in accordance with the present invention;

|     |                                  |     |                             |
|-----|----------------------------------|-----|-----------------------------|
| 10  | fixing structure                 | 11  | upper joining ring slot     |
| 12  | lower engaged surrounding groove | 13  | connecting segment          |
| 14  | linearity connecting component   | 15  | corner connecting component |
| 16  | first engaged portion            | 17  | pressing surrounding groove |
| 20  | outer puzzle piece               | 21  | top section                 |
| 211 | upper engaging portion           | 212 | upper mating portion        |
| 22  | side section                     | 221 | side mating portion         |
| 23  | bottom section                   | 231 | lower engaging portion      |
| 232 | second engaged portion           | 30  | inner puzzle piece          |

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0019]** The following descriptions illustrate the technical means for achieving the proposed purpose by drawings and the preferred embodiments.

**[0020]** Please refer to Fig. 1 and Fig. 2, a first embodiment of the present invention provides a jigsaw puzzle without a frame, the jigsaw puzzle comprising a fixing structure 10 and a puzzle main body.

**[0021]** Please refer to Fig. 3, Fig. 5, and Fig. 6. The fixing structure 10 comprises an upper joining ring slot 11 and a lower engaged surrounding groove 12. The upper joining ring slot 11 is concaved on a top surface of the fixing structure 10. The lower engaged surrounding groove 12 is concaved on a bottom surface of the fixing structure 10. In this embodiment, both of the upper joining ring slot 11 and the lower engaged surrounding groove 12 are shaped like a rectangular loop corresponding to the shape of the edge of the fixing structure 10; but it is not limited thereto, as the upper joining ring slot 11 and the lower engaged surrounding groove 12 may be circular loops or loops in other shapes.

**[0022]** In this embodiment, the fixing structure 10 is a loop, and is a rectangular loop; but it is not limited thereto, and the fixing structure 10 may be a circular loop or a loop in any other shape. Besides, in another embodiment, the fixing structure may not form a loop, as long as an upper joining ring slot surrounds and is concaved on a top surface of said fixing structure and a lower engaged surrounding groove surrounds and is concaved on a bottom of said fixing structure.

**[0023]** Please refer to Fig. 2 and Figs. 8 to Fig. 10. In this embodiment, the fixing structure 10 forms a loop and further comprises a plurality of connecting segments 13 and a plurality of connecting components 14 and 15. The connecting segments 13 and the connecting components 14 or 15 are staggered and form a loop. Each one of the connecting segments 13 comprises an inner space and two openings at two ends thereof. Two ends of each one of the connecting components 14, 15 are mounted through and interlocked into two of connecting segments 13. In this embodiment, the ends of either of the connecting components 14 and 15 are tightly mounted in the connecting segments 13 so that the connecting component 14 or 15 is assembled on the connecting segment 13. It is not limited thereto, and the connecting components 14 and 15 and the connecting segments 13 may be assembled via other means. In this embodiment, the connecting components 14, 15 may be linear connecting components 14 and corner connecting components 15. Each one of the linear connecting components 14 is configured to connect two of the connecting segments 13 in a straight line. Each one of the corner connecting components 15 is configured to connect two of the connecting segments 13 at the right angle. Therefore, the connecting segments 13 and the connecting components 14, 15 are staggered and form a rectangular loop. The structure of the fixing structure 10 is not limited thereto and may be formed integrally.

**[0024]** Please refer to Fig. 1 to Fig. 3. The puzzle main body comprises a plurality of outer puzzle pieces 20 and a plurality of inner puzzle pieces 30. Each one of the outer puzzle pieces 20 is mounted on the fixing structure 10. The outer puzzle pieces 20 are connected to each other as a loop and thereby enclose an inner space. The inner puzzle pieces 30 are mounted in the inner space enclosed by the outer puzzle pieces 20. The inner puzzle pieces 30 are interlocked to each other, and some of the inner puzzle pieces 30 that are located outmost are interlocked to the outer puzzle pieces 20. In this embodiment, the inner puzzle pieces 30 are shaped like ordinary conventional puzzle pieces so the details of structures thereof are omitted.

**[0025]** Please refer to Fig. 3 and Fig. 6. Each one of the outer puzzle pieces 20 comprises a top section 21, at least one side section 22, and at least one bottom section 23. The side section 22 is tiltably connected to the top section 21. The bottom section 23 is tiltably connected to the side section 22, and the bottom section 23 and the top section 21 are located at two opposite sides of the side section 22.

**[0026]** In this embodiment, the outer puzzle pieces 20 may be divided into side outer puzzle pieces 20 as shown in Fig. 11 and Fig. 12 and corner outer puzzle pieces 20 as shown in Fig. 13 and Fig. 14. The difference between the side outer puzzle pieces 20 and the corner outer puzzle pieces 20 is that each one of the side outer puzzle pieces 20 comprises only one side section 22 and only one bottom section 23, but each one of the corner outer puzzle pieces 20 comprises two side sections 22 and two bottom sections 23. In this embodiment, the two side sections 22 of the corner outer puzzle piece 20 are respectively connected to two sides of the top section 21 and said two sides are perpendicular to each other. Therefore, the jigsaw puzzle may be a rectangle, but it is not limited thereto. If an angle between the two sides, configured to be respectively connected to the two side sections 22, of the top section 21 is smaller than 90 degrees or larger than 90 degrees, the jigsaw puzzle may be a triangle, a pentagon, etc.

**[0027]** Please refer to Figs. 3 to 7 and Fig. 12. The top section 21 of each one of the outer puzzle pieces 20 abuts the top surface of the fixing structure 10. The top section 21 comprises an upper engaging portion 211. The upper engaging portion 211 protrudes from a bottom surface of the top section 21 and is mounted through and interlocked into the upper joining ring slot 11 of the fixing structure 10. In this embodiment, the upper engaging portion 211 is shaped like a flake and is clamped tightly in the upper joining ring slot 11, but it is not limited thereto. The top section 21 comprises at least one upper mating portion 212. The at least one upper mating portion 212 forms on a verge of the top section 21. The top sections 21 of each two adjacent ones of the outer puzzle pieces 20 are interlocked via the upper mating portions 212. In this embodiment, the top section 21 comprises two upper mating portions 212; the two upper mating portions 212 of the top section 21 of the side outer puzzle piece 20 are located on two opposite lateral sides of said top section

21 (as shown in Fig. 11 and Fig. 12); the two upper mating portions 212 of the top section 21 of the corner outer puzzle piece 20 are located on two sides of top section 21 and said sides are perpendicular to each other (as shown in Fig. 13 and Fig. 14); the number and the location of the upper mating portion 212 are not limited thereto.

**[0028]** The side section 22 comprises an inner wall surface and an outer wall surface opposite to each other. The side section 22 can be tilted with respect to the top section 21 so that the outer wall surface of the side section 22 is parallel to the top surface of the top section 21. The side section 22 also can be tilted with respect to the top section 21 so that the inner wall surface of the side section 22 abuts a side surface of the fixing structure 10. In this embodiment, the side section 22 comprises at least one side mating portion 221. The at least one side mating portion 221 forms on a verge of the side section 22. The side sections 22 of each two adjacent ones of the outer puzzle pieces 20 are interlocked via the side mating portions 221. Precisely, the side section 22 of the side outer puzzle piece 20 comprises two side mating portions 221 and the two side mating portions 221 are located on two opposite lateral sides of said side section 22; each one of the side sections 22 of the corner outer puzzle piece 20 comprises a side mating portion 221 and the side mating portion 221 is located on a lateral outer side of the side section 22. However, the number and location of the side mating portion 221 are not limited thereto, and the side section 22 may not comprises any side mating portion 221.

**[0029]** The bottom section 23 comprises an inner wall surface and an outer wall surface opposite each other. The bottom section 23 comprises a lower engaging portion 231. The lower engaging portion 231 protrudes from the inner wall surface. The bottom section 23 can be tilted with respect to the side section 22 so that the outer wall surface of the bottom section 23 is parallel to the outer wall surface of the side section 22. The bottom section 23 also can be tilted with respect to the side section 22 so that the lower engaging portion 231 of the bottom section 23 is mounted through and interlocked into the lower engaged surrounding groove 12 of the fixing structure 10.

**[0030]** In this embodiment, a second engaged portion 232 protrudes from an end of the lower engaging portion 231, and the fixing structure 10 has a first engaged portion 16 protruding from an edge of an opening of the lower engaged surrounding groove 12. When the lower engaging portion 231 of the bottom section 23 is mounted through and interlocked into the lower engaged surrounding groove 12, the second engaged portion 232 of the lower engaging portion 231 engages with the first engaged portion 16 of the lower engaged surrounding groove 12, so that the bottom section 23 is fixed on the fixing structure 10 stably. However, the fixing means of the lower engaging portion 231 and the lower engaged surrounding groove 12 is not limited thereto.

**[0031]** Besides, in this embodiment, the fixing structure 10 further comprises a pressing surrounding groove 17. The pressing surrounding groove 17 is concaved on a bottom surface of the fixing structure 10 and is adjacent to the lower engaged surrounding groove 12. The lower engaged surrounding groove 12 surrounds the pressing surrounding groove 17. With the pressing surrounding groove 17 forming a space, the walls of the lower engaged surrounding groove 12 can deform inward, and thus the lower engaging portion 231 can be mounted through and interlocked into the lower engaged surrounding groove 12.

**[0032]** Please refer to Fig. 1 and Fig. 3. A pattern is continuously formed on the top surface of the top section 21 of the outer puzzle piece 20, the outer wall surface of the side section 22 of the outer puzzle piece 20, and a top surface of the inner puzzle piece 30 and thereby a pattern of the jigsaw puzzle is formed. It is to be emphasized that the pattern can be formed via painting or coating. In addition, patterns on the top surface of the top section 21 of the outer puzzle piece 20, patterns on the outer wall surface of the side section 22 of the outer puzzle piece 20, and patterns on the top surface of the inner puzzle piece 30 may be continuous or non-continuous with respect to each other. The key point is that areas are formed on the top surface of the top section 21 of the outer puzzle piece 20, the outer wall surface of the side section 22 of the outer puzzle piece 20, and the top surface of the inner puzzle piece 30 respectively and thereby the areas are connected to each other, so that the pattern can be formed on the areas.

**[0033]** Please refer to Fig. 3 and Fig. 6. When a user assembles the jigsaw puzzle of the present invention, at the top section 21 of the outer puzzle piece 20, the upper engaging portion 211 is mounted through and interlocked into the upper joining ring slot 11 of the fixing structure 10, and the upper mating portion 212 of one of the top sections 21 is interlocked to the upper mating portion 212 of the top section 21 of another outer puzzle piece 20 at the same time. Then, please refer to Fig. 4, the side sections 22 are tilted sequentially so that the side mating portion 221 of each side section 22 is interlocked to the side mating portion 221 of the side section 22 of another outer puzzle piece 20. At last, please refer to Fig. 5 and Fig. 7. The bottom section 23 is bent so that the lower engaging portion 231 of the bottom section 23 is mounted through and interlocked into the lower engaged surrounding groove 12 on the bottom surface of the fixing structure 10, and then assembly of one outer puzzle piece 20 is accomplished. The assembly process is not limited thereto and can be changed.

**[0034]** In the present invention, with the outer puzzle pieces 20 mounted on and interlocked to the fixing structure 10, and the side section 22 of the outer puzzle piece 20 assembled on the side surface of the fixing structure 10 (in the second, fourth, and sixth embodiments) or the bottom section 23 of the outer puzzle piece 20 assembled on the bottom surface of the fixing structure 10 (in the first, third, and fifth embodiments), the bottom surface of the top section 21 of the outer puzzle piece 20 may slightly protrude to interlock the fixing structure 10 (i.e. on the upper engaging portion 211). Thus, the thickness of the top sections 21 of the outer puzzle pieces 20 may be lowered. Or, if the outmost inner

puzzle pieces 30 are assembled on the fixing structure 10 and the outer puzzle pieces 20 are interlocked to the inner puzzle piece 30 to be indirectly assembled on the fixing structure 10 (in the fifth and sixth embodiments), the outer puzzle piece 20 may not comprise any structure for interlocking on the bottom surface of the top section 21, which further lowers the thickness of the top section 21 of the outer puzzle piece 20. With the lower thickness of the top section 21, the outer puzzle pieces 20 are easy to be fixed, manufactured, and processed. Besides, because of the lower thickness of the top section 21, to paint or coat on the inner wall surface of the side section 22 of the outer puzzle piece 20 becomes easier, and the user may assemble the jigsaw puzzle with more convenience. Therefore, the purpose of the present invention is achieved.

**[0035]** In addition, when the side sections 22 of an entire row of outer puzzle pieces 20 are tilted upward to be painted or coated, because the side sections 22 of each two adjacent ones of the outer puzzle piece 20 are interlocked (via the side mating portions 221), the adjacent two side sections 22 may not stagger, which prevents that the painting or coating pattern is displaced or not flat.

**[0036]** Finally, with the fixing structure 10 forming a loop and composed by a plurality of the connecting segments 13 and a plurality of the connecting components 14 and 15, the connecting segments 13 and the connecting components 14 and 15 can be stored in a smaller casing rather than a casing according to the dimensions of the assembled fixing structure 10, which decreases the volume of the packaged jigsaw puzzle of the present invention.

**[0037]** The foregoing description is only preferred embodiments of the present invention and is not configured to restrict the present invention. Anyone skilled in the same technical field of the present invention with normal technical ability can use the disclosure above to make changes or modifications to equivalent embodiment without departing from the technical field of the present invention. The scope of the invention is defined by the appended claims.

## Claims

1. A jigsaw puzzle without a frame **characterized in that** the jigsaw puzzle comprises:

a fixing structure (10) comprising:

an upper joining ring slot (11) concaved on a top surface of the fixing structure (10); and

a lower engaged surrounding groove (12) concaved on a bottom surface of the fixing structure (10);

a puzzle main body comprising:

a plurality of outer puzzle pieces (20) mounted on the fixing structure (10); the outer puzzle pieces (20) connected with each other as a loop thereby enclosing an inner space; each one of the outer puzzle pieces (20) comprising:

a top section (21) comprising:

an upper engaging portion (211) protruding from a bottom surface of the top section (21); the upper engaging portion (211) mounted through and interlocked into the upper joining ring slot (11) of the fixing structure (10); and

at least one upper mating portion (212) on a verge of the top section (21); the top sections (21) of each two adjacent ones of the outer puzzle pieces (20) interlocked to each other via the upper mating portions (212);

at least one side section (22) tiltably connected to the verge of the top section (21), each one of the at least one side section (22) comprising:

an inner wall surface and an outer wall surface opposite each other; the at least one side section (22) being capable of being tilted so that the outer wall surface of the at least one side section (22) is parallel to a top surface of the top section (21) and the inner wall surface of the at least one side section (22) abuts a side surface of the fixing structure (10);

at least one bottom section (23) tiltably connected to the at least one side section (22); the top section (21) and the at least one bottom section (23) located on two opposite sides of the at least one side section (22); each one of the at least one bottom section (23) comprising:

an inner wall surface and an outer wall surface opposite each other; the at least one bottom section (23) being capable of being tilted so that the outer wall surface of the at least one bottom section

(23) is parallel to the outer wall surface of the at least one side section (22);  
a lower engaging portion (231) protruding from the inner wall surface of the at least one bottom  
section (23); the at least one bottom section (23) being capable of being tilted so that the lower  
engaging portion (231) of the at least one bottom section (23) is mounted through and interlocked  
into the lower engaged surrounding groove (12) of the fixing structure (10);

a plurality of inner puzzle pieces (30) mounted within the inner space enclosed by the outer puzzle pieces  
(20); the inner puzzle pieces (30) interlocked to each other and some of the inner puzzle pieces (30)  
interlocked to the outer puzzle pieces (20);

wherein a pattern is formed on the top surfaces of the top sections (21) of the outer puzzle pieces (20), the  
outer wall surfaces of the side sections (22) of the outer puzzle pieces (20), and top surfaces of the inner puzzle  
pieces (30).

**2.** The jigsaw puzzle without a frame as claimed in claim 1, wherein the fixing structure (10) comprises:  
a pressing surrounding groove (17) on the bottom surface of the fixing structure (10) and adjacent to the lower  
engaged surrounding groove (12); the lower engaged surrounding groove (12) surrounding the pressing surrounding  
groove (17).

**3.** The jigsaw puzzle without a frame as claimed in claim 1, wherein the upper engaging portion (211) of the top section  
(21) of each one of the outer puzzle pieces (20) is shaped like a flake.

**4.** The jigsaw puzzle without a frame as claimed in claim 1, wherein:

the fixing structure (10) comprises:

a first engaged portion (16) protruding from an edge of an opening of the lower engaged surrounding groove  
(12) of the fixing structure (10);

the at least one bottom section (23) of each one of the outer puzzle pieces (20) comprises:

a second engaged portion (232) protruding from the lower engaging portion (231) of the at least one bottom  
section (23);

when the lower engaging portion (231) is mounted through and interlocked into the lower engaged sur-  
rounding groove (12), the second engaged portion (232) is engaged with the first engaged portion (16).

**5.** The jigsaw puzzle without a frame as claimed in claim 1, wherein the at least one side section (22) of each one of  
the outer puzzle pieces (20) forms:

at least one side mating portion (221) on a verge of the at least one side section (22); the side sections (22) of each  
two adjacent ones of the outer puzzle pieces (20) interlocked to each other via the side mating portions (221).

**6.** The jigsaw puzzle without a frame as claimed in claim 1, wherein the fixing structure (10) is a loop.

**7.** The jigsaw puzzle without a frame as claimed in claim 6, wherein the fixing structure (10) comprises:

a plurality of connecting segments (13); and

a plurality of connecting components (14, 15); the connecting segments (13) and the connecting components  
(14, 15) arranged staggered and forming the loop.

**8.** The jigsaw puzzle without a frame as claimed in claim 7, wherein each one of the connecting segments (13) comprises:

an inner space; and

two end openings; two ends of each one of the connecting components (14, 15) mounted through and interlocked  
to two of the connecting segments (13) respectively.

## Patentansprüche

### 1. Rahmenloses Puzzle, **dadurch gekennzeichnet, dass** das Puzzle umfasst:

- 5 eine Befestigungsstruktur (10), umfassend:
- einen oberen Verbindungsringsschlitz (11), der an einer obere Fläche der Befestigungsstruktur eingekerbt ist; und
- 10 eine untere eingegriffene umlaufende Nut (12), die an einer unteren Fläche der Befestigungsstruktur (10) eingekerbt ist;
- einen Puzzle-Hauptkörper, der umfasst:
- eine Vielzahl von äußeren Puzzlestücken (20), die an der Befestigungsstruktur (10) angebracht sind; wobei
- 15 die äußeren Puzzlestücke (20) miteinander als eine Umführung verbunden sind, wodurch ein Innenraum umschlossen wird; wobei jedes der äußeren Puzzlestücke (20) umfasst:
- einen oberen Bereich (21), der umfasst:
- 20 einen oberen Eingriffsabschnitt (211), der von einer unteren Fläche des oberen Bereichs (21) vorsteht; wobei der obere Eingriffsabschnitt (211) durch den oberen Verbindungsringsschlitz (11) der Befestigungsstruktur (10) hindurch montiert und darin ineinandergegriffen ist; und
- wenigstens einen oberen Passabschnitt (212) an einer Kante des oberen Bereichs (21); die oberen
- 25 Bereiche (21) von jeweils zwei benachbarten der äußeren Puzzlestücke (20) über die oberen Passabschnitte (212) miteinander ineinandergegriffen sind;
- wenigstens einen Seitenbereich (22), der kippbar mit der Kante des oberen Bereichs (21) verbunden ist, wobei jeder des wenigstens einen Seitenbereichs (22) umfasst:
- eine Innenwandfläche und eine Außenwandfläche, die einander gegenüberliegen; wobei der wenigstens
- 30 einen Seitenbereich (22) so geneigt werden kann, dass die Außenwandfläche des wenigstens einen Seitenbereichs (22) parallel zu einer oberen Fläche des oberen Bereichs (21) verläuft und die Innenwandfläche des wenigstens einen Seitenbereichs (22) an einer Seitenfläche der Befestigungsstruktur (10) anliegt;
- wenigstens einen unteren Bereich (23), der kippbar mit dem wenigstens einen Seitenbereich (22)
- 35 verbunden ist; wobei der obere Bereich (21) und der wenigstens eine untere Bereich (23) sich auf zwei gegenüberliegenden Seiten des wenigstens einen Seitenbereichs (22) befinden; wobei jeder des wenigstens einen unteren Bereichs (23) umfasst:
- eine Innenwandfläche und eine Außenwandfläche, die einander gegenüberliegen; wobei der wenigstens
- 40 einen unteren Bereich (23) so gekippt werden kann, dass die Außenwandfläche des wenigstens einen unteren Bereichs (23) parallel zur Außenwandfläche des wenigstens einen Seitenbereichs (22) verläuft;
- einen unteren Eingriffsabschnitt (231), der von der Innenwandfläche des wenigstens einen unteren
- 45 Bereichs (23) vorsteht; wobei der wenigstens eine untere Bereich (23) so gekippt werden kann, dass der untere Eingriffsabschnitt (231) des wenigstens einen unteren Bereichs (23) durch die untere eingegriffene umlaufende Nut (12) der Befestigungsstruktur (10) hindurch montiert und darin ineinandergegriffen wird;
- eine Vielzahl von inneren Puzzlestücken (30), die in dem von den äußeren Puzzlestücken (20) eingeschlos-
- 50 senen Innenraum angebracht sind; wobei die inneren Puzzlestücke (30) miteinander ineinandergegriffen sind und einige der inneren Puzzlestücke (30) mit den äußeren Puzzlestücken (20) ineinandergegriffen sind;
- wobei ein Muster auf den oberen Flächen der oberen Bereiche (21) der äußeren Puzzlestücke (20), den Außenwandflächen der Seitenbereiche (22) der äußeren Puzzlestücke (20) und den oberen Flächen der inneren
- 55 Puzzlestücke (30) gebildet wird.

### 2. Rahmenloses Puzzle gemäß Anspruch 1, wobei die Befestigungsstruktur (10) umfasst: eine umlaufende Pressnut (17) auf der unteren Fläche der Befestigungsstruktur (10) und angrenzend an die untere

eingegriffene umlaufende Nut (12); die untere eingegriffene umlaufende Nut (12) die umlaufende Pressnut (17) umgibt.

3. Rahmenloses Puzzle gemäß Anspruch 1, wobei der obere Eingriffsabschnitt (211) des oberen Bereichs (21) jedes der äußeren Puzzlestücke (20) die Form einer Flocke aufweist.

4. Rahmenloses Puzzle gemäß Anspruch 1, wobei:

die Befestigungsstruktur (10) umfasst:

einen ersten Eingriffsabschnitt (16), der aus einer Kante einer Öffnung der unteren eingegriffenen umlaufenden Nut (12) der Befestigungsstruktur (10) herausragt;

der wenigstens eine untere Bereich (23) jedes der äußeren Puzzlestücke (20) umfasst:

einen zweiten Eingriffsabschnitt (232), der aus dem unteren Eingriffsabschnitt (231) des wenigstens einen unteren Bereichs (23) herausragt;

wenn der untere Eingriffsabschnitt (231) durch die untere eingegriffene umlaufende Nut (12) hindurch montiert und darin ineinandergreift, der zweite Eingriffsabschnitt (232) mit dem ersten Eingriffsabschnitt (16) in Eingriff ist.

5. Rahmenloses Puzzle gemäß Anspruch 1, wobei der wenigstens eine Seitenbereich (22) jedes der äußeren Puzzlestücke (20) ausbildet:

wenigstens einen seitlichen Verbindungsabschnitt (221) an einer Kante des wenigstens einen Seitenbereichs (22); die Seitenbereiche (22) von jeweils zwei benachbarten der äußeren Puzzlestücke (20) über die seitlichen Passabschnitte (221) miteinander eingegriffen sind.

6. Rahmenloses Puzzle gemäß Anspruch 1, wobei die Befestigungsstruktur (10) eine Umführung ist.

7. Rahmenloses Puzzle gemäß Anspruch 6, wobei die Befestigungsstruktur (10) umfasst:

eine Vielzahl von Verbindungssegmenten (13); und

eine Vielzahl von Verbindungselementen (14, 15); die Verbindungssegmente (13) und die Verbindungselemente (14, 15) versetzt angeordnet sind und die Umführung bilden.

8. Rahmenloses Puzzle gemäß Anspruch 7, wobei jedes der Verbindungssegmente (13) umfasst:

einen Innenraum; und

zwei Endöffnungen; zwei Enden jedes der Verbindungselemente (14, 15) jeweils durch zwei der Verbindungssegmente (13) hindurchgeführt und mit diesen ineinandergreifend sind.

## Revendications

1. Puzzle sans cadre, **caractérisé en ce que** le puzzle comprend :

une structure de fixation (10) comprenant :

une fente d'anneau de jonction supérieure (11) concave sur une surface supérieure de la structure de fixation (10) ; et

une rainure périphérique engagée inférieure (12) concave sur une surface inférieure de la structure de fixation (10) ;

un corps principal de puzzle comprenant :

une pluralité de pièces de puzzle externes (20) montées sur la structure de fixation (10) ; les pièces de puzzle externes (20) étant connectées entre elles en formant une boucle qui entoure ainsi un espace interne ; chacune des pièces de puzzle externes (20) comprenant :

une section supérieure (21) comprenant :

une portion d'engagement supérieure (211) faisant saillie depuis une surface inférieure de la section supérieure (21) ; la portion d'engagement supérieure (211) étant montée à travers, et verrouillée dans,

la fente d'anneau de jonction supérieure (11) de la structure de fixation (10) ; et  
 au moins une portion d'accouplement supérieure (212) sur un rebord de la section supérieure (21) ;  
 les sections supérieures (21) de chaque paire de pièces adjacentes des pièces de puzzle externes  
 (20) étant verrouillées entre elles via les portions d'accouplement supérieures (212) ;  
 au moins une section latérale (22) connectée de manière inclinable au rebord de la section supérieure  
 (21), chacune desdites au moins une sections latérales (22) comprenant :

une surface de paroi interne et une surface de paroi externe opposées entre elles ; lesdites au  
 moins une sections latérales (22) pouvant être inclinées de sorte que la surface de paroi externe  
 desdites au moins une sections latérales (22) est parallèle à une surface supérieure de la section  
 supérieure (21) et que la surface de paroi interne desdites au moins une sections latérales (22)  
 vient à butée contre une surface latérale de la structure de fixation (10) ;  
 au moins une section inférieure (23) connectée de manière inclinable auxdites au moins une  
 sections latérales (22) ; la section supérieure (21) et lesdites au moins une sections inférieures  
 (23) étant situées sur deux côtés opposés desdites au moins une sections latérales (22) ; chacune  
 desdites au moins une sections inférieures (23) comprenant :

une surface de paroi interne et une surface de paroi externe opposées entre elles ; lesdites  
 au moins une sections inférieures (23) pouvant être inclinées de telle sorte que la surface de  
 paroi externe desdites au moins une sections inférieures (23) soit parallèle à la surface de  
 paroi externe desdites au moins une sections latérales (22) ;  
 une portion d'engagement inférieure (231) faisant saillie depuis la surface de paroi interne  
 desdites au moins une sections inférieures (23) ; lesdites au moins une sections inférieures  
 (23) pouvant être inclinées de telle sorte que la portion d'engagement inférieure (231) desdites  
 au moins une sections inférieures (23) est montée à travers, et verrouillée dans, la rainure  
 périphérique engagée inférieure (12) de la structure de fixation (10) ;  
 une pluralité de pièces de puzzle internes (30) montées dans l'espace interne entouré par les  
 pièces de puzzle externes (20) ; les pièces de puzzle internes (30) étant verrouillées entre  
 elles et certaines des pièces de puzzle internes (30) étant verrouillées aux pièces de puzzle  
 externes (20) ;  
 dans lequel un motif est formé sur les surfaces supérieures des sections supérieures (21) des  
 pièces de puzzle externes (20), sur les surfaces de paroi externes des sections latérales (22)  
 des pièces de puzzle externes (20), et sur les surfaces supérieures des pièces de puzzle  
 internes (30).

2. Puzzle sans cadre selon la revendication 1, dans lequel la structure de fixation (10) comprend :  
 une rainure périphérique de compression (17) sur la surface inférieure de la structure de fixation (10) et adjacente  
 à la rainure périphérique engagée inférieure (12) ; la rainure périphérique engagée inférieure (12) entourant la  
 rainure périphérique de compression (17).

3. Puzzle sans cadre selon la revendication 1, dans lequel la portion d'engagement supérieure (211) de la section  
 supérieure (21) de chacune des pièces de puzzle externes (20) est conformée comme une lamelle.

4. Puzzle sans cadre selon la revendication 1, dans lequel :  
 la structure de fixation (10) comprend :

une première portion engagée (16) faisant saillie depuis un bord d'une ouverture de la rainure périphérique  
 engagée inférieure (12) de la structure de fixation (10) ;  
 lesdites au moins une sections inférieures (23) de chacune des pièces de puzzle externes (20) comprennent :

une deuxième portion engagée (232) faisant saillie depuis la portion d'engagement inférieure (231) desdites  
 au moins une sections inférieures (23) ;  
 quand la portion d'engagement inférieure (231) est montée à travers, et verrouillée dans, la rainure péri-  
 phérique engagée inférieure (12), la deuxième portion engagée (232) est engagée avec la première portion  
 engagée (16).

5. Puzzle sans cadre selon la revendication 1, dans lequel lesdites au moins une sections latérales (22) de chacune  
 des pièces de puzzle externes (20) forment :

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au moins une portion d'accouplement latérale (221) sur un rebord desdites au moins une sections latérales (22) ; les sections latérales (22) de chaque paire de pièces adjacentes des pièces de puzzle externes (20) étant verrouillées entre elles via les portions d'accouplement latérales (221).

- 5      **6.** Puzzle sans cadre selon la revendication 1, dans lequel la structure de fixation (10) est une boucle.
7. Puzzle sans cadre selon la revendication 6, dans lequel la structure de fixation (10) comprend :
- 10          une pluralité de segments de connexion (13) ; et  
            une pluralité de composants de connexion (14, 15) ;  
            les segments de connexion (13) et les composants de connexion (14, 15) étant répartis et formant la boucle.
- 8.** Puzzle sans cadre selon la revendication 7, dans lequel chacun des segments de connexion (13) comprend :
- 15          un espace interne ; et  
            deux ouvertures d'extrémité ;  
            deux extrémités de chacun des composants de connexion (14, 15) étant respectivement montées à travers, et  
            verrouillées avec, deux des segments de connexion (13).
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- 25
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- 35
- 40
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- 55

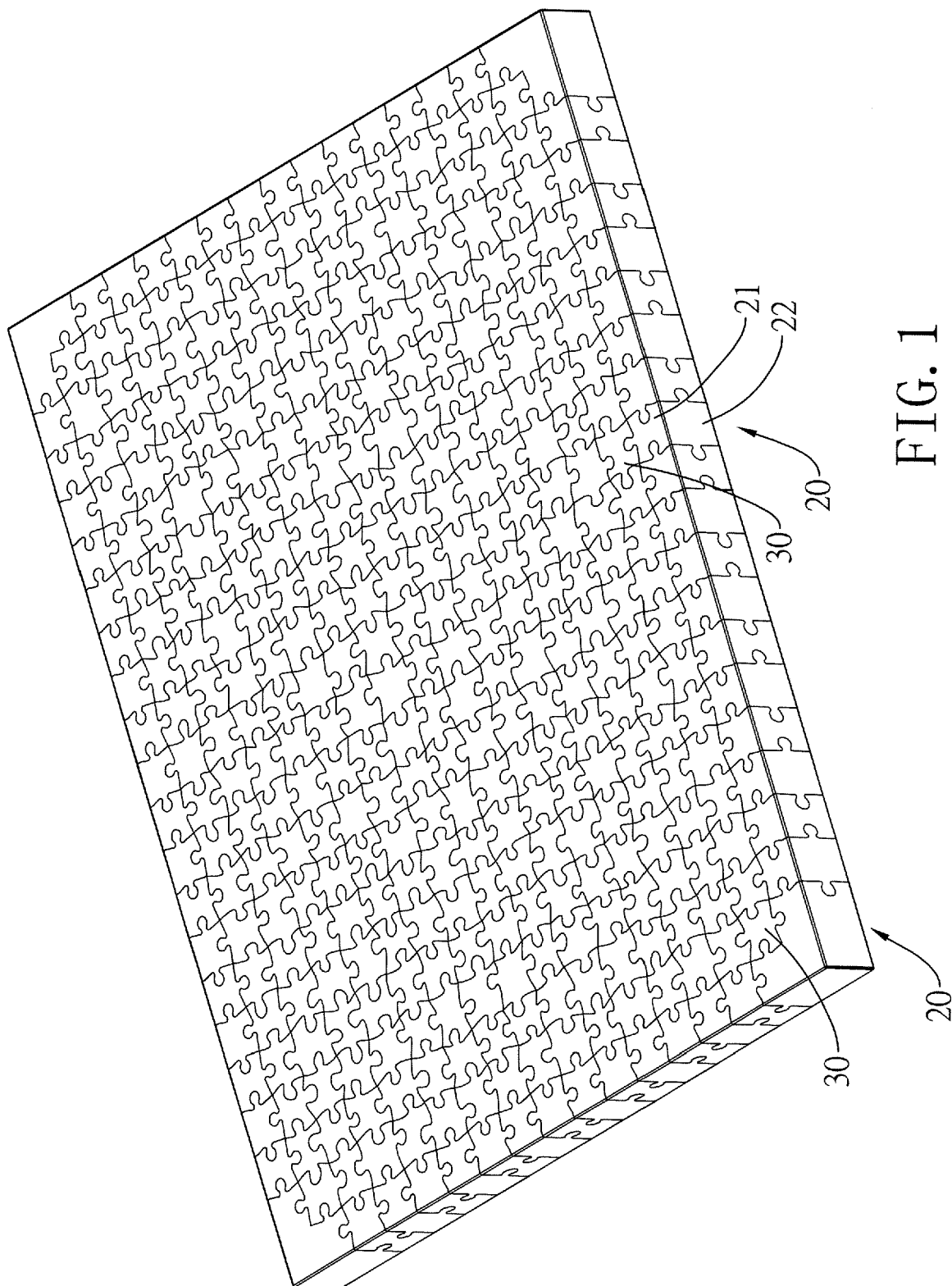


FIG. 1

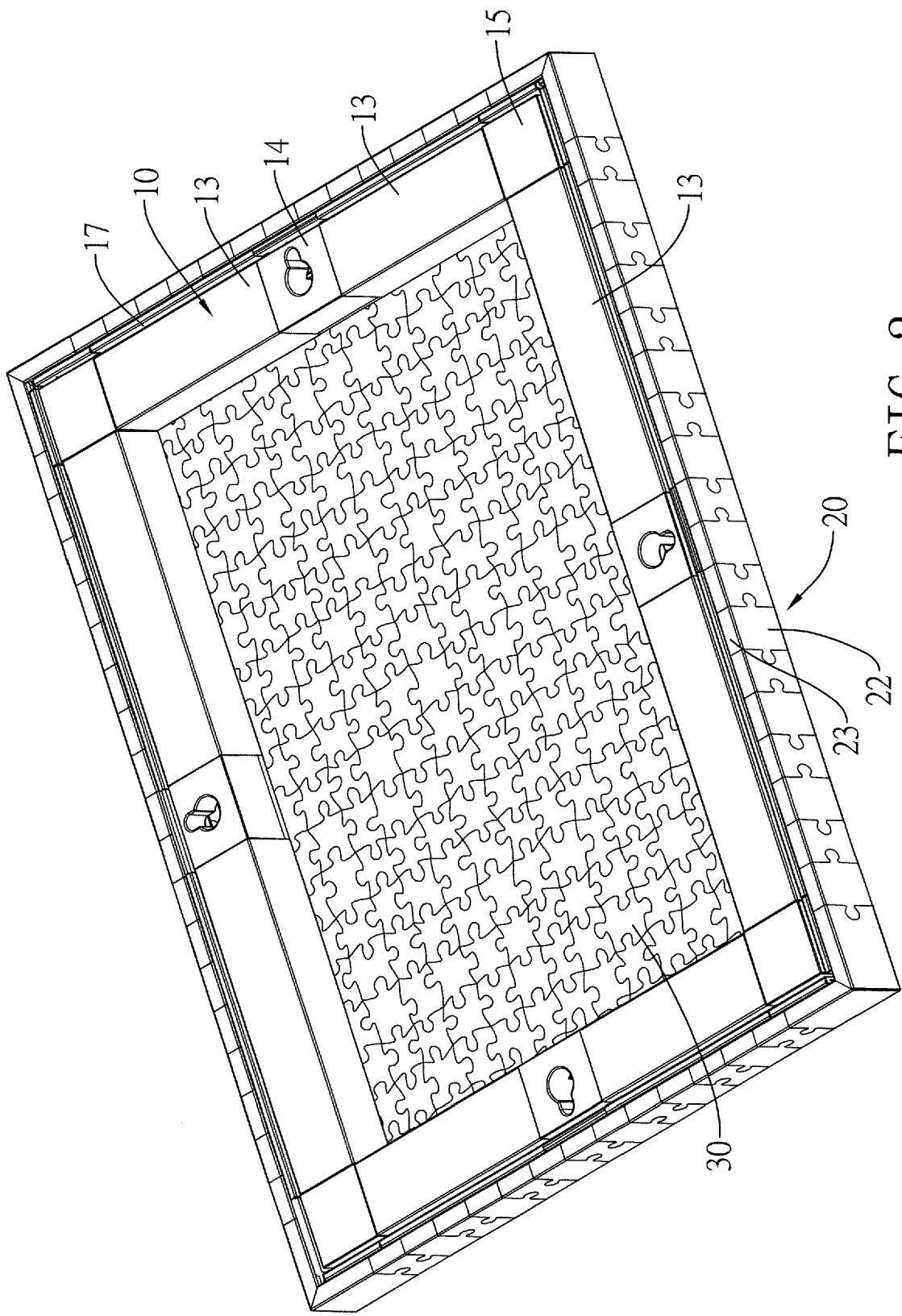


FIG. 2

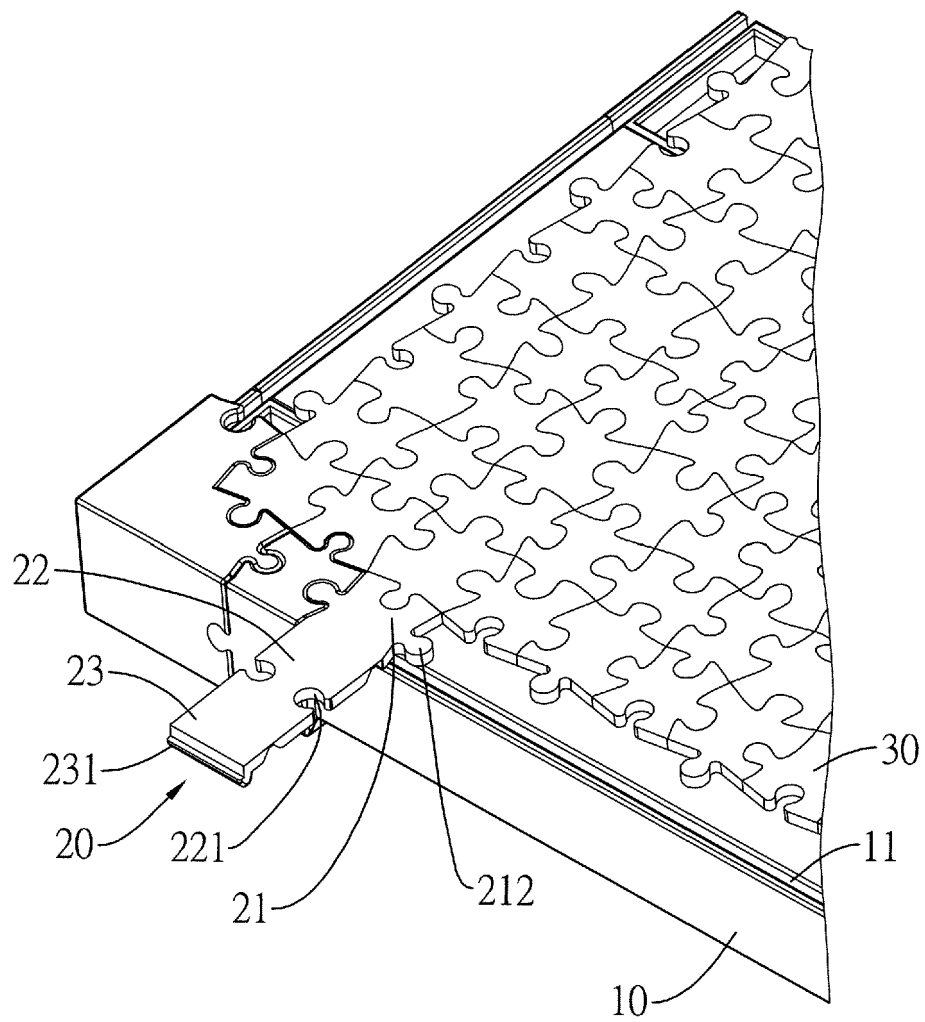


FIG. 3

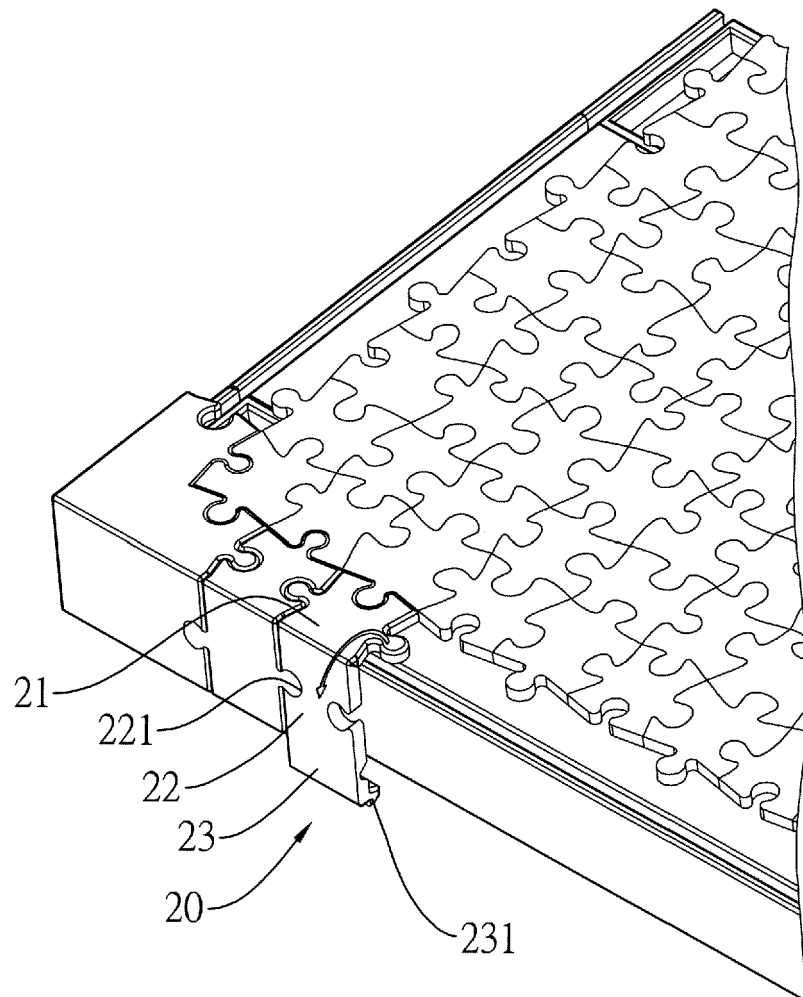


FIG. 4

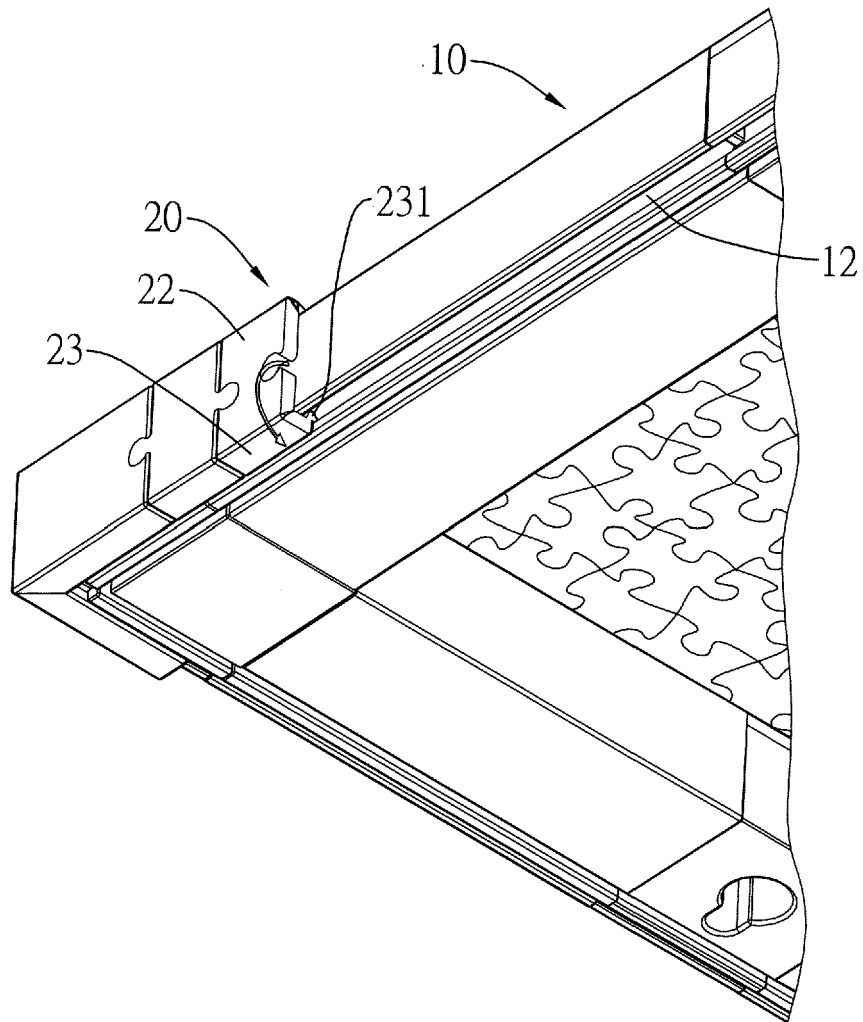


FIG. 5

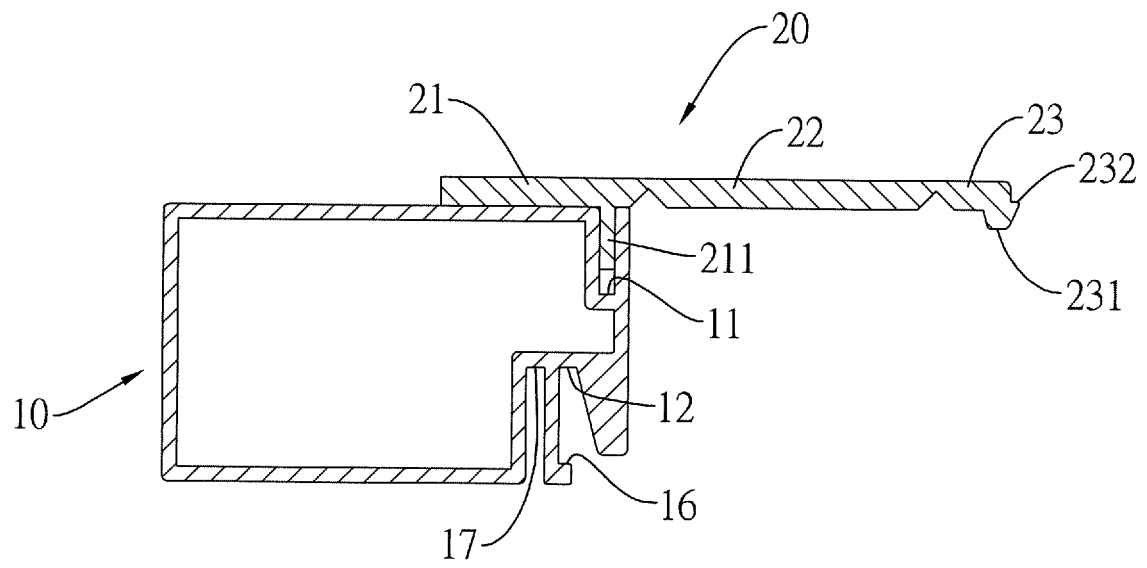


FIG. 6

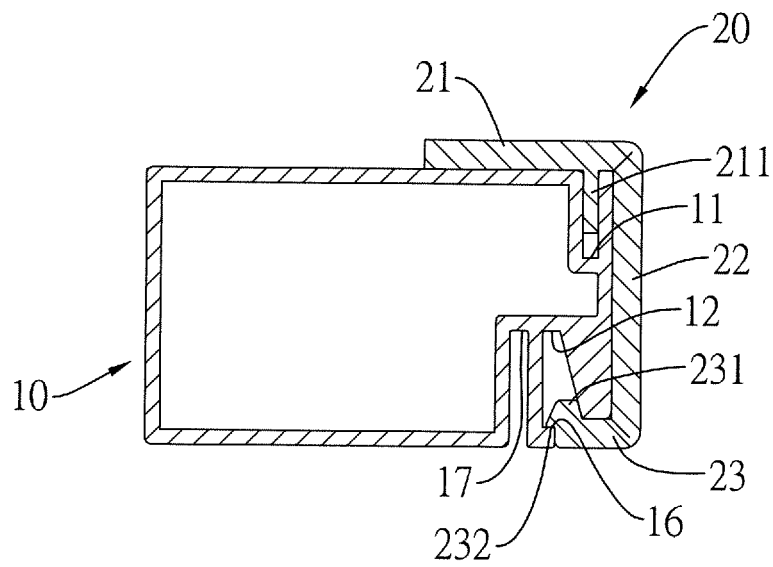


FIG. 7

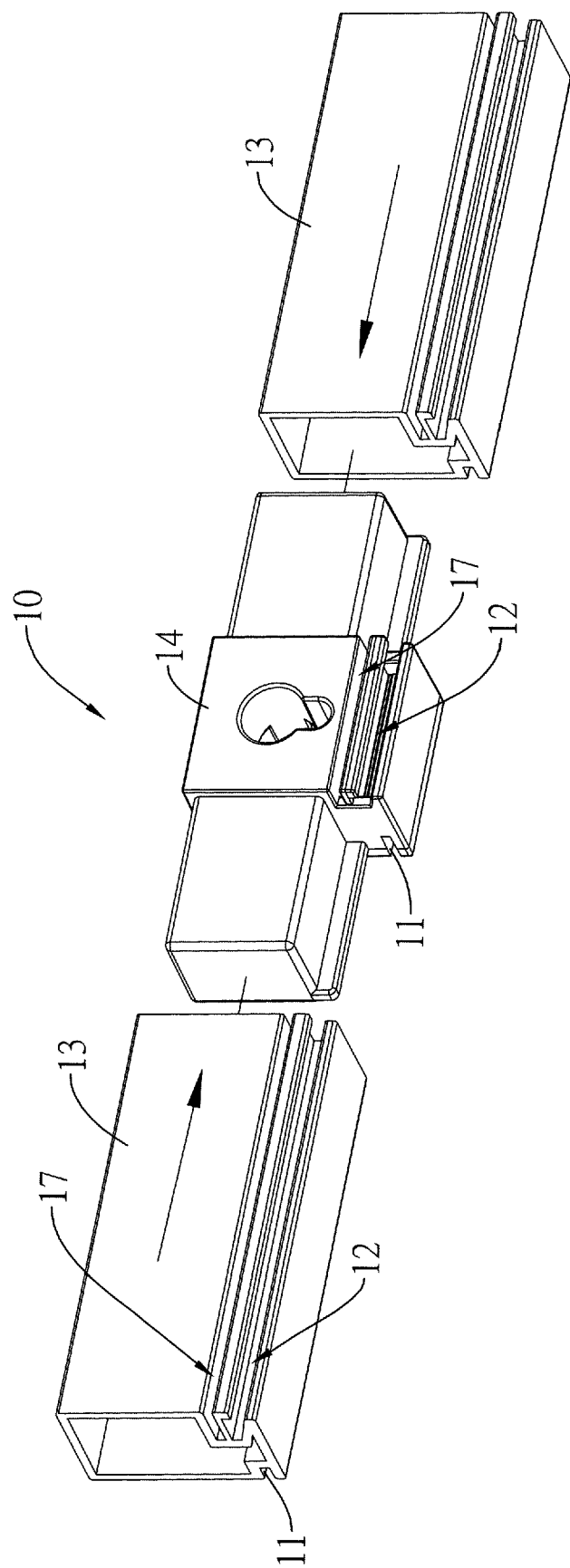


FIG. 8

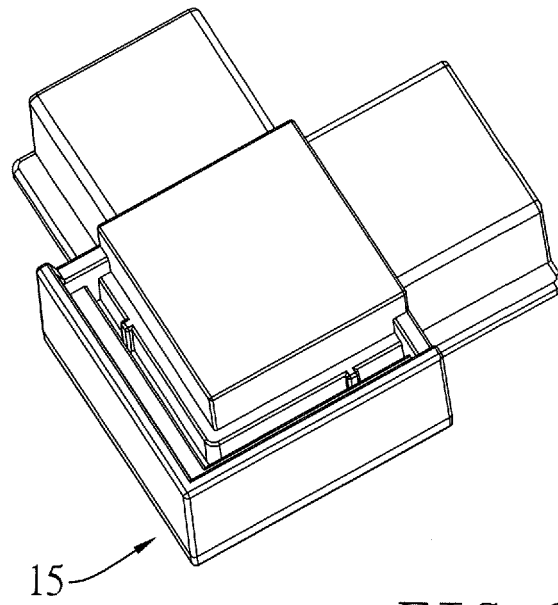


FIG. 9

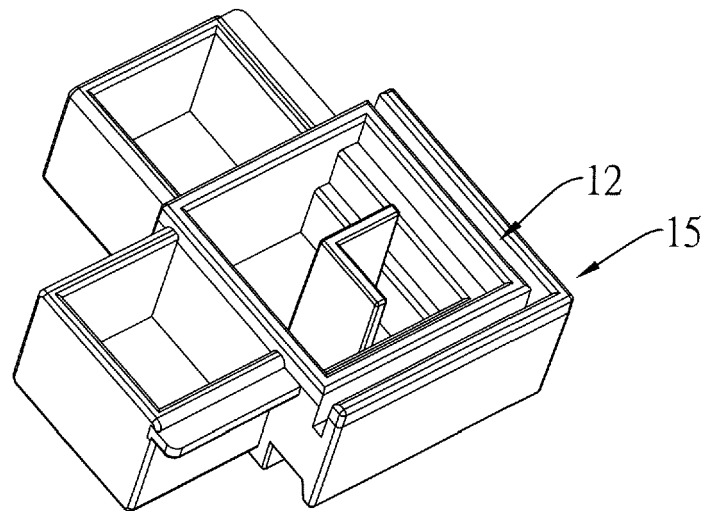


FIG. 10

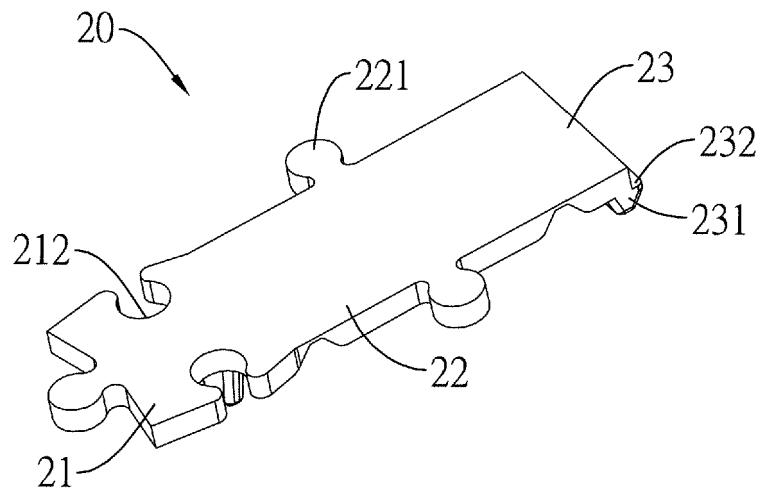


FIG. 11

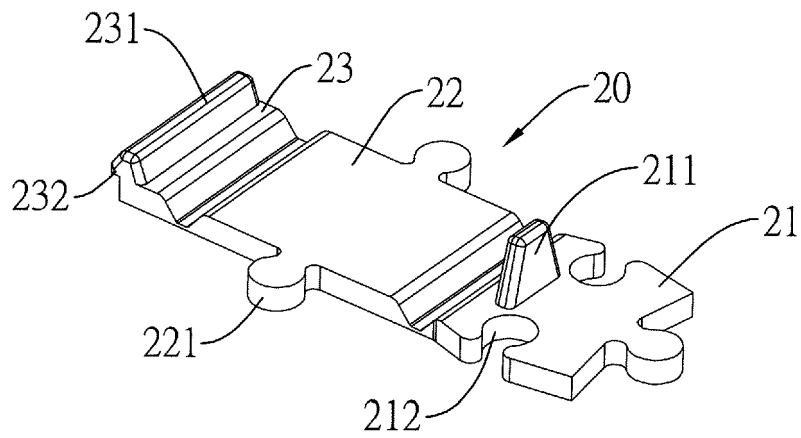


FIG. 12

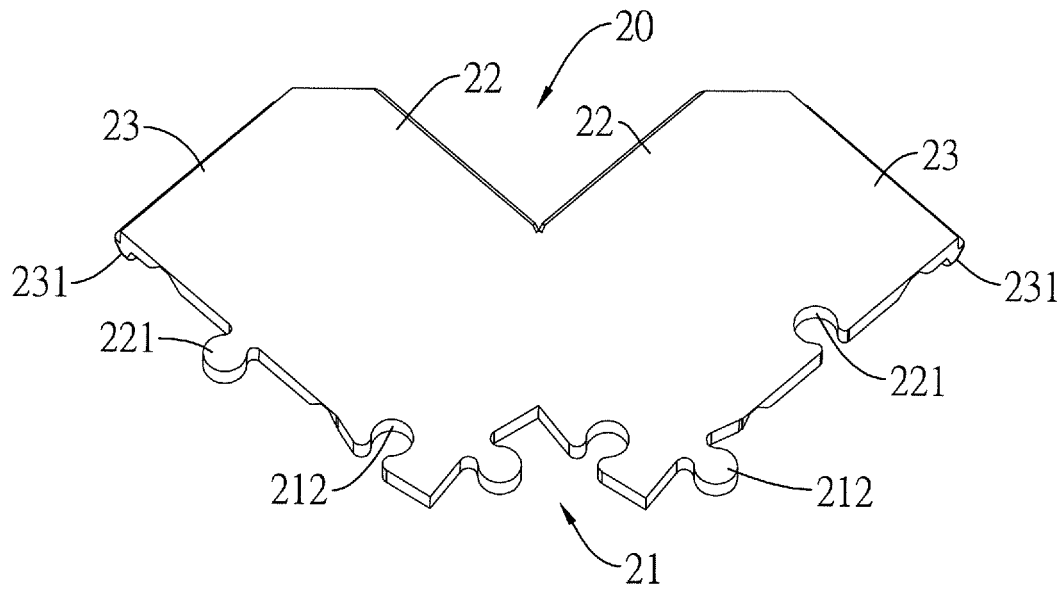


FIG. 13

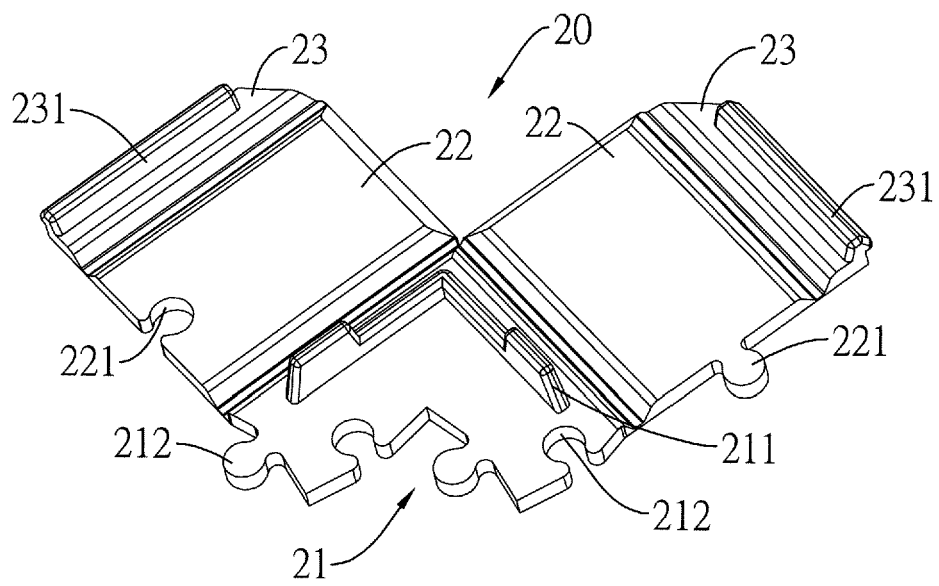


FIG. 14

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- CN 206715281 U [0002]