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(54) **CUT FOR GEMSTONE**

(57) A method of manufacturing a gemstone (2) comprises providing a ball of a gemstone material having a radius R; cutting the ball to provide the gemstone (2) comprising a first side (4), a second side (22), and a girdle (14) between the first side (4) and the second side (22). The girdle (14) comprises two curved sections (16a, 16b) on opposite sides, each curved section (16a, 16b) having a radius of curvature R equal to the radius of the ball, and two straight sections (18a, 18b) on opposite sides and spacing apart the two curved sections (16a, 16b), wherein the straight (18a, 18b) and curved (16a, 16b) sections of the girdle (14) meet at edges (20) extending between the first (4) and second (22) sides of the gemstone (2). Also provided is a gemstone (2) manufactured by the method, and a gemstone (2) having a girdle (14) comprising curved (16a, 16b) and straight (18a, 18b) sections. Articles including a gemstone (2) according to the disclosure are also provided.

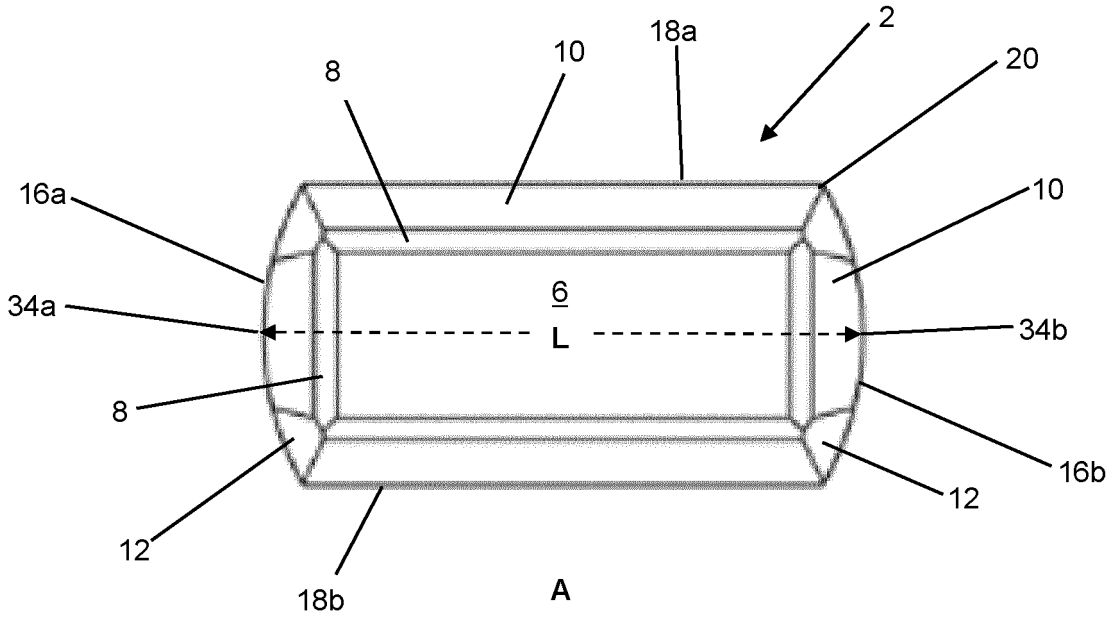

Figure 2

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Description

Field of the Invention

[0001] The invention concerns a cut for a gemstone and, in particular, a gemstone having a partly curved girdle.

Background Art

[0002] Geometric accuracy is a valued characteristics of a faceted gemstone for optical appearance, and is especially important for the setting in a jewelry piece. Various different geometries of gemstone cuts are known to the skilled person, depending on the desired appearance of the cut gemstone and the gemstone material. The baguette cut is a special facetted cut also used in combination with other cuts and with different materials, such as emeralds and diamonds.

[0003] A gemstone with a baguette cut of the prior art has a rectangular shape and includes a first side (or crown) having facets that meet at a generally flat table, a second side (or pavilion) having facets that typically converge to form a straight line, and a girdle between the first (crown) and the second (pavilion) sides.

[0004] Due to large production tolerances, the geometric shape of a rectangular baguette cut varies and this impairs the geometric accuracy. Further, large tolerances of the geometric shape result in sub-optimal optical appearance and can lead to problems in setting the baguette cut into a jewelry piece, for example. Additionally, the sharp edges of the rectangular baguette cut (at the junctions between the perpendicular sides of the girdle) increases the chance of breakage (chipping) at the corners of the baguette cut gemstone during the setting of the gemstone in a jewelry piece.

[0005] The application US2021244140A1 discloses a rectangular baguette cut with modified angle values to vary the optical appearance of the cut gemstone, but this document is silent about manufacturing tolerances during production of the geometric shape and any resultant detriments to appearance and problems in setting the gemstone.

[0006] The present disclosure aims to address one or more of the disadvantages or problems in the prior art

Summary of the Invention

[0007] Objects of the present disclosure aim to provide gemstones with improved manufacturing tolerances, and/or gemstones having a baguette-like cut and which have improved (reduced) breakage risk compared to the prior art baguette cut gemstones. The disclosure also relates to a method for cutting a gemstone having one or more beneficial properties over the prior art. One or more of the objects of this disclosure are provided by a gemstone as described herein.

[0008] In one aspect, there is provided a method of manufacturing a gemstone, comprising: (i) providing a ball having a radius R; and (ii) cutting the ball to provide a gemstone comprising a first side (or crown), a second side (or pavilion), and a girdle between the first side and the second side. The girdle comprises two curved sections on opposing sides of the gemstone; each curved section having a 'radius of curvature' R equal to the radius R of the ball, and two straight sections on opposing sides of the gemstone and spacing apart the two curved sections. The straight and curved sections of the girdle meet at a corner (where the girdle is a line) or edge, wherein the edge extends across the thickness of the girdle and extends in a line between the first and second sides of the gemstone. Typically, the edge is a straight line.

[0009] In a second aspect, the disclosure also encompasses a gemstone manufactured according to the method of the first aspect.

[0010] In a third aspect, there is provided a gemstone comprising: a first side (or crown), a second side (or pavilion), and a girdle between the first side and the second side. The gemstone is characterized in that the girdle comprises two curved sections on opposite sides, each curved section having a radius of curvature R, and two straight sections on opposite sides spacing apart the two curved sections, wherein the junction between the straight and curved sections of the girdle meet at a corner or edge, wherein the edge extends the thickness of the girdle between the first and second sides of the gemstone.

[0011] Surprisingly, it has been found that a cut for a gemstone - especially one approximating a 'baguette' (or rectangular or trapezoid) cut - but in which the girdle comprises two curved sections on opposite sides can beneficially provide improved geometric accuracy over a similar gemstone cut comprising a girdle having only straight sides. A particularly advantageous baguette cut has a generally rectangular shaped girdle, albeit with two curved sides. Suitably, curved sides are provided on the short sides of the baguette.

[0012] In embodiments of these aspects, each curved section (or portion) of the gemstone's girdle can be considered to have a vertex at the centre / midpoint of the curve, such that the vertex of one (first) curved section is spaced from the vertex of the other (second) curved section by the maximum length (L) of the gemstone. Accordingly, when the gemstone is cut from a ball (or sphere) of material, the maximum length (L) of the cut gemstone is advantageously equal to 2R (i.e. the diameter of the ball of material from which the gemstone is cut); or is substantially equal to 2R. In various embodiments, the gemstone has a length (2R) measured between the centre points (vertexes) of each curved section of the girdle of not more than about 12 mm, not more than about 10 mm, or not more than about 8 mm. In various embodiments, the length (2R) of the gemstone may be between about 1.5 mm and 12 mm, between about 2 mm and 10 mm, between about 2.5 mm and 8 mm, or between about 3 mm and 6 mm. In various embodiments,

the gemstone has a length (2R) measured between the centre points (vertexes) of each curved section of the girdle of at least about about 1.5 mm, at least about 2 mm, or at least about 2.5 mm. By using balls / spheres of material having a relatively small diameter wastage of material from cutting of the gemstone is reduced. Furthermore, the curved sections only slightly change the visual appearance of the cut gemstone in comparison to a traditional e.g. baguette cut gemstone comprising a girdle having only straight sections.

[0013] The gemstone of this disclosure may be cut according to any in any suitable configuration, for example, to provide various features of a typical crown and/or pavilion. In this way the benefits of the invention will be maintained, while the visual appearance of the gemstone retains the pleasing esthetic characteristics of a traditional gemstone.

[0014] In accordance with various embodiments, the gemstone is cut to provide a table on the first side (or crown), wherein the table is spaced from the girdle by a plurality of faceted sides inclined with respect to the table. In embodiments, the plurality of faceted sides may include a first set of faceted sides (first crown facets) that adjoin the table and a second set of faceted sides (second crown facets) that adjoin the girdle. In embodiments, the first set of the plurality of faceted sides and the second set of the plurality of faceted sides are different. For example, the first set of the plurality of faceted sides may be defined by a common shape and/or a common facet angle with respect to the table. In some embodiments, the first set of facetted sides all share a common shape and a common angle with respect to the table. Likewise, the second set of the plurality of faceted sides may be defined by a common shape and/or a common facet angle with respect to the table. In some embodiments, the second set of facetted sides all share a common shape and a common angle with respect to the table. In some embodiments there is only one type of facetted side on the first / table side of the gemstone. In such embodiments, the facetted sides of the first side each adjoin both the table and the girdle.

[0015] In embodiments, the gemstone is cut to provide a plurality of faceted sides on the second side (pavilion), the faceted sides on the second side inclined relative to the table, and wherein the plurality of faceted sides on the second side converge at one of a straight line, a rounded point, or a point. In embodiments, the plurality of faceted sides of the second / pavilion side may include a first set of faceted sides (first pavilion facets) that adjoin the straight line, rounded point or point at the base of the pavilion, and a second set of faceted sides (second pavilion facets) that adjoin the girdle. In embodiments, the first set of the plurality of faceted sides and the second set of the plurality of faceted sides are different. For example, each set of the plurality of faceted sides may be defined by a common shape and/or a common facet angle with respect to the table. In some embodiments, the first set of facetted sides all share a common shape and a common angle with respect to the table. Likewise, the second set of the plurality of faceted sides may be defined by a common shape and/or a common facet angle with respect to the table. In some embodiments, the second set of facetted sides all share a common shape and a common angle with respect to the table. In some embodiments there is only one type of facetted side on the second / pavilion side of the gemstone. In such embodiments, the facetted sides of the second side each adjoin both the girdle at the line, rounded point or point at the base of the pavilion.

[0016] Suitably, the gemstone is cut to provide a ratio of the length (L) of the gemstone to the width (W) - generally perpendicular to the length axis of the gemstone - of at least 1.5:1, at least 1.75:1, at least 2:1, or at least 2.5:1. In embodiments, the ratio of the length (L) to the width (W) of the gemstone is about 1.75:1, about 2.0:1, about 2.5:1 or about 3.0:1. It should be appreciated that the width (W) of the gemstone is defined by a straight line distance between the two corners or edges defining the junctions between a curved section of the girdle and each straight section of the girdle adjoining the curved section. In particular, the width of the gemstone may be between about 0.75 mm and 8 mm, between about 1 mm and 7 mm, between about 1.5 mm and 6 mm, between about 2 mm and about 5 mm, or between about 2.5 mm and 4 mm.

[0017] In various beneficial embodiments, the gemstone is cut to form a substantially rectangular gemstone, i.e. such that a pair of straight lines drawn respectively between the two corners or edges defining the junctions between each end of each of the curved sections and the respective pair of adjacent straight sections are essentially parallel and of equal length. In other embodiments, the two straight sections are inclined relative to each other to form a substantially trapezoidal gemstone.

[0018] Typically the gemstone of the disclosure is cut to have a four-sided girdle having four edges.

[0019] In aspects and embodiments, the gemstone has a length tolerance of not more than +/- 0.05 mm, not more than +/- 0.04 mm, not more than +/- 0.03 mm, or not more than +/- 0.02 mm.

[0020] The ball as used in the methods of the disclosure is suitably formed of a gemstone material. Preferred gemstones in the context of the present disclosure are made of cubic zirconia, glass, or glass ceramic. Glass ceramic is a material with an amorphous phase and one or more crystalline phases, which is produced by a controlled crystallization. Other possible gemstone materials include, but are not limited to, diamond, emerald, or corundum, such as sapphire or ruby.

[0021] As disclosed herein, the methods of this disclosure comprise the step of providing a ball of a gemstone material having a radius R. Balls can be produced having a high geometric accuracy, i.e. low geometric tolerances of the radius R. Balls also have the advantage that they can be placed on a cutting machine very accurately. In preferred embodiments, the tolerance of the radius R of

the ball is not more than about +/- 0.04 mm, not more than about +/- 0.03 mm, or not more than about +/- 0.02 mm; particularly, not more than about +/- 0.02 mm.

[0022] The skilled person will appreciate that gemstones of the prior art typically include edges forming sharp lines and thus the problem arises that due to the setting of the gemstone in a jewelry piece there is a risk of breakage at the edges (and corners) of the gemstone, especially when securing members (clamps, claws or so on) are used to fix the gemstone into a setting. Any type of securing member, for example prongs or claws can lead to breakage. The curved sections of the girdle of the gemstones of this disclosure have been surprisingly found to reduce the risk of breakage of the gemstone and/or to improve manufacturing tolerances. Additionally, the cut gemstone may in embodiments be set at the edges in a jewelry piece more stably.

[0023] In a particular embodiment, the gemstone is cut from a sphere / ball of gemstone material to provide two curved sections on opposite (short) sides of the gemstone which have a radius of curvature identical to the radius of the sphere from which the gemstone is cut,. The girdle of the cut gemstone suitably further includes two straight sections on opposites side of the girdle and spacing apart the curved sections of the girdle. Beneficially, the straight sections are essentially parallel and a pair of straight lines drawn respectively between the two edges defining the junctions of each of the curved sections and the respective pair of adjacent straight sections are also essentially parallel. As such, the cut gemstone when viewed from the top (crown / table side) or bottom (pavilion side) maintains the visual appearance / aesthetic characteristics of a traditional baguette / rectangular cut.

[0024] In another particular embodiment, the gemstone is cut from a sphere / ball of gemstone material to provide two curved sections on opposite (short) sides of the gemstone which have a radius of curvature identical to the radius of the sphere from which the gemstone is cut. In such embodiments, a pair of straight lines drawn respectively between the two corners or edges defining the junctions between the ends of each of the curved sections and the respective pair of adjacent straight sections are substantially parallel. The girdle of the cut gemstone suitably further includes two straight sections on opposite sides of the girdle and spacing apart the curved sections of the girdle. Beneficially, according to these embodiments, the straight sections are inclined relative to each other. As such, the cut gemstone when viewed from the top (crown / table side) or bottom (pavilion side) has the visual appearance of a trapezoid cut.

[0025] The first side (or crown) and the second side (or pavilion) of the gemstones according to various embodiments of this disclosure may have a plurality of facets. In embodiments, the plurality of crown facets may comprise one or more sets of facets, wherein each facet of a set is angled with respect to the table of the gemstone at essentially the same angle. Similarly, in embodiments, the plurality of pavilion facets may comprise one or more sets of facets, wherein each facet of a set is angled with respect to the table of the gemstone at essentially the same angle. Each set of facets of a set of crown or pavilion facets may have one or more facets, depending on the intended geometry and appearance of the gemstone.

[0026] These gemstone cuts provide an additional four-sided shape for a gemstone while maintaining the benefits described herein, including reduced risk of breakage at the edges (or corners) and/or improved (reduced) manufacturing tolerances.

[0027] Within the scope of this application, it is expressly intended that the various aspects, embodiments, examples and alternatives set out in the preceding paragraphs, in the claims and/or in the following description and drawings, and in particular the individual features thereof, may be taken independently or in any combination. That is, all embodiments and/or features of any embodiment can be combined in any way and/or combination, unless such features are incompatible. More particularly, it is specifically intended that any embodiment of any aspect may form an embodiment of any other aspect, and all such combinations are encompassed within the scope of the invention. The applicant reserves the right to change any originally filed claim or file any new claim, accordingly, including the right to amend any originally filed claim to depend on and/or incorporate any feature of any other claim although not originally claimed in that manner.

Brief Description of the Figures

[0028] Further details and advantages of various aspects and embodiments of the present disclosure are described more fully hereinafter by means of the specific description with reference to the accompanying drawings.

Figures 1A to 1C show, respectively, a plan (top) view, a side view, and a view from below of a rectangular baguette cut according to the prior art.

Figures 2A to 2C show, respectively, a plan (top) view, a side view, and a view from below of a gemstone according to an embodiment of this disclosure having two curved sections on opposite sides of the girdle, and two straight sections on opposite sides of the girdle.

Figures 3A and 3B are schematic side representations of a baguette cut gemstone according to the prior art, depicting cut deviations through manufacturing tolerances, particularly along the girdle.

Figures 4A and 4B are schematic side representations of a baguette cut gemstone according to this disclosure, depicting less significant cut deviations through manufacturing tolerances when compared

to the prior art baguette cut gemstones of Figures 3A and 3B.

Figure 5A and 5B shows the setting of a gemstone according to an embodiment of the disclosure. (A) The black ovals at the edges / corners of the gemstone represent the positions of fixing elements (such as claws) to secure the gemstone in a jewelry setting. (B) Photo illustrating the setting of a plurality of gemstones according to embodiments of the disclosure mounted in a parallel row.

Figures 6A to 6C are schematic illustrations showing, respectively, a plan (top) view, a side view, and a view from below of a gemstone according to the disclosure, having a girdle formed of two curved sections on opposite sides and two straight sections on opposite sides. According to this embodiment the straight sides are inclined relative to each other.

Figures 7A to 7C are schematic illustrations showing respectively, a plan (top) view, a side view, and a view from below of a gemstone according to the disclosure, having a girdle formed of two curved sections on opposite sides and two straight sections on opposite sides. According to this embodiment the sides defined by the pair of straight sections are parallel to each other.

Figure 8A is a schematic representation of a baguette cut gemstone according to the prior art, showing (in circles) at the sides of the gemstone, the points at which manufacturing tolerances around the girdle of the gemstone are measured according to the assays described herein.

Figure 8B is a graph illustrating the measured manufacturing tolerances at the girdle of a baguette cut gemstone according to the prior art.

Figure 9A is a bar graph illustrating the length tolerances of baguette cut gemstones of the prior art having an intended length of 3 mm and a width of 1.5 mm. **Figure 9B** is a bar graph illustrating the measured length tolerances of a baguette cut gemstone according to embodiments of the disclosure, measured from vertex to vertex.

Figures 10A and 10B are schematic illustrations of baguette cut gemstones according to the prior art (**A**) and an embodiment of the present disclosure (**B**) illustrating the reduced risk of breakage at the edges of the gemstone according to the present disclosure.

Description of the Invention

[0029] Rectangular baguette cut gemstones as illustrated in Figures 1A to 1C are known from the prior art. The gemstone (1) of Figures 1A to 1C has a first side or crown (3) including a table (5) and facets (7, 9) between the table (5) and girdle (11). The facets include a first set or type (7) which adjoin the table (5) and a second set or type (9) which adjoins the girdle (11). The gemstone (1) further has a second side or pavilion (13) comprising facets (15, 17) that converge at a straight line (19) at the base of the pavilion.

[0030] As illustrated in Figures 1A to 1C, the length (L) of a gemstone according to the prior art may be defined as the longest distance between the girdle at opposite sides of the gemstone, e.g. measured from the middle of one side of the girdle to the middle of the opposite side of the girdle. The width (W) of a gemstone according to the prior art may be defined as the shortest distance between the girdle at opposite sides of the gemstone, e.g. measured from edge to edge along the shortest side. When the gemstone has a trapezoid, rather than a rectangular shape (in plan view), the width (W) is typically considered to be represented by the longer one of the two short sides.

[0031] Gemstone cuts having the shape of the prior art are associated with several problems. The edges (21) are formed at relatively sharp corners (e.g. of 90°) and, thus, due to the setting of the gemstone in a jewelry piece there is a significant risk of breakage at the edges / corners. Additionally, due to manufacturing tolerances variations of length, width and height can frequently occur.

[0032] In general, according to the prior art, a method to manufacture a baguette cut gemstone uses rectangular preformed blanks. Because of the rectangular preform, the exact positioning of the blanks for cutting is difficult. As such, during cutting of the blank, variations in both the length and width of the girdle can occur. As a result of these variations, a less aesthetically pleasing gemstone is produced, and difficulties in accurately setting the gemstone in a jewelry piece also arise. Similar manufacturing variations are found using other production methods known in the prior art.

[0033] Figures 2A to 2C depict an embodiment of a gemstone (2) according to the present disclosure, having a first side or crown (4), including a table (6) and facets (8, 10, 12) arranged between the table (6) and girdle (14) which are inclined relative to the table (6). As clearly depicted in the plan and bottom views (Figures 2A and 2C, respectively), the girdle (14) has four sides including two curved sections (16a, 16b) at opposite sides of the girdle (14), and two straight sections (18a, 18b) at opposite sides of the girdle (14), wherein the sides meet at edges (20) defined at the junctions between curved sections (16a, 16b) and straight sections (18a, 18b). As illustrated most clearly in Figures 2B and 2C a second side or pavilion (22) of the gemstone (2) comprises facets (24, 26, 28, 30) below the girdle (14) and inclined relative to the table (6), which converge to a line (32) at the base of the second side (22).

[0034] As can be seen in Figures 2A to 2C, the curved sections (16a, 16b) of the girdle (14) can be considered

to comprise a vertex (34a, 34b) at the centre / midpoint of each curved section (16a, 16b), i.e. the point at the maximum of the curve. In addition, it can be seen that the girdle (14) has a non-parallel edge profile around the curved sections (16a, 16b) at the junctions between the facets (12) and (30) of the first (4) and second (22) sides, respectively.

[0035] The length (L) of a gemstone (2) according to embodiments of the disclosure is the longest girdle distance, measured from a vertex (34a) of a first curved section (16a) of the girdle to the vertex (34b) of a second curved section (16b) on the opposite side of the gemstone (2). The width (W) of a gemstone (2) according to embodiments of the disclosure is the girdle distance, measured from a first edge (20) to a second edge (20) across a curved section (16a, 16b). When curved sections (16a, 16b) on opposite sides of the girdle (14) have different lengths, because the straight sections (18a, 18b) are not parallel, the width (W) of the gemstone is considered to be the longer distance from first edge (20) to second edge (20) across the respective curved section (16a, 16b).

[0036] According to various embodiments of the disclosure it has been found that a preferred ratio of the length (L) of a gemstone to the width (W) of the gemstone is at least about 1.5:1, at least about 1.75:1, at least about 2:1 or at least about 2.5:1. In some particular embodiments the ratio of length (L) to width (W) is between about 1.75:1 and 2.0:1 (particularly about 2.0:1). Such ratios enable a clear visual appearance of an elongated gemstone, which can be especially popular. Generally, the curved sections provide the short sides of the gemstone, i.e. representing the width (W) of the gemstone; although it is envisaged that the opposite arrangement may be provided in some embodiments.

[0037] Figure 3A is a schematic illustration showing a perspective side view of a gemstone cut according to the prior art depicting the result of prior art facet cutting procedures and showing shifts in facet (9; 17) and girdle (11) alignment across an edge (21) of the gemstone (1) in view of the large manufacturing tolerances. Figure 3B illustrates a second perspective side view of a gemstone cut according to the prior art and showing girdle (11) variation around the circumference of the gemstone (1) similarly due to relatively large production tolerances.

[0038] In contrast to the prior art gemstone cut illustrated in Figures 3A and 3B, Figures 4A and 4B depict a gemstone (2) according to the present disclosure having a pair of curved sections (16a, 16b). The illustrations depict first and second perspective side views of a gemstone, and demonstrate the accuracy of facet (10, 12; 26, 30) and girdle (14) alignment in a gemstone cut according to this disclosure. Beneficially, in accordance with embodiments of the disclosure, the variation in girdle thickness / width of the gemstones according to the disclosure is below about 0.1 mm, below about 0.08 mm or below about 0.06 mm.

[0039] Figure 5A illustrates a typical setting arrangement for a gemstone (2) according to embodiments of the disclosure using four fixing members (36), such as claws, prongs or clamps, illustrated as dark ovals at the corners of the gemstone. By modifying the size and the position of the fixing members (36), different portions of the curved sections (16a, 16b) can optionally be covered and, hence disguised, so that the geometrical optical appearance of a straight-sided gemstone according to the prior art can be essentially achieved.

[0040] As then shown in Figure 5B a plurality of similar gemstones (2) according to embodiments of the disclosure can be set in parallel in a jewelry piece (38). In view of the beneficial geometric accuracy of each of the gemstones (2), the setting accuracy is improved in comparison to the prior art baguette cut gemstones (1), resulting in an improved appearance through better alignment of a finished jewelry piece (38). An article comprising at least one gemstone according to embodiments of this disclosure is also provided in further aspects and embodiment of the disclosure.

[0041] As shown in Figures 6A to 6C, in another embodiment of the disclosure the gemstone (40) has a girdle (42) comprising two straight sections (44a, 44b) on opposite sides, wherein the straight line of one straight section (44a) is inclined relative to the straight line of the other straight section (44b) such that the gemstone (40) has a trapezoid shape when viewed in plan. Similar to Figures 2A to 2C, Figures 6A to 6C show the first side or crown (46), having a table (48) and facets (50, 52, 54) lying between the table (48) and the girdle (42). The girdle (42) thus has four sides defined by the two curved sections (56a, 56b) at opposing sides of the gemstone (40), and the two straight sections (44a, 44b) at opposing sides of the gemstone (40). As illustrated most clearly in Figures 6A and 6C, the straight lines defined by the two straight sections (44a, 44b) are inclined relative to each other, such that the curved sections (56a, 56b) have different lengths and the gemstone has different widths (W1, W2) across each short side of the gemstone (40). In such embodiments, for convenience, the width may be considered to equal the shortest width (W1) of the gemstone (40). Figure 6B depicts a side view of the gemstone (40) and more clearly shows the first side or crown (46) and the second side or pavilion (58), with the girdle (42) therebetween. Figures 6A to 6C particularly illustrate the facets (50, 52, 54) of the first (46) side and the facets (60, 62, 64, 66, 68) of the second side (58). As shown, depending on the intended appearance and/or the shape of the gemstone, the facets of the crown may comprise more than one set of facets (50, 52, 54), wherein the facets of a set may adjoin the table (48) and/or the girdle (42). Similarly, the facets of the pavilion may comprise more than one set of facets (60, 62, 64, 66, 68), wherein the facets of a set may adjoin the girdle (42) and/or may converge to meet at a point (70) or line (72).

[0042] Figures 7A to 7C illustrate another embodiment of a gemstone (74) according to the disclosure, which has a first or crown side (76) comprising a table (78) and

modified facets (80, 82, 84, 86, 88) arranged between the table (78) and girdle (90). The gemstone (74) further includes a second or pavilion side (92), which has a plurality of different sets (or types) of facet (94, 96, 98, 100, 102), which meet at a point (104). The gemstone (74) is as further described in Example 6 below.

Examples

[0043] The following examples demonstrate the advantages of gemstone cuts according to various embodiments of the present disclosure in comparison to the prior art. Gemstones according to embodiments of this disclosure can be cut to provide various different facets. Throughout this disclosure and Examples facet angles are measured with respect to the table of the gemstone.

Example 1 (girdle variation):

[0044] Gemstone girdle thickness / width and thickness variation was measured at various points around the girdle of gemstones according to the prior art, and gemstones according to this disclosure. Girdle thickness measurements were performed at approximately the positions indicated by bold circles in the schematic gemstone representation of Figure 8A. As indicated, the girdle thickness at each side of the four-sided gemstones according to embodiments of the disclosure or the prior art was measured at the middle of each side, at the points labelled 0°, 90°, 180° and 270°; and the thickness variation as the difference between the maximum and the minimum measured values for the four measurements of each gemstone were calculated. For consistency, gemstones for which girdle thickness and variation were measured were of the same overall dimensions, i.e. 3 mm in length (L) and 1.5 mm in width (W).

[0045] Figure 8B is a bar graph illustrating the variation in girdle width of the various gemstones according to embodiments of the disclosure (y-axis = percentage of gemstones with a particular magnitude of girdle variation; x-axis = girdle thickness variation in mm). As demonstrated, the variation in girdle thickness / width of more than 90% of the gemstones according to embodiments of the disclosure is below 0.1 mm. In comparison to baguette cut gemstones of the prior art having a length of 3 mm and a width of 1.5 mm, the girdle thickness variation is less for gemstones according to the present disclosure; i.e. less than 90% of the gemstones cut according to the prior art and tested in this assay demonstrated less than or equal to 0.1 mm variation in girdle thickness variation.

[0046] As the skilled person will appreciate, variation of the girdle width is also very important to manage for the accurate setting of gemstones, such that minimal variation in girdle thickness is another benefit of the aspects and embodiments of the disclosure. As such, the gemstones according to the disclosure may provide further benefits in relation to more accurate and/or improved aesthetics in setting within a jewelry piece.

Example 2 (length variation):

[0047] Variations in the length of baguette cut gemstones according to various embodiments of the disclosure were compared to variations in the length of baguette cut gemstones according to the prior art, in order to determine improvements in the accurate cutting of gemstones by methods according to this disclosure.

[0048] Figures 9A and 9B illustrate variations of the length of gemstones due to production tolerances and compare measurements taken from prior art gemstones and gemstones of the disclosure.

[0049] Figure 9A is a bar graph depicting length measurements of various baguette cut gemstones according to the prior art (see e.g. gemstones of Figures 1A to 1C,) having an intended length (L) of 3 mm and an intended width (W) of 1.5 mm. Figure 9B is a bar graph illustrating length measurements of various gemstones according to embodiments of the disclosure (see e.g. exemplary gemstones of Figures 2A to 2C), having an intended length (L) of 3 mm and an intended width (W) of 1.5 mm. It can clearly be seen from the graph of Figure 9A that the length tolerance range of prior art gemstones used in this study was 0.05 mm; whereas the graph of Figure 9B indicates that the tolerance range for gemstones according to this disclosure was only 0.02 mm.

[0050] As such, the length tolerance range of gemstones according to embodiments of the disclosure was significantly less than the tolerance of gemstones according to the prior art, demonstrating the greatly improved length tolerance / length variation achieved by the aspects and embodiments of this disclosure.

Example 3 (breakage risk):

[0051] The risk of breakage at the edges (or corners) of baguette cut gemstones (1) according to the prior art and according to gemstones (2) of this disclosure was assessed.

[0052] The sharp corner profile of gemstones (1) according to the prior art can result in broken / chipped gemstones, which have significantly reduced commercial value. Furthermore, any such damaged stones may not be set accurately into a jewelry piece. If breakage occurs after fixing the gemstone in its setting, the gemstone may then become loose or even lost.

[0053] Figure 10A depicts a baguette cut gemstone (1) according to the prior art having square (90°) corners at each edge (21). Figure 10B depicts a baguette cut gemstone (2) according to embodiments of the disclosure having obtuse corner angles (>90°) at each edge (20).

[0054] Figure 10A illustrates an inherent weakness at the sharp (right-angled) corner (21), such that the pressure applied to the corner / edge (21) due to a fixing member (36) at the edge (21) can induce a breakage, as indicated by the arrow and fracture line on the upper left corner of Figure 10a. By contrast, the curved sections (16a, 16b) of a gemstone according to embodiments of

the disclosure - as illustrated in Figure 10B - the curvature of the edges / corners spreads the pressure exerted on the edge / corner of the gemstone, for example, as a result of a jewelry mount, and significantly reduces the risk of breakage, as indicated at the arrow on the upper left side of Figure 10A.

Example 4 (optical properties):

[0055] Another benefit of the aspects and embodiments of this disclosure is that the cut of the gemstone does not decrease the ability of the gemstones to reflect light, and so does not impair the optical appearance of the new cut gemstone in comparison to prior art baguette cut gemstone.

[0056] In order to confirm optical properties, computer simulations were conducted using the DiamCalc 3.3.53 software program from Octonus.

[0057] A baguette cut gemstone of the prior art, as shown in Figures 1A to 1C, having the refractive index of a diamond was measured to exhibit a light return mono of 0.97. In contrast, a gemstone according to an embodiment of the present disclosure, as shown in Figures 2A to 2C, having the refractive index of a diamond (and essentially identical dimensions to the prior art gemstone) was also measured to have a light return mono of 0.97, showing that the gemstone cut of this disclosure does not adversely affect optical properties. Comparable results are also expected for other gemstone materials.

Example 5:

[0058] A particular exemplary gemstone of this disclosure has a length of 3 mm and a width of 1.5 mm. The gemstone is four-sided, as illustrated for example in Figures 2A to 2C.

[0059] On the first side or crown (4) a first set of facets (8) has an angle of 16.6° relative to the table (6); a second set of facets (10) has an angle of 39.5° relative to the table (6); a third set of facets (12) has an angle of 39.5°.

[0060] On the second side or pavilion (22), a first set of facets (14) has an angle of 45.5° relative to the table (6); a second set of facets (26) has an angle of 45.5°; a third set of facets has (28) an angle of 36.1°; and a fourth set of facets (30) has an angle of 49.3°.

Example 6:

[0061] Another particular exemplary gemstone of this disclosure has a length of 3 mm and a width of 1.5 mm. The gemstone is four-sided as illustrated in Figures 7A to 7C.

[0062] On the first side or crown (76) a first set of facets (80) has an angle of 11.1°; a second set of facets (82) has an angle of 14.9°; a third set of facets (84) has an angle of 32.4°; a fourth set of facets (86) has an angle of 40.3°; and a fifth set of facets (88) has an angle of 40.6°.

[0063] On the second side or pavilion (92) a first set of facets (94) has an angle of 51.4°; a second set of facets (96) has an angle of 31.3°; a third set of facets (98) has an angle of 40.4°; a fourth set of facets (100) has an angle of 34.5°; and a fifth set of facets (102) has an angle of 31.1°.

[0064] Various embodiments and expressions of the inventive concept are set out in the following numbered clauses.

Clauses

[0065]

1. A method of manufacturing a gemstone, the method comprising the steps of:

   providing a ball of a gemstone material, the ball having a radius R;
   cutting the ball to provide a gemstone comprising a first side, a second side, and a girdle between the first side and the second side, wherein the girdle comprises two curved sections on opposite sides, each curved section having a radius of curvature R equal to the radius of the ball, and two straight sections on opposite sides and spacing apart the two curved sections, wherein the straight and curved sections of the girdle meet at edges extending along the thickness of the girdle between the first and second sides of the gemstone.

2. The method according to clause 1, wherein the ball is made of glass or cubic zirconia.

3. The method according to clause 1 or clause 2, wherein the gemstone is cut to provide two curved sections of girdle, wherein each curved section comprises a vertex.

4. The method according to any preceding clause, wherein the gemstone has a maximum length (2R) measured is a line between the centre points (vertex) of each curved section of the girdle.

5. The method according to clause 4, wherein the maximum length is equal to the diameter of the ball.

6. The method according to any preceding clause, wherein the gemstone has a length (2R) measured between the centre points (vertex) of each curved section of the girdle equal to the diameter of the ball.

7. The method according to any preceding clause, wherein the gemstone has a length (2R) measured between the centre points (vertex) of each curved section of the girdle of not more than 12 mm, not more than 10 mm, not more than 8 mm, not more than 6 mm or not more than 5 mm.

8. The method according to any preceding clause, wherein the gemstone has a length (2R) measured between the centre points (vertex) of each curved section of the girdle of between about 1.5 mm and 12 mm, between about 2 mm and 10 mm, between about 2.5 mm and 8 mm, or between about 3 mm and 6 mm.

9. The method according to any preceding clause, wherein the gemstone is cut to provide a table on the first side, the table spaced from the girdle by a plurality of faceted sides inclined with respect to the table.

10. The method according to clause 9, wherein a first set of the plurality of the faceted sides adjoin the table and a second set of faceted sides adjoin the girdle.

11. The method according to clause 9 or clause 10, wherein the first set of the plurality of faceted sides and the second set of the plurality of faceted sides are the same.

12. The method according to clause 9 or clause 10, wherein the first set of the plurality of faceted sides and the second set of the plurality of faceted sides are different.

13. The method according to any preceding clause, wherein the gemstone is cut to provide a plurality of faceted sides on the second side, the faceted sides on the second side inclined relative to the table, and wherein a plurality of the faceted sides on the second side converge at one of a straight line, a rounded point, or a point.

14. The method according to any preceding clause, wherein the gemstone is cut to provide a ratio of the length of the gemstone to the width of the gemstone of at least 1.5:1, at least 1.75:1, at least 2:1 or at least 2.5:1.

15. The method according to any preceding clause, wherein the width of the gemstone is defined by the straight line distance between the two edges defining the junction between a curved section of the girdle and each adjacent straight section of the girdle.

16. The method according to clause 15, wherein the width of the gemstone is between about 0.75 mm and 8 mm, between about 1 mm and 7 mm, between about 1.5 mm and 6 mm, between about 2 mm and about 5 mm, or between about 2.5 mm and 4 mm.

17. The method according to any preceding clause, wherein the gemstone is cut such that a pair of straight lines drawn respectively between the two edges defining the junctions of each of the curved sections and the respective pair of adjacent straight sections are essentially parallel.

18. The method according to any of clauses 1 to 17, wherein the two straight sections of the girdle are essentially parallel.

19. The method according to any of clauses 1 to 17, wherein the two straight sections of the girdle are inclined relative to each other.

20. The method according to any preceding clause, wherein the gemstone is cut to provide a four-sided girdle having four edges.

21. A gemstone manufactured by a method according to any preceding clause.

22. The gemstone according to clause 21, wherein the gemstone has a length tolerance of not more than about +/- 0.04 mm, not more than about +/- 0.03 mm, or not more than about +/- 0.02 mm.

23. A plurality of gemstones according to clause 21, wherein the plurality of gemstones have a length tolerance of not more than about +/- 0.04 mm, not more than about +/- 0.03 mm, or not more than about +/- 0.02 mm.

24. A gemstone comprising:

a first side,
a second side,
and a girdle between the first side and the second side,
characterized in that the girdle comprises two curved sections on opposite sides, each curved section having a radius of curvature R, and two straight sections on opposite sides and spacing apart the two curved sections, wherein the straight and curved sections of the girdle meet at edges extending between the first and second sides of the gemstone.

25. The gemstone according to clause 24, wherein the gemstone is made of glass or cubic zirconia.

26. The gemstone according to clause 24 or clause 25, wherein the curved sections each include a vertex.

27. The gemstone according to any of clauses 24 to 26, wherein the gemstone has a maximum length (2R) measured between the centre points (vertex) of each curved section of the girdle.

28. The gemstone according to any of clauses 24 to

27, wherein the gemstone has a length (2R) measured between the centre points (vertex) of each curved section of the girdle of not more than 12 mm, not more than 10 mm, not more than 8 mm, not more than 6 mm or not more than 5 mm.

29. The gemstone according to any of clauses 24 to 28, wherein the gemstone has a length (2R) measured between the centre points (vertex) of each curved section of the girdle of between about 1.5 mm and 12 mm, between about 2 mm and 10 mm, between about 2.5 mm and 8 mm, between about 3 mm and 6 mm.

30. The gemstone according to any of clauses 24 to 29, wherein the gemstone has a table on the first side, the table spaced from the girdle by a plurality of faceted sides inclined with respect to the table.

31. The gemstone according to clause 30, wherein a first set of the plurality of the faceted sides adjoin the table and a second set of faceted sides adjoin the girdle.

32. The gemstone according to clause 30 or clause 31, wherein the first set of the plurality of faceted sides and the second set of the plurality of faceted sides are the same.

33. The gemstone according to clause 30 or clause 31, wherein the first set of the plurality of faceted sides and the second set of the plurality of faceted sides are different.

34. The gemstone according to any of clauses 24 to 33, wherein the gemstone comprises a plurality of faceted sides on the second side, the faceted sides on the second side inclined relative to the table, and wherein the plurality of faceted sides on the second side converge at one of a straight line, a rounded point, or a point.

35. The gemstone according to any of clauses 24 to 34, wherein the gemstone has a ratio of the length of the gemstone to the width of the gemstone of at least about 1.5:1, at least about 1.75:1 or at least about 2:1.

36. The gemstone according to any of clauses 24 to 35, wherein the width of the gemstone is defined by the straight line distance between the two edges defining the junction between a curved section of the girdle and each adjacent straight section of the girdle.

37. The gemstone according to any of clauses 24 to 36, wherein the width of the gemstone is between about 0.75 mm and 8 mm, between about 1 mm and 7 mm, between about 1.5 mm and 6 mm, between about 2 mm and about 5 mm, or between about 2.5 mm and 4 mm.

38. The gemstone according to any of clauses 24 to 37, wherein a pair of straight lines drawn respectively between the two edges defining the junctions of each of the curved sections of girdle and the respective pair of adjacent straight sections of the girdle are essentially parallel.

39. The gemstone according to clause 38, wherein the two straight sections of the girdle are essentially parallel.

40. The gemstone according to clause 38, wherein the two straight sections of the girdle are inclined relative to each other.

41. The gemstone according to any of clauses 24 to 40, wherein the gemstone has a four-sided girdle having four edges.

42. An article comprising one or more gemstone according to any of clauses 21 to 41.

43. An article according to clause 42, wherein the article comprises a gemstone setting, the setting comprising at least one securing member for securing the gemstone within the setting and wherein the at least one securing member is arranged adjacent to at least one corresponding edge of the gemstone and is arranged to enclose a portion of a curved section of the gemstone so as to fix the gemstone within the setting.

Claims

1. A method of manufacturing a gemstone, the method comprising the steps of:

providing a ball of a gemstone material, the ball having a radius R;
cutting the ball to provide a gemstone comprising a first side, a second side, and a girdle between the first side and the second side, wherein the girdle comprises two curved sections on opposite sides, each curved section having a radius of curvature R equal to the radius of the ball, and two straight sections on opposite sides and spacing apart the two curved sections, wherein the straight and curved sections of the girdle meet at edges extending along the thickness of the girdle between the first and second sides of the gemstone.

2. The method according to Claim 1, wherein the gem-

stone is cut to provide two curved sections of girdle, wherein each curved section comprises a vertex, and wherein the gemstone has a maximum length (2R) measured is a line between the centre points of each curved section of the girdle, preferably wherein the length is equal to the diameter of the ball.

3. The method according to Claim 1 or Claim 2, wherein the gemstone has a length (2R) measured between the centre points (vertex) of each curved section of the girdle of between about 1.5 mm and 12 mm, between about 2 mm and 10 mm, between about 2.5 mm and 8 mm, or between about 3 mm and 6 mm.

4. The method according to any preceding claim, wherein the gemstone is cut to provide a table on the first side, the table spaced from the girdle by a plurality of faceted sides inclined with respect to the table; optionally wherein a first set of the plurality of the faceted sides adjoin the table and a second set of faceted sides adjoin the girdle.

5. The method according to any preceding claim, wherein the gemstone is cut to provide a plurality of faceted sides on the second side, the faceted sides on the second side inclined relative to the table, and wherein a plurality of the faceted sides on the second side converge at one of a straight line, a rounded point, or a point.

6. The method according to any preceding claim, wherein the width of the gemstone is defined by the straight line distance between the two edges defining the junction between a curved section of the girdle and each adjacent straight section of the girdle; and optionally wherein the width of the gemstone is between about 0.75 mm and 8 mm, between about 1 mm and 7 mm, between about 1.5 mm and 6 mm, between about 2 mm and about 5 mm, or between about 2.5 mm and 4 mm.

7. The method according to any preceding claim, wherein the two straight sections of girdle are essentially parallel; or wherein the two straight sections of girdle are inclined relative to each other.

8. A gemstone manufactured by a method according to any preceding claim.

9. The gemstone according to Claim 8, wherein the gemstone has a length tolerance of not more than about +/- 0.04 mm, not more than about +/- 0.03 mm, or not more than about +/- 0.02 mm.

10. A gemstone comprising:

a first side,
a second side,
and a girdle between the first side and the second side,
characterized in that the girdle comprises two curved sections on opposite sides, each curved section having a radius of curvature R, and two straight sections on opposite sides and spacing apart the two curved sections, wherein the straight and curved sections of the girdle meet at edges extending between the first and second sides of the gemstone.

11. The gemstone according to Claim 10, wherein the gemstone has a length (2R) measured between the centre points of each curved section of the girdle of between about 1.5 mm and 12 mm, between about 2 mm and 10 mm, between about 2.5 mm and 8 mm, between about 3 mm and 6 mm.

12. The gemstone according to Claim 10 or Claim 11, wherein the gemstone has a table on the first side, the table spaced from the girdle by a plurality of faceted sides inclined with respect to the table, optionally wherein a first set of the plurality of the faceted sides adjoin the table and a second set of faceted sides adjoin the girdle.

13. The gemstone according to any of Claims 10 to 12, wherein the width of the gemstone is defined by the straight line distance between the two edges defining the junction between a curved section of the girdle and each adjacent straight section of the girdle; optionally wherein the width of the gemstone is between about 0.75 mm and 8 mm, between about 1 mm and 7 mm, between about 1.5 mm and 6 mm, between about 2 mm and about 5 mm, or between about 2.5 mm and 4 mm.

14. The gemstone according to any of Claims 10 to 13, wherein a pair of straight lines drawn respectively between the two edges defining the junctions of each of the curved sections of girdle and the respective pair of adjacent straight sections of the girdle are essentially parallel; and wherein: (i) the two straight sections of the girdle are essentially parallel; or (ii) the two straight sections of the girdle are inclined relative to each other.

15. An article comprising a gemstone according to any of Claims 8 to 14.

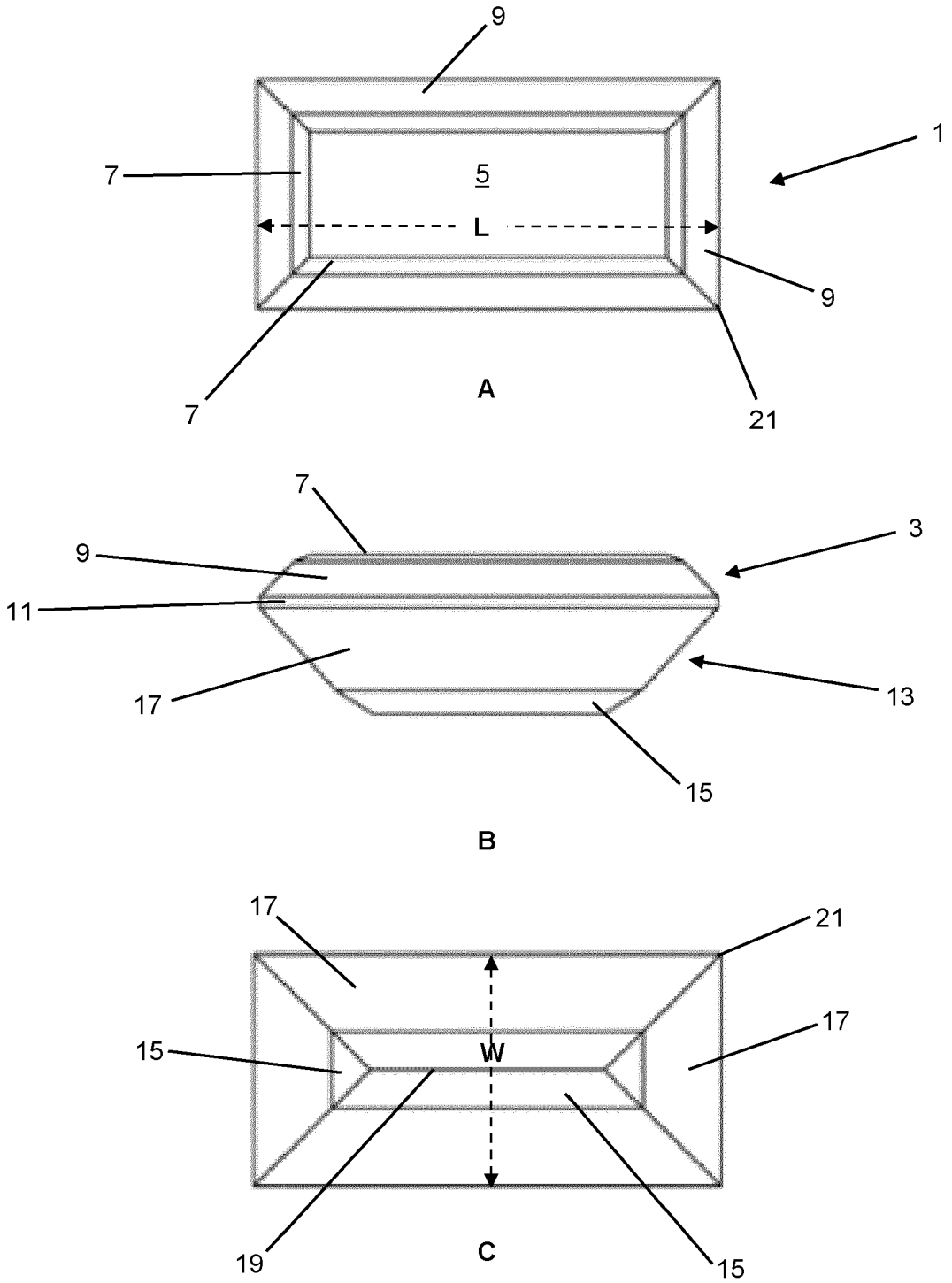

Figure 1

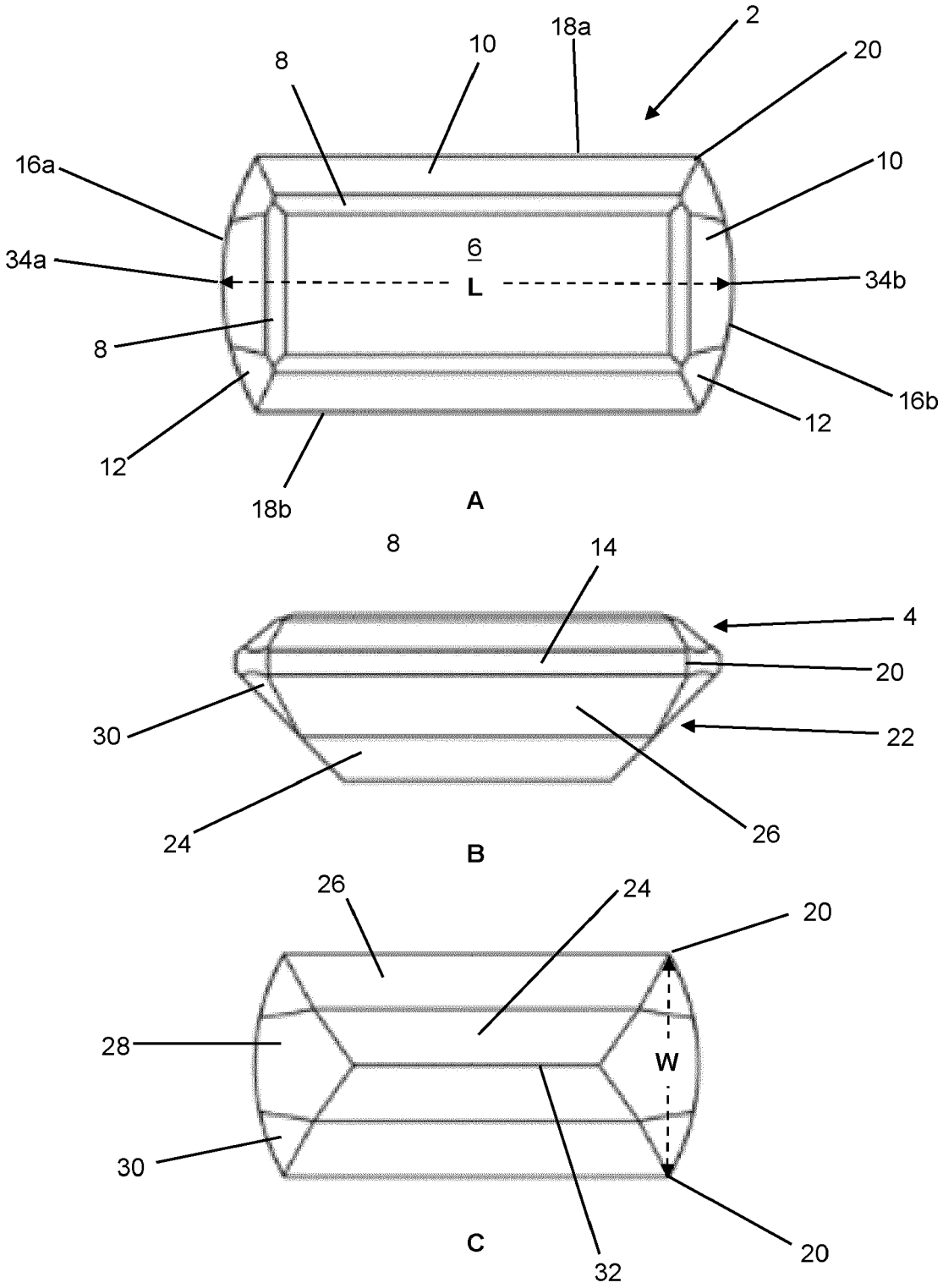
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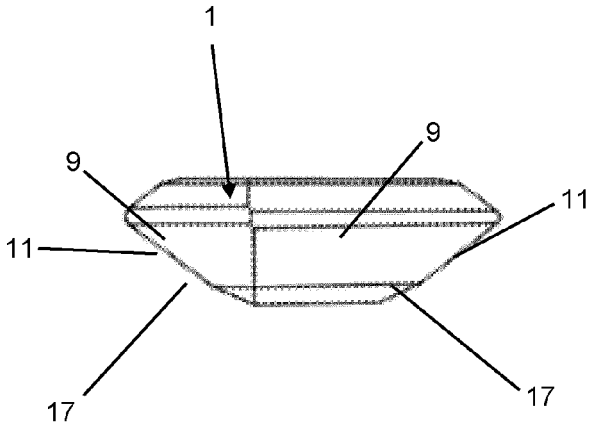
Figure 2



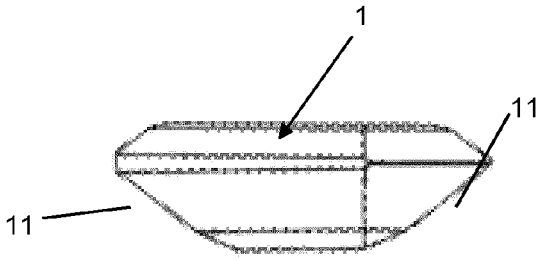


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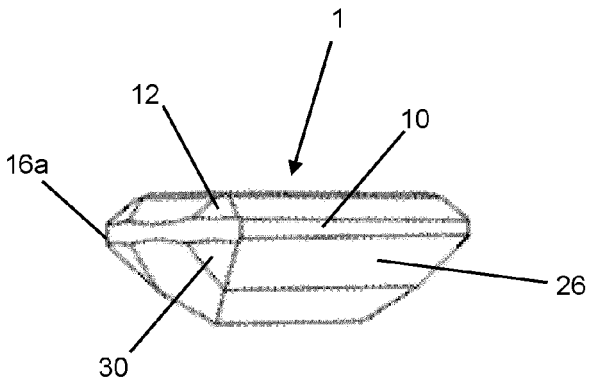
Figure 3



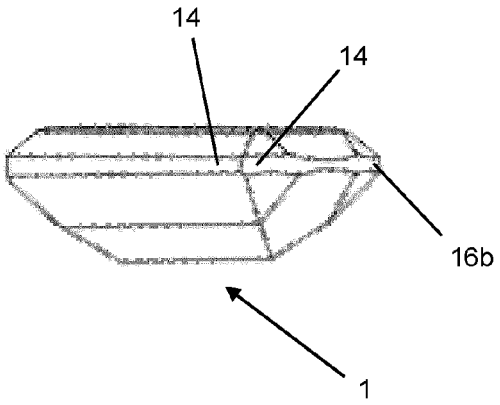


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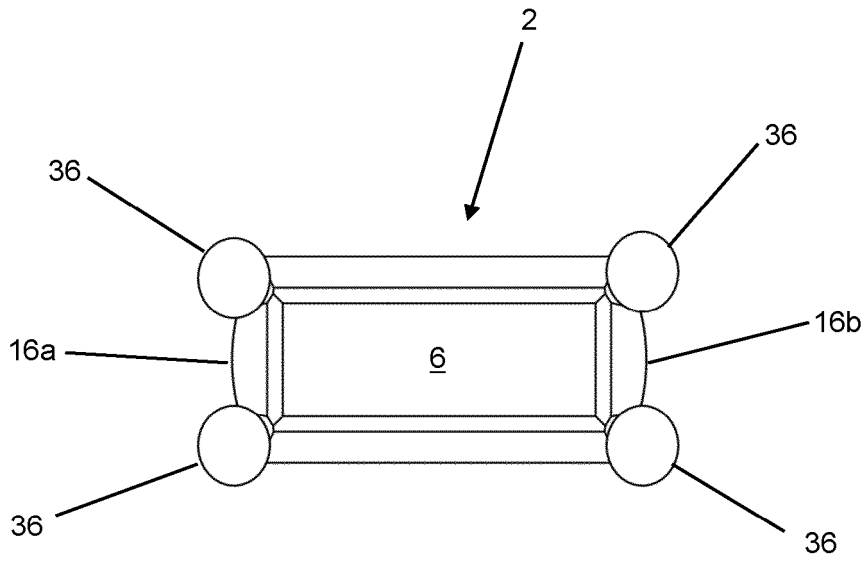
Figure 4



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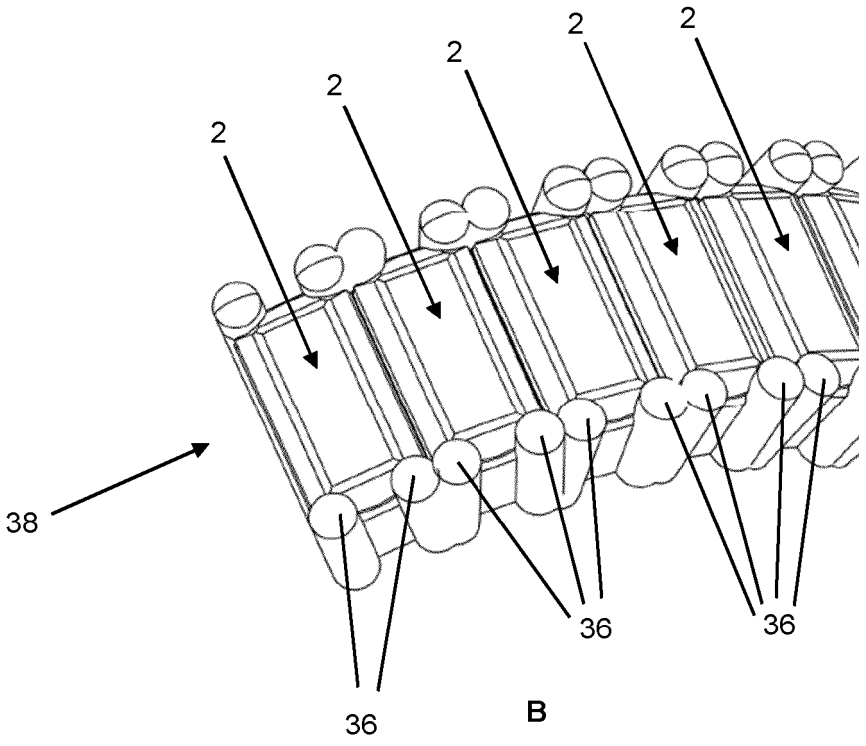

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Figure 5

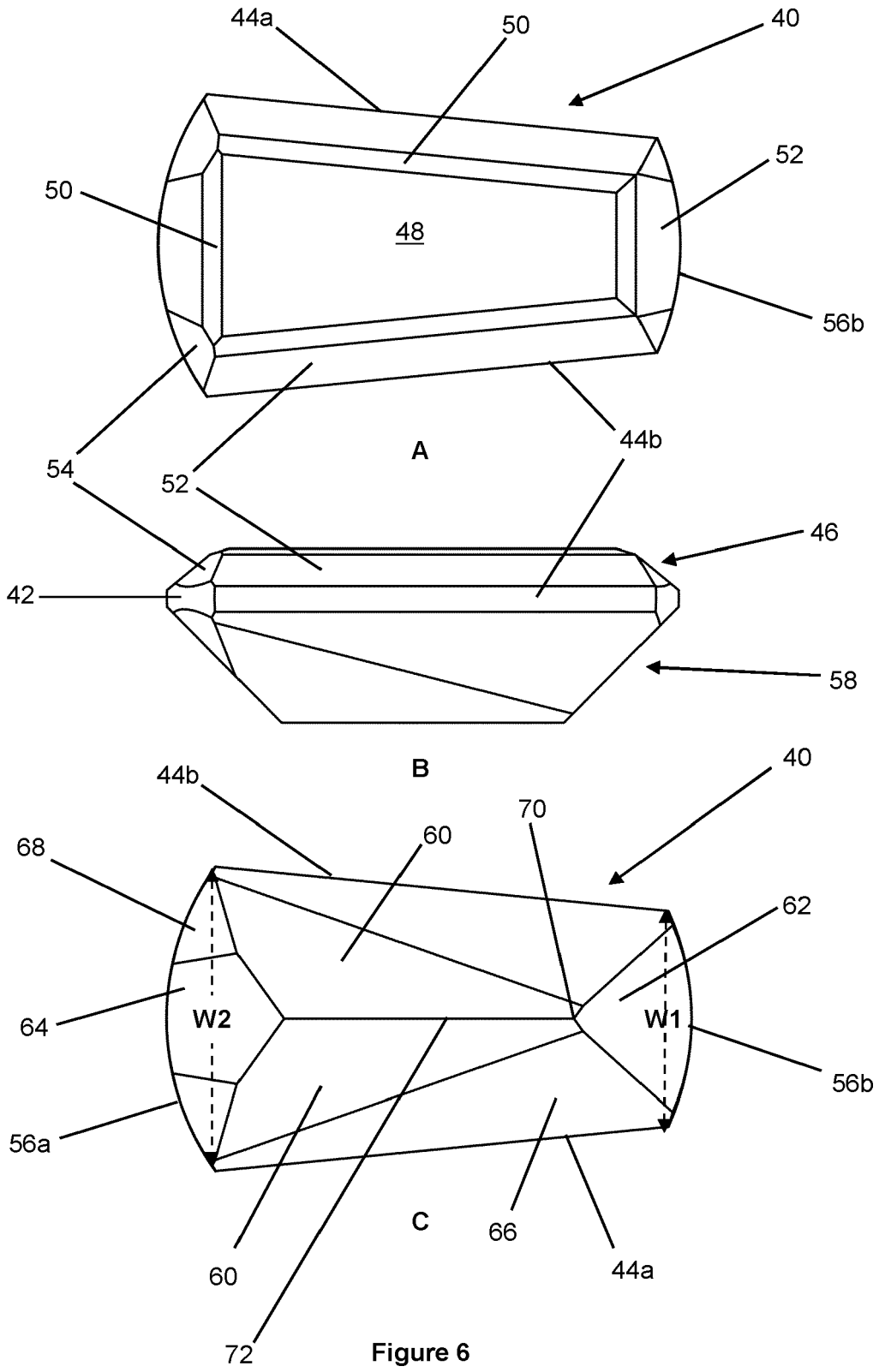
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Figure 6

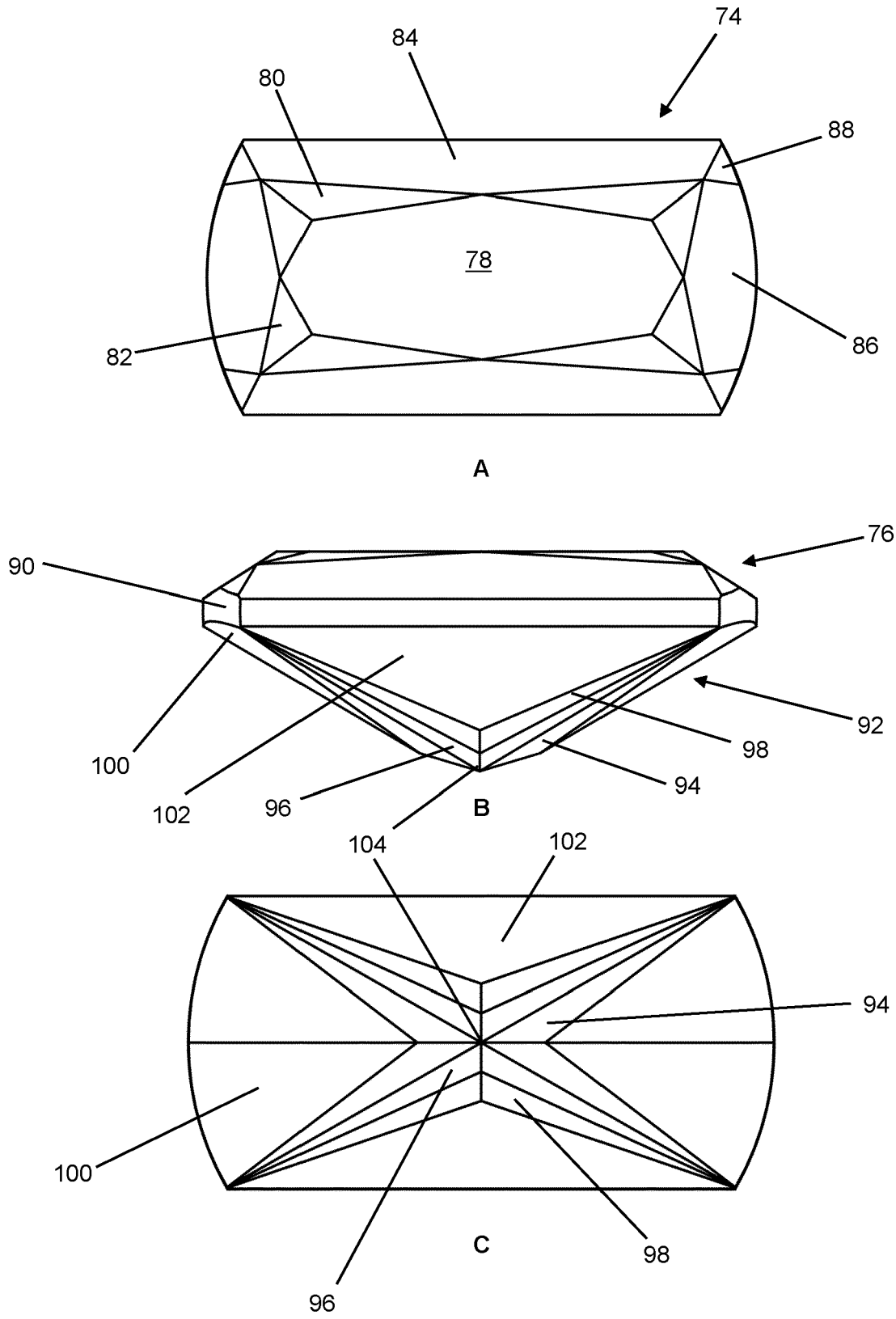
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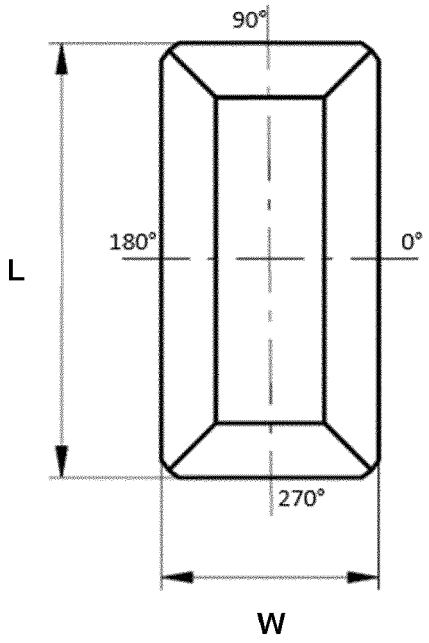
Figure 7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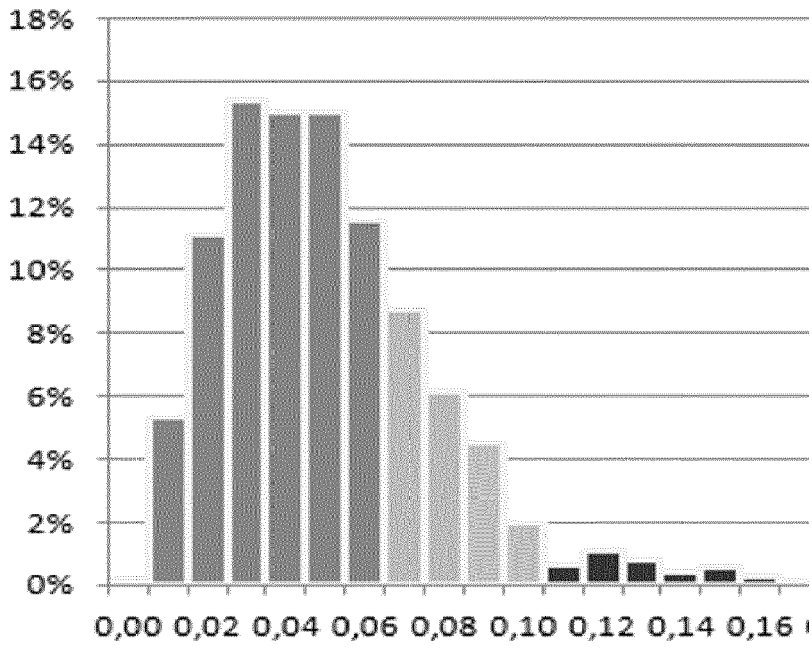
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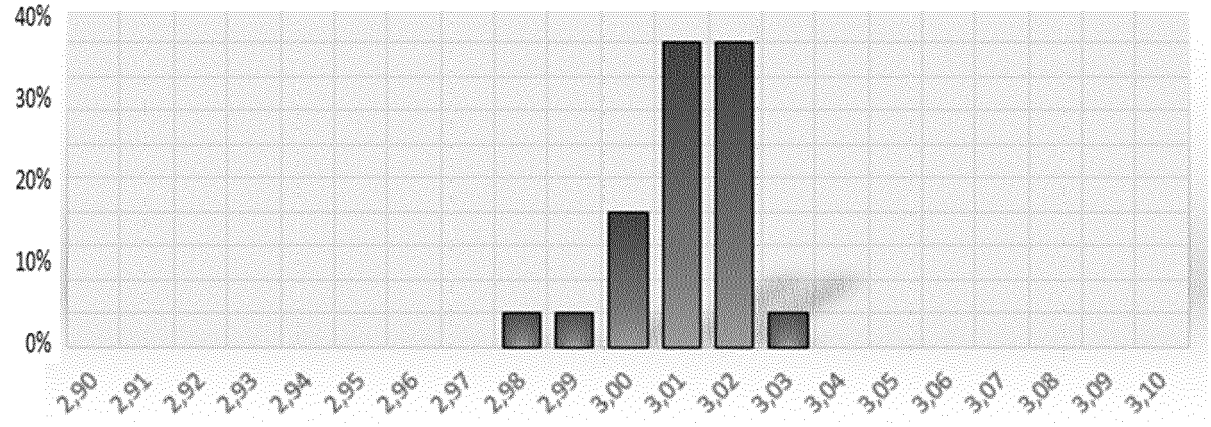
Figure 8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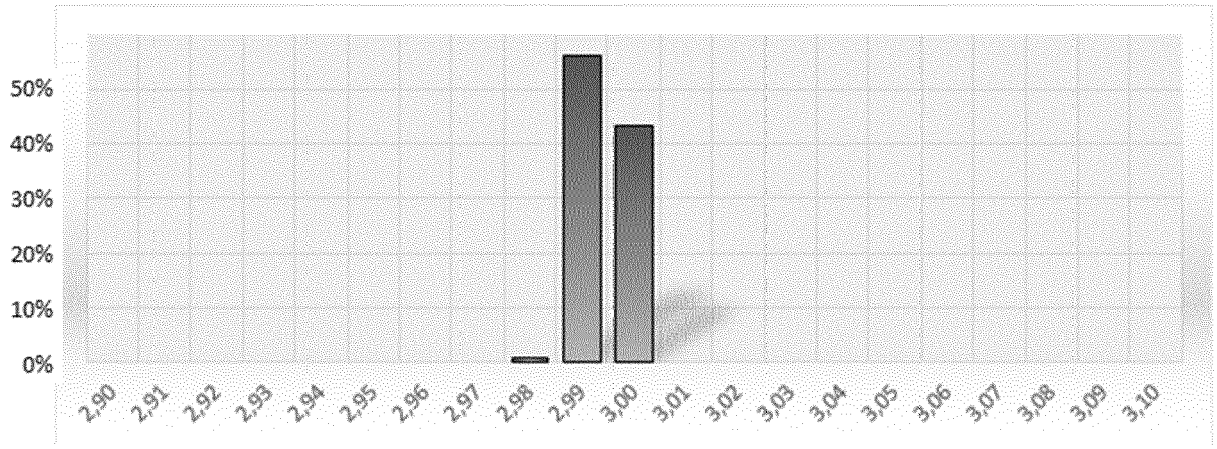
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Figure 9

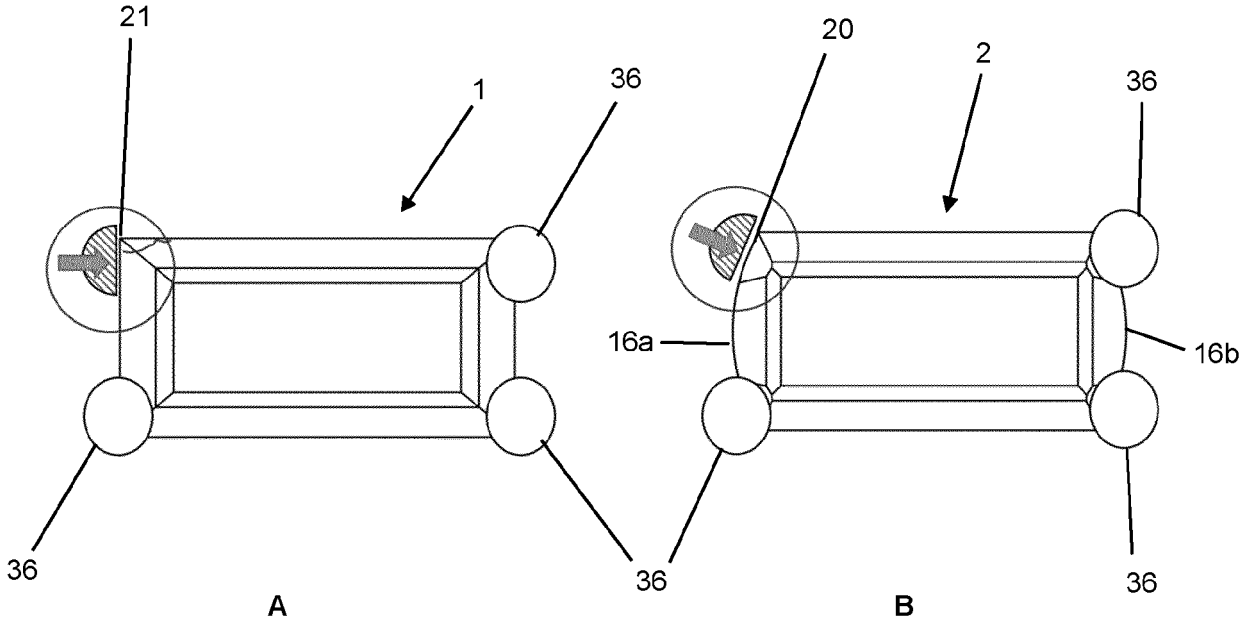

Figure 10

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 22 20 8424

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	US 9 398 791 B1 (SLOWINSKI CHRISTOPHER [US]; ECNA LLC) 26 July 2016 (2016-07-26) * abstract; figures 1-4 * * column 2, line 38 - line 47 *	8-15 1-7	INV. A44C17/00
X	US D 400 819 S1 (AMBAR BETZALEL) 10 November 1998 (1998-11-10) * the whole document *	8-15	
X	WO 2007/048331 A1 (LI BINGZHENG [CN]) 3 May 2007 (2007-05-03) * abstract; figure 3G *	8-15	
			TECHNICAL FIELDS SEARCHED (IPC) A44C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 March 2023	Thielgen, Robert

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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P : intermediate document

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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 22 20 8424

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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30-03-2023

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