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

(11) EP 3 345 732 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
11.07.2018 Bulletin 2018/28

(51) Int Cl.:
B26F 1/44 *(2006.01)* ***C14B 5/02*** *(2006.01)*
B26F 1/22 *(2006.01)*

(21) Application number: **17207779.4**

(22) Date of filing: **15.12.2017**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD TN

(30) Priority: **04.01.2017 TW 106200077 U**

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(54) CUTTING STRUCTURE FOR ASSISTING THE CURVATURE OF A FLEXIBLE SHEET TO FORM A STEREOSCOPIC CONTOUR

(57) A cutting structure is provided for forming on the bent position of a flexible sheet. The cutting structure has two parallel cutting paths. Each of the cutting paths has a plurality of cutting sections adjacently arranged at intervals to each other. Each cutting section is of a linear shape to cut through the flexible sheet. The cutting sections on the cutting path are laterally offset with respect to the cutting sections on another cutting path. The two ends of the cutting sections of two parallel cutting paths are oppositely interlaced without connecting to each other. While the cutting structures are correspondingly formed on the bent positions of the flexible sheet to assist the curvature of the bent position, the flexible sheet can be formed into a stereoscopic contour.

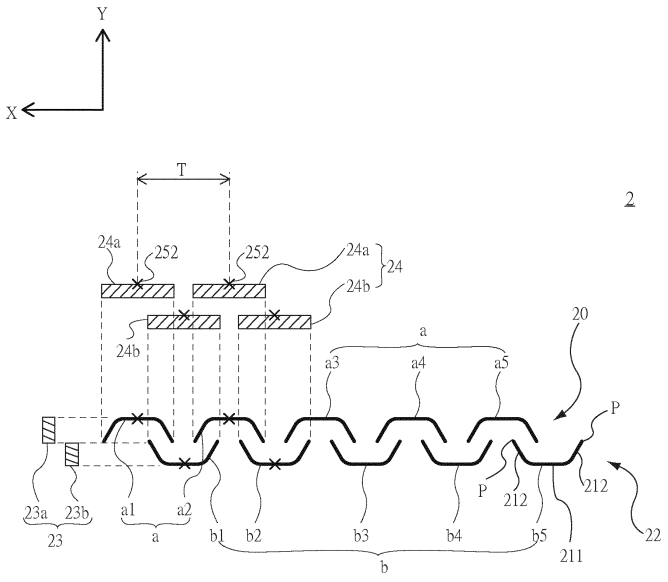

FIG.2A

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Description

[FIELD OF THE INVENTION]

[0001] The present invention provides a cutting structure for assisting the curvature of a flexible sheet. In particular, the cutting structure is formed at the corresponding position to allow the flexible sheet to bend into a stereoscopic contour.

[DESCRIPTION OF THE RELATED ART]

[0002] The manufacturing of conventional leather bags involve complicated processes, such as plate-making, tailoring, gluing, punching, sewing or the like and preparation of tools and materials. For those that are not professional artisans, making a leather bag by oneself has a considerably high technical threshold.

[0003] Moreover, during the sewing and weaving of general leather, a plurality of thread holes need to be prefabricated at a joint position of at least two pieces of leather, and then the threads are utilized to pass through the thread holes to fix the two pieces of leather. When an article of a complicated structure (e.g., a handbag or a wallet) is to be manufactured, a plurality of pieces of leather is required and moreover, the sewing process consumes a lot of time. Thus, the self-made leather goods cannot be manufactured within a short period of time, and it is hard for a non-professional artisan to enjoy making leather bags.

[0004] Accordingly, the present invention provides a special cutting structure to solve the aforesaid technical problems of a time consuming process, a required skill level and lengthy manufacturing process.

[CONTENTS OF THE INVENTION]

[0005] The present invention provides a cutting structure to be formed on the bent position of a flexible sheet. The cutting structure comprises two parallel cutting paths. Each of the cutting paths has a plurality of cutting sections adjacently arranged at intervals to each other. Each cutting section is of a liner shape to cut through the flexible sheet. The cutting sections on one of the cutting paths are laterally offset with respect to the cutting sections on another cutting path. Two ends of the cutting sections of the two parallel cutting paths are oppositely interlaced without connecting with each other. Each cutting section is projected to form a first cutting projection towards a first direction and a second cutting projection towards a second direction. Two second cutting projections from any two oppositely interlaced cutting sections are partially overlapped, and the first direction is vertical to the second direction.

[0006] When the aforesaid cutting structure is correspondingly formed on the bent position of the flexible sheet, the flexible sheet can be formed into a stereoscopic contour by bending the bent position.

[0007] The cutting structure of the present invention can be widely applied to a leather material, a plastic material, a fabric material or a paper material. When the cutting structure is applied to the leather material, the leather material in the form of a sheet can be formed into a stereoscopic article simply by bending these bent positions without the need of sewing skills and without using adhesive attachment.

[0008] The detailed technology and preferred embodiments implemented for the subject invention are described in the following paragraphs accompanying the appended drawings for people skilled in this field to well appreciate the features of the claimed invention.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0009]

FIG. 1 is a schematic view illustrating the cutting structure of the present invention applied to a flexible sheet.

FIG. 2A is a schematic view illustrating arrangement of a first embodiment of the cutting structure according to the present invention.

FIG. 2B is a partially schematic view taken from **FIG. 2A.**

FIG. 3A is a schematic view illustrating another pattern of cutting sections of the first embodiment.

FIG. 3B is a partially schematic view taken from **FIG. 3A.**

FIG. 4 is a schematic view illustrating another pattern of cutting sections according to the second embodiment of a cutting structure of the present invention.

FIG. 5 is a schematic view illustrating the arc-shaped cutting sections according to the third embodiment of a cutting structure of the present invention.

FIG. 6 is a schematic view illustrating the cutting structure of the present invention applied to a leather material and bent into a stereoscopic contour.

[DESCRIPTION OF EMBODIMENTS]

[0010] In the following description, the present invention will be explained with reference to embodiments thereof. However, the description of these embodiments is only for purpose of explaining technical contents and objectives of the present invention rather than to directly limit the present invention. It shall be appreciated that in the following embodiments and the attached drawings, elements unrelated to the present invention are omitted from depiction; and dimensional and positional relationships among individual elements in the attached drawings are illustrated only for ease of understanding, but not to limit the actual scale and dimension.

[0011] **FIG. 1** is a schematic view illustrating the cutting structure of the present invention applied to a flexible sheet. In this embodiment, a whole piece of flexible sheet **1** may first have a predetermined shape, and then the

cutting structures **2** of the present invention are correspondingly formed on the bent portions.

[0012] The cutting structure of the present invention comprises two parallel cutting paths, and each of the cutting paths has a plurality of cutting sections adjacently arranged at intervals to each other. The specific aspects of the cutting structure will be detailed hereinafter with reference to the attached drawings.

[0013] **FIG. 2A** is a schematic view illustrating the arrangement of a first embodiment of the cutting structure according to the present invention. For ease of description of the two parallel cutting paths and arrangement of the cutting sections thereof, different reference symbols are used to represent different elements. For example, the cutting structure **2** comprises a cutting path **20** and a cutting path **22** parallel to each other, the cutting path **20** has a plurality of cutting sections **a1, a2, a3, a4, a5...** (which can be collectively referred to herein as a "cutting section **a"**) adjacently arranged at intervals to each other, and the cutting path **22** also has a plurality of cutting sections **b1, b2, b3, b4, b5...** (which can be collectively referred to as a "cutting section **b"**) adjacently arranged at intervals to each other. Each of the cutting sections **a, b** has a liner shape to cut through the flexible sheet **1;** this means that linear cutting lines running through the flexible sheet **1** in a vertical direction are generated in the flexible sheet **1** by using laser cutting, cutters, cutting dies or choppers.

[0014] A feature of the cutting structure of the present invention lies in that the cutting sections on one of cutting paths are laterally offset with respect to the cutting sections on another cutting path. The two ends of the cutting sections of the two parallel cutting paths are oppositely interlaced without connecting with each other. Specifically, as shown in **FIG. 2A,** each of the cutting sections **a, b** has two ends **P,** the cutting sections **a1, a2, a3, a4, a5...** on the cutting path **20** are laterally offset with respect to the cutting sections **b1, b2, b3, b4, b5... on** another cutting path **22,** the two ends **P** of each cutting section **a** are oppositely interlaced with the two ends **P** of each cutting section **b,** and the two ends **P** of each cutting section **a** are not connected with the two ends **P** of each cutting section **b.**

[0015] The cutting sections of a linear shape as shown in **FIG. 2A, FIG. 3A, FIG. 4** and **FIG. 5** may have different patterns. To describe the arrangement relationships between the two parallel cutting paths more clearly, projections will serve as the basis for defining positions and dimensional proportions of the cutting sections. Still in reference to **FIG. 2A,** the first direction **X** and second direction **Y** perpendicular to each other may be defined, and the first direction **X** refers to a direction parallel to the two cutting paths.

[0016] As shown in **FIG. 2A,** the cutting sections **a1, a2, a3, a4, a5...** and the cutting sections **b1, b2, b3, b4, b5...** are respectively projected to form first cutting projections **23a, 23b** (which can be collectively referred to herein as the "first cutting projection **23"**) toward the first direction **X** and are respectively projected to form second cutting projections **24a, 24b** (which can be collectively referred to herein as a "second cutting projection **24"**) towards the second direction **Y.**

[0017] The two second cutting projections **24a, 24b** generated from any two of oppositely interlaced cutting sections are only partially overlapping. Specifically, with reference to **FIG. 2B,** the two second cutting projections **24a, 24b** generated from any two of the oppositely interlaced cutting sections (e.g., the cutting section **a1** and the cutting section **b1**) are partially overlapping. It shall be appreciated that the case in where the second cutting projections **24a, 24b** of the cutting section **a1** and the cutting section **b1** are completely overlapping is not the best implementation mode although it can be implemented.

[0018] On the other hand, in addition to the arrangement shown in **FIGs. 2A** to **2B,** the two first cutting projections **23a** and **23b** may also have another arrangement as shown in **FIGs. 3A** to **3B.** In **FIGs. 2A** to **2B,** the two first cutting projections **23a, 23b** from any two oppositely interlaced cutting sections **a, b** are not overlapping, i.e., the first cutting projections **23a, 23b** are separated from each other by a distance, or the first cutting projection **23a** is tangent to the first cutting projection **23b.** Both of the above cases fall within the scope that can be implemented by the present invention. However, a good effect of assisting the bending cannot be obtained if the distance between the first cutting projection **23a** and the first cutting projection **23b** is too large.

[0019] In **FIGs. 3A** to **3B,** the two first cutting projections **23a, 23b** from any two oppositely interlaced cutting sections **a, b** are partially overlapping.

[0020] Moreover, as shown in **FIG. 2B,** each cutting section defines a pivot **25** which is projected towards the first direction **X** to form a first pivot projection **251** and towards the second direction **Y** to form a second pivot projection **252.**

[0021] In terms of the distance between the cutting sections adjacently arranged at intervals to each other, the distance between the two second pivot projections from any two of adjacent cutting sections on either of the cutting paths is preferably between 4mm to 40mm. For example, as shown in **FIG. 2A,** the second pivot projections at the cutting sections **a1, a2, a3, a4, a5...** are equally spaced by a distance **T,** and the second pivot projections **252** at the cutting sections **b1, b2, b3, b4, b5...** are also equally spaced by the distance **T.**

[0022] In terms of the distance between two oppositely interlaced cutting sections, the first distance between the two first pivot projections from two oppositely interlaced cutting sections is preferably between 2mm to 20mm, and the second distance between the two second pivot projections from two oppositely interlaced cutting sections is preferably between 2mm to 20mm. For example, with reference to **FIG. 2B,** the first distance **T1** between the two first pivot projections **251** from two oppositely interlaced cutting sections **a1, b1** is between 2mm to

20mm, and the second distance **T2** between the two second pivot projections **252** from the two oppositely interlaced cutting sections **a1, b1** is between 2mm to 20mm. The second distance **T2** is the lateral offset distance between the cutting sections **a1, b1.**

[0023] By the aforesaid arrangement, the second cutting projection of one cutting section, except for the cutting sections at the two ends of the cutting paths, is oppositely interlaced with the second cutting projections of the other two cutting sections. For example, as shown in **FIG. 2A,** the second cutting projection of the cutting section **a2** is oppositely interlaced with the second cutting projections of both the cutting sections **b1, b2,** or the cutting section **b1** is oppositely interlaced with both of the cutting sections **a1, a2.**

[0024] Furthermore, the cutting sections of the present invention are cutting sections of a linear shape rather than conventional circular, rhombic or rectangular thread holes. As shown in **FIGs. 2A** to **2B** and **FIGs. 3A** to **3B,** each of the cutting sections **a, b** includes a first edge **211** and two non-parallel second edges **212** in which the two second edges **212** are respectively are not vertically connected with two sides of the first edge **211,** and the two ends **P** of the cutting section are terminals of the two second edges **212.**

[0025] The cutting sections of the linear shape described above are not limited to what is shown in **FIGs. 2A** to **2B** and **FIGs. 3A** to **3B.** Instead, the cutting sections may have another pattern of " ⊓ " as shown in **FIG. 4.** In this case, each cutting section **31** includes a first edge **311** and two parallel second edges **312** in which the two second edges **312** are respectively connected with two sides of the first edge **311** vertically, and the two ends **P** of the cutting section are terminals of the two second edges **312.** Alternatively, the cutting section may have another pattern as shown in **FIG. 5,** wherein the cutting section is an arc-shaped cutting section **41,** and the two ends **P** of the cutting section are the terminals of the arc-shaped cutting section **41.**

[0026] It shall be again noted that the cutting sections **a1, a2, a3, a4, a5...** and the cutting sections **b1, b2, b3, b4, b5...** mentioned in the above embodiments are of the same shape and size. The different reference symbols used to represent the cutting sections are only for ease of description in the above embodiments. In principle, the shapes of individual cutting sections in **FIGs. 2A** to **2B, FIGs. 3A** to **3B** and **FIG. 4** may be the following: bilaterally symmetrical, i.e., the second edges of each cutting section are not parallel but are symmetrical (i.e., **FIGs. 2A** to **2B, FIGs. 3A** to **3B**), parallel and symmetrical (i.e., **FIG. 4**), or symmetrically V-shaped (not shown). However, as can be inferred by those of ordinary skill in the art, the individual cutting sections may also have shapes that are not completely bilaterally symmetrical (not shown).

[0027] In terms of the size of the cutting sections, the first length of the first cutting projection and the second length of the second cutting projection serve as a unified basis for defining the depth and the width of the cutting sections because the cutting sections of the linear shape may have different patterns. For example, in **FIG. 2B,** the depth of each of the cutting sections **a, b** corresponds to the first length **D1** of the first cutting projections **23a, 23b** and the first length is preferably between 1mm to 10mm. The width of each of the cutting sections **a, b** corresponds to the second length **D2** of the second cutting projections **24a, 24b** and the second length is preferably between 3mm to 30mm.

[0028] According to the above descriptions, the cutting structure **2** of the present invention can replace the conventional sewing process and adhesive attachment by assisting in bending the flexible sheet **1** into a stereoscopic article, wherein the flexible sheet **1** may be a leather material, a plastic material, a fabric material or a paper material.

[0029] In terms of business application, front-end manufacturers prefabricate the cutting structures of the present invention on flat flexible sheets for mass production, and then the flexible sheets are sold to rear-end consumers to be assembled into stereoscopic structures by the consumers themselves.

[0030] Moreover, the cutting structure of the present invention can vividly simulate the visual effect of thread sewing when it is applied to the leather material. As shown in **FIG. 6,** the manufacturer applies the cutting structure **2** of the present invention to a piece of leather material, and the cutting structure **2** is formed at each of the plurality of portions to be bent on the leather material. The leather material can then be sold to the consumer on the rear-end so that the consumer can bend the bent positions of the leather material by hand to change the leather material into a stereoscopic wallet. Accordingly, the consumer does not need sewing skills, and he or she may easily make leather bags. Since the leather material is flexible, a water color pen, a writing brush, or a wet sponge may be used to first moisturize the cutting sections oppositely interlaced so that the leather material can be bent more flexibly.

Claims

1. A cutting structure formed on a bent position of a flexible sheet for assisting curvature of the flexible sheet, the cutting structure comprising:

   two parallel cutting paths, each of the cutting paths has a plurality of cutting sections adjacently arranged at intervals to each other, each cutting section is of a liner shape to cut through the flexible sheet, the cutting sections on one of cutting paths are laterally offset with respect to the cutting sections on another cutting path, and two ends of the cutting sections of the two parallel cutting paths are oppositely interlaced without

connecting with each other,
wherein each cutting section is projected to form a first cutting projection toward a first direction and a second cutting projection toward a second direction, the two second cutting projections from any two of oppositely interlaced cutting sections are partially overlapped, and the first direction is vertical to the second direction.

2. The cutting structure as claimed in claim 1, wherein the two first cutting projections from any two of oppositely interlaced cutting sections are not overlapped.

3. The cutting structure as claimed in claim 1, wherein the two first cutting projections from any two of oppositely interlaced cutting sections are partially overlapped.

4. The cutting structure as claimed in claims 1, 2 or 3, wherein each cutting section can define a pivot which is projected toward the first direction to form a first pivot projection and toward the second direction to form a second pivot projection, and a distance between the two second pivot projections from any two of adjacent cutting sections on either of cutting paths is preferably between 4mm to 40mm.

5. The cutting structure as claimed in claim 4, wherein a first distance between the two first pivot projections from any two of oppositely interlaced cutting sections is preferably between 2mm to 20mm, and a second distance between the two second pivot projections from any two of oppositely interlaced cutting sections is preferably between 2mm to 20mm.

6. The cutting structure as claimed in claims 1, 2 or 3, wherein each cutting section of the liner shape includes a first edge and two non-parallel second edges, wherein the two second edges are respectively connected with two sides of the first edge not vertically, and the two ends of the cutting section are terminals of the two second edges.

7. The cutting structure as claimed in claims 1, 2 or 3, wherein each cutting section of the liner shape includes a first edge and two parallel second edges, wherein the two second edges are respectively connected with the two sides of the first edge vertically, and the two ends of the cutting section are the terminals of the two second edges.

8. The cutting structure as claimed in claims 1, 2 or 3, wherein each cutting section of the liner shape is an arc-shaped cutting section, and the two ends of the cutting section are the terminals of the arc-shaped cutting section.

9. The cutting structure as claimed in any of claims 1 to 8, wherein a depth of each cutting section corresponds to a first length of the first cutting projection and the first length is preferably between 1mm to 10mm, and a width of each cutting section corresponds to a second length of the second cutting projection and the second length is preferably between 3mm to 30mm.

10. The cutting structure as claimed in any of claims 1 to 9, wherein the flexible sheet can be a leather material, a plastic material, a fabric material or a paper material.

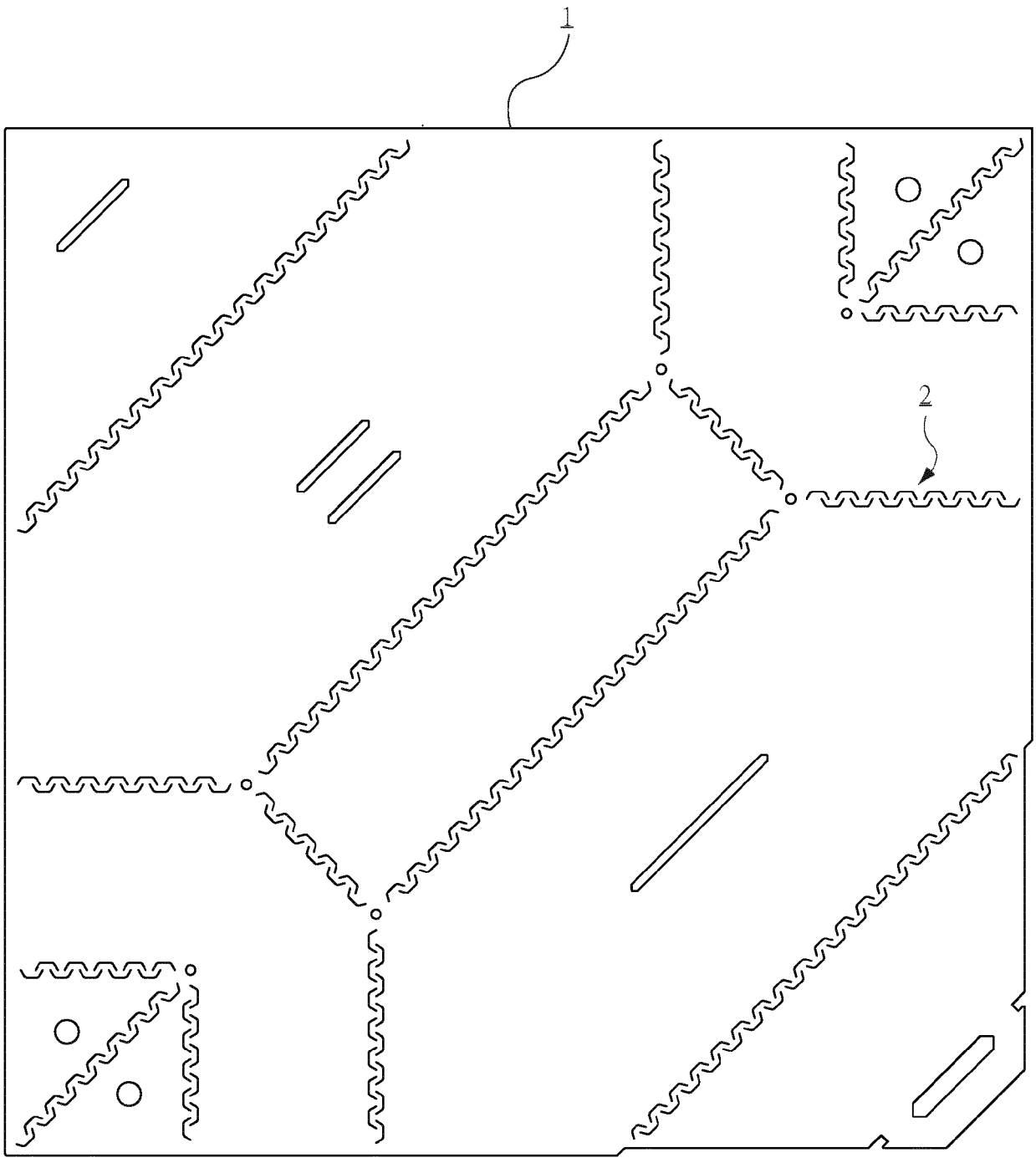

FIG.1

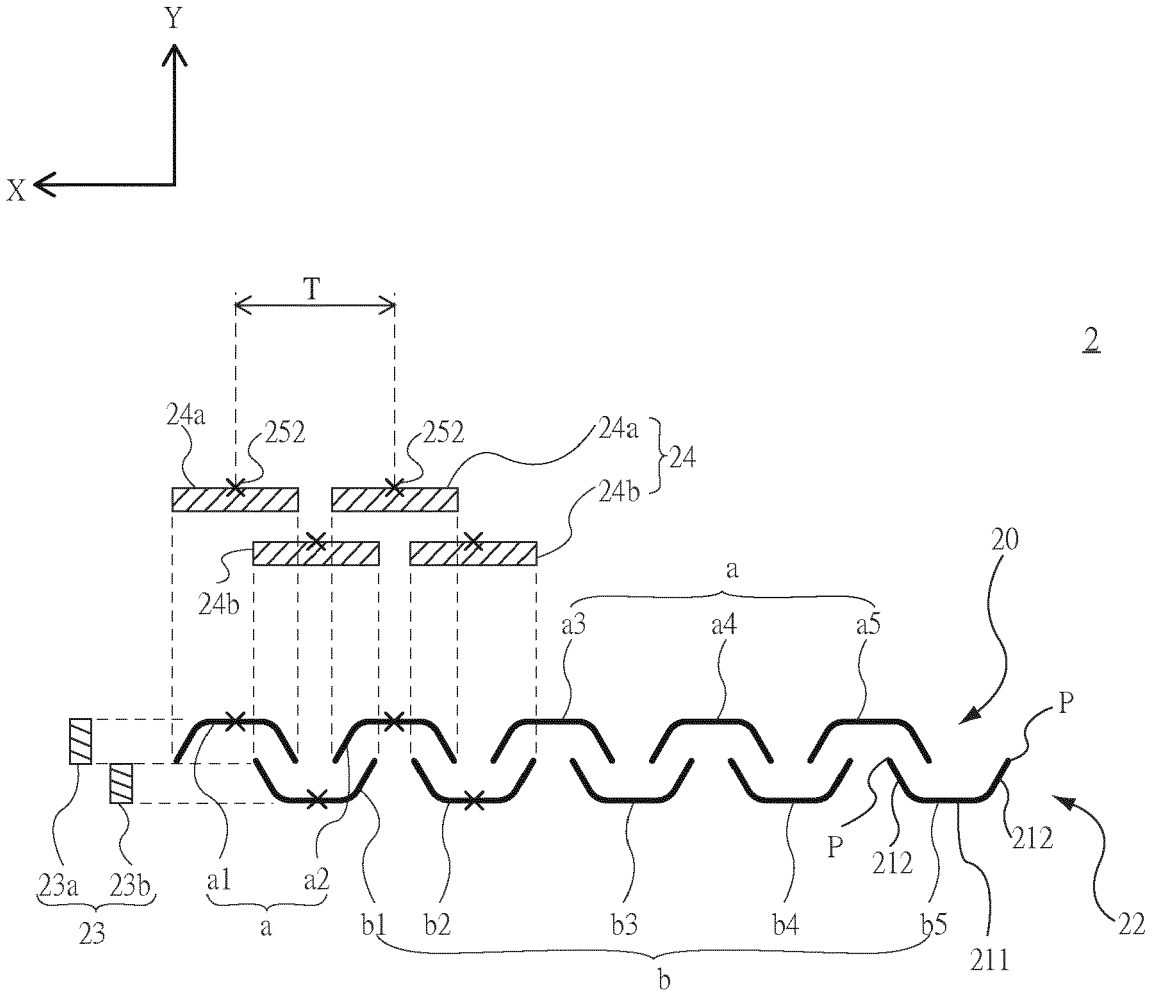
Y
X
T
2
24a
252
252
24a
24
24b
24b
20
a
a3
a4
a5
P
P
212
212
23a
23b
23
a1
a2
a
b1
b2
b3
b4
b5
b
211
22

FIG.2A

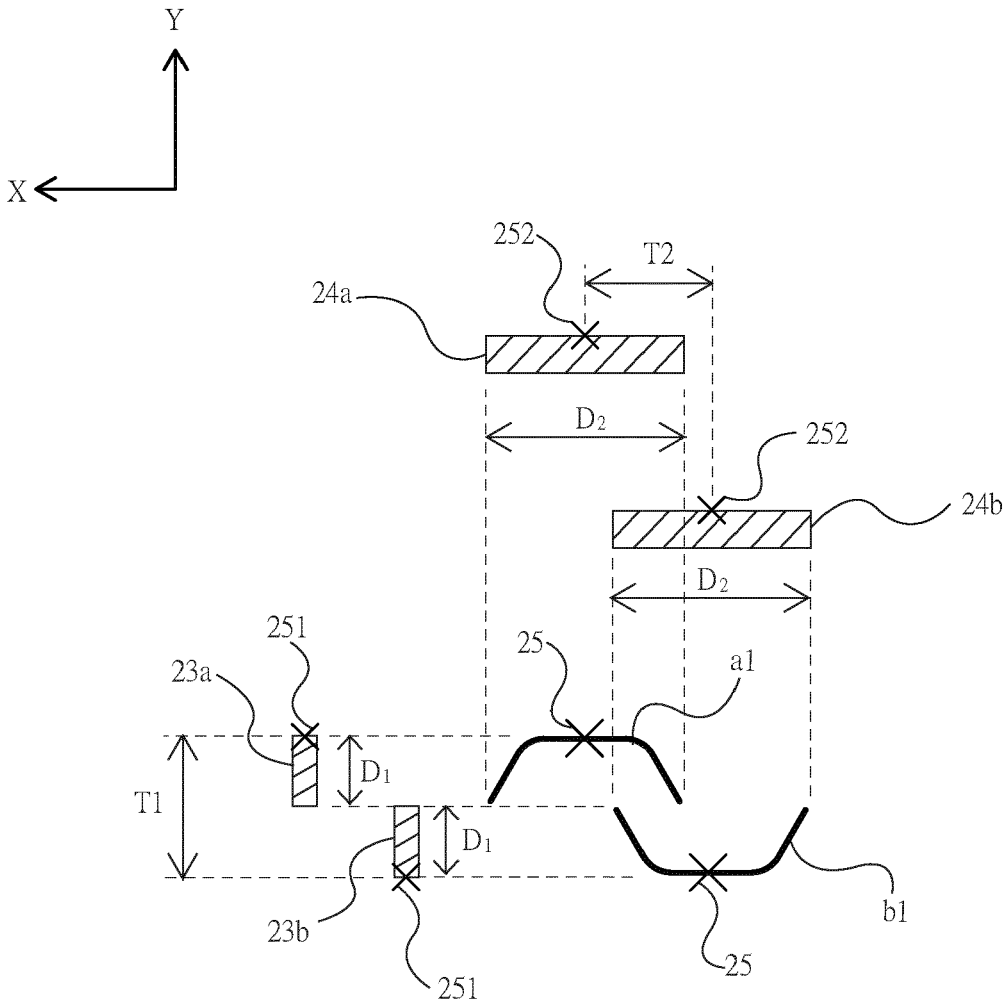

FIG.2B

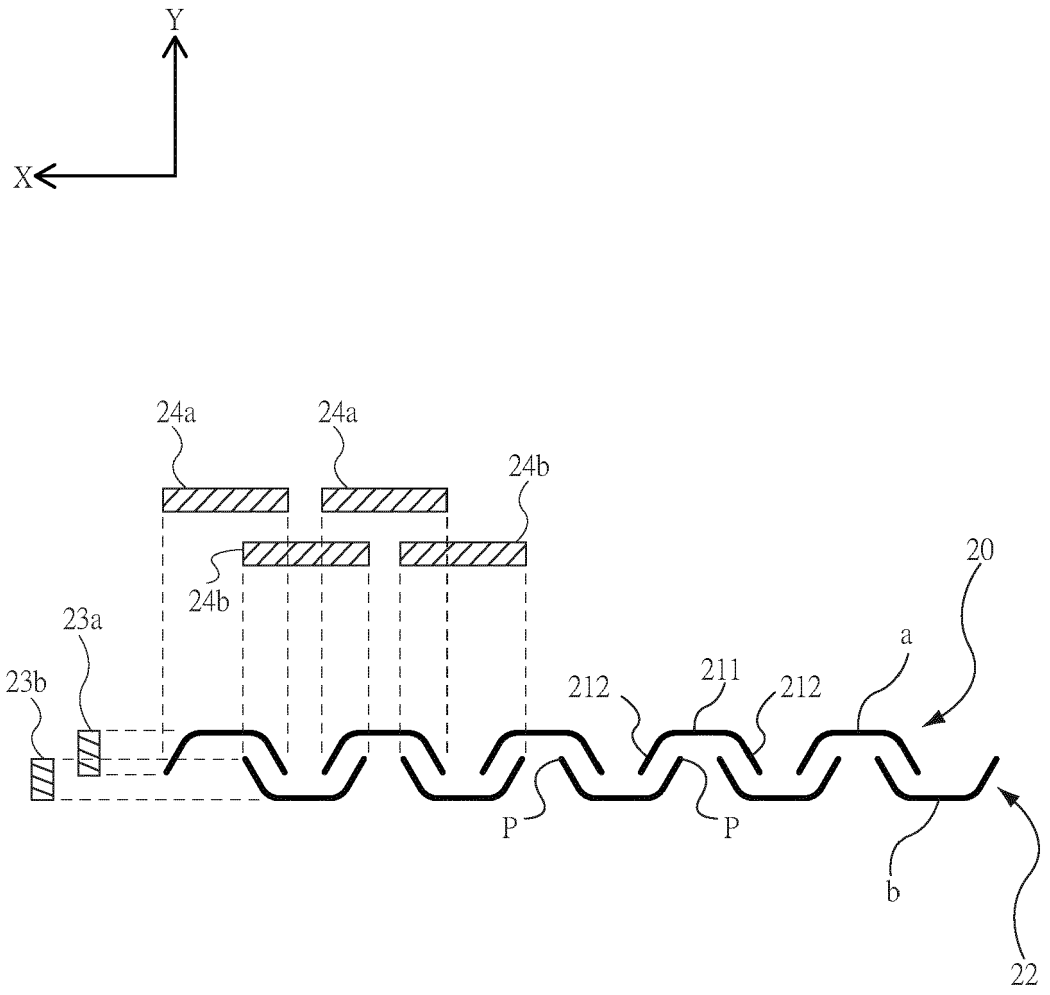

FIG.3A

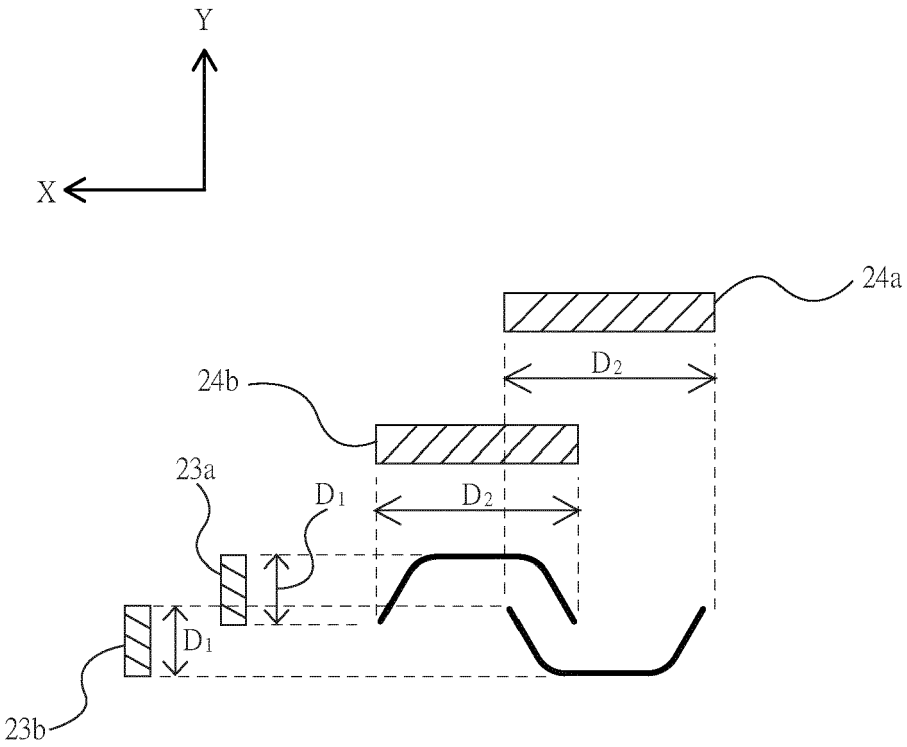

FIG.3B

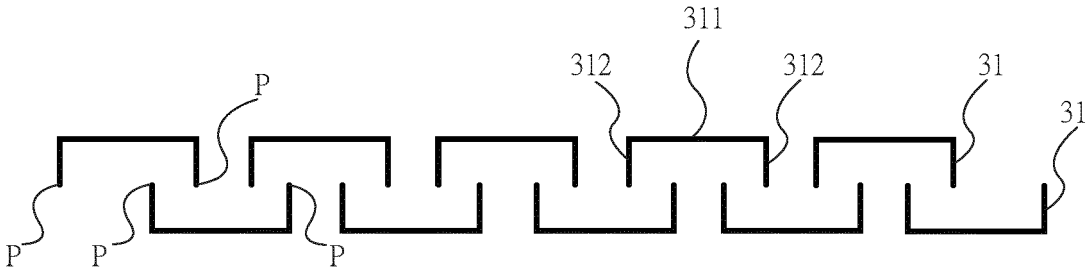

FIG.4

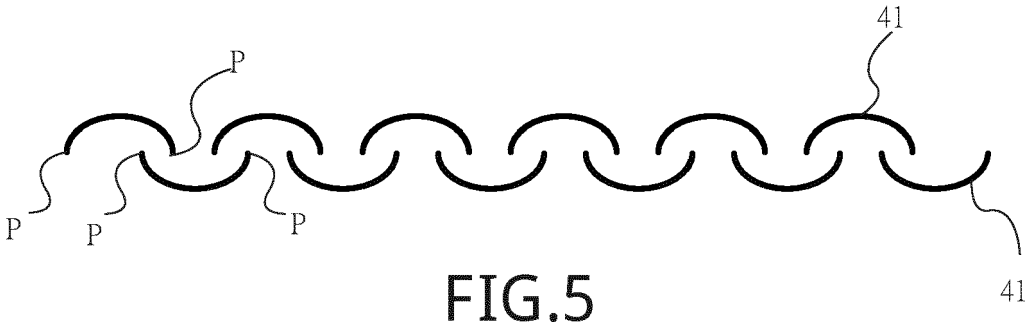

FIG.5

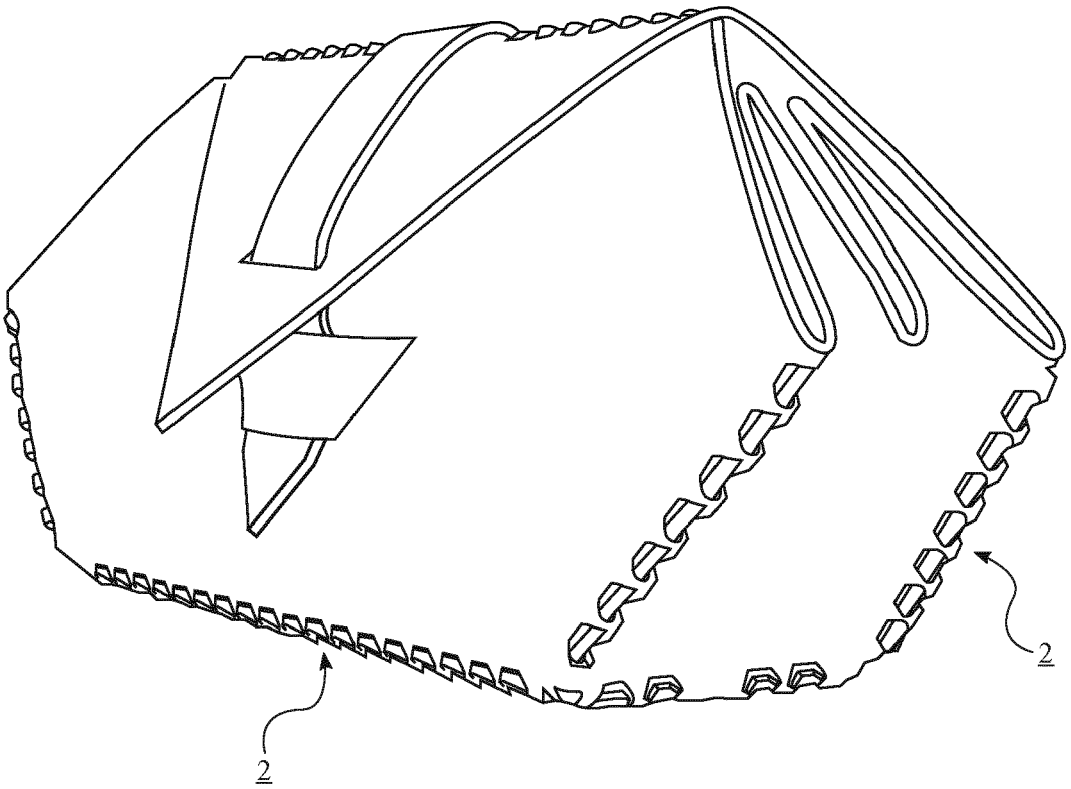

FIG.6

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EUROPEAN SEARCH REPORT

Application Number
EP 17 20 7779

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TECHNICAL FIELDS SEARCHED (IPC)

B26F
C14B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	30 May 2018	Canelas, Rui

CATEGORY OF CITED DOCUMENTS

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