



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
08.10.2008 Bulletin 2008/41

(51) Int Cl.:
A44C 17/00 (2006.01)

(21) Application number: **07425203.2**

(22) Date of filing: **05.04.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(71) Applicant: **Cielo S.R.L.**
36051 Olmo di Creazzo (VI) (IT)

(72) Inventor: **Bonoli, Massimiliano**
47034 Forlimpopoli
Forli' (IT)

(74) Representative: **Petruzzello, Aldo et al**
Racheli & C. S.p.A.
Viale San Michele del Carso, 4
20144 Milano (IT)

Remarks:

Amended claims in accordance with Rule 137(2) EPC.

(54) **Method for producing precious or semi-precious stones**

(57) A method for producing precious or semi-precious stones comprising the following steps is described:
- cutting and polishing of a rough crystal (1) so as to obtain a polyhedron of cut crystal (2);

- gluing together of at least four polyhedrons (2) of cut crystal so as to obtain a larger polyhedron (4); and
- cutting of the polyhedron (4) of glued crystals so as to obtain a finished precious or semi-precious stone (6).

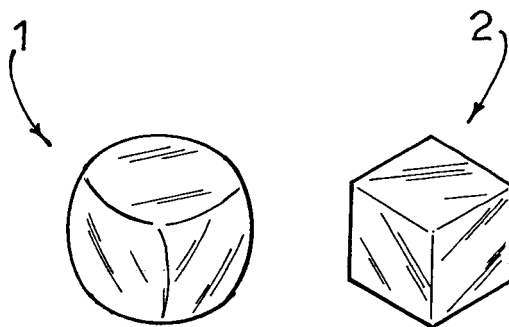


FIG. 3

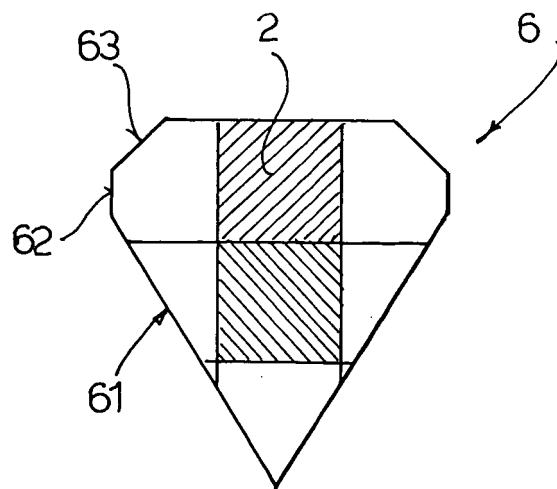


FIG. 6

Description

[0001] The present invention refers to a method for producing precious or semi-precious stones.

[0002] As is known, a precious stone, such as, for example, a diamond, an emerald, a ruby, a sapphire, etc. or even a semi-precious stone such as, for example, beryls, quartz, aquamarine, etc., is produced by cutting a rough crystal. Various types of cutting exist, such as, for example, faceting (brilliant cut, emerald cut, princess cut, etc.), cabochon and mixed.

[0003] In Figure 1 a precious stone 100 obtained by cutting a rough crystal is shown. The precious stone 100 has a lower portion 101 called "pavilion", possibly an intermediate portion 102 called "girdle", and an upper portion 103 called "crown" which varies in shape according to the type of cut.

[0004] The value of the stone is given by the carats or by the points. A carat corresponds to 1/5 of a gram in weight and to 100 points. Clearly, the larger the stone, the greater its value will be.

[0005] For this reason small rough crystals (about 5-10 points) have a low commercial value because to be suitably cut into a finished precious stone they have a weight loss which varies from 20% to 40% according to the type of cut.

[0006] According to the prior art, in order to increase the carat weight of the stone, it is known to obtain a precious stone, like that illustrated in Figure 1, by joining two or three crystals defined gemologically as a "doublet" and a "triplet". As shown in Figure 2, three rough crystals A, B, C are cut separately to form the pavilion, the girdle and the crown, respectively. Crystals A, B and C are then joined together, by means of an adhesive, such as epoxy glue, for example.

[0007] However, this procedure holds drawbacks from the point of view of the quality of the stone. In fact, a high thickness of glue must be used to ensure a sufficient strength of the join. As a result, the walls of the join in the crystals are translucent, worsening the effect of brilliance of the stone. In addition, over time the epoxy glue tends to make the crystal opaque.

[0008] Furthermore, only rough crystals with a particular shape can be used with this system, namely low and wide ones, and in any case there is a high waste of precious material for cutting of the crystals.

[0009] Object of the present invention is to overcome the drawbacks of the prior art by providing a method of producing a precious or a semi-precious stone that is able to employ small sized crystals to obtain stones of high carat weight and with a minimum waste of material.

[0010] Another object of the present invention is to provide a method of producing a precious or semi-precious stone that has a high carat weight and a lower cost compared with the same type of stone of the same carat weight.

[0011] Yet another object of the present invention is to produce precious and semi-precious stones that do not

exist in nature, for example a single stone with different colours.

[0012] These objects are achieved in accordance with the invention with the characteristics listed in appended independent claim 1.

[0013] Advantageous embodiments of the invention are apparent from the dependent claims.

[0014] The method for producing precious and semi-precious stones comprises the following steps:

- cutting and polishing a rough crystal so as to obtain a polyhedron of cut crystal;
- gluing together of at least four polyhedrons of cut crystal so as to obtain a larger polyhedron;
- cutting of the polyhedron of glued crystals so as to obtain a finished precious or semi-precious stone.

[0015] The advantages of the method according to the invention are obvious in that it allows a precious or a semi-precious stone of medium or of large size to be obtained, with a similar visual effect to that of a stone obtained from a single crystal, but at a considerably lower cost, and furthermore with the possibility of creating precious and semi-precious stones that do not exist in nature.

[0016] Further characteristics of the invention will be made clearer by the detailed description that follows, referring to a purely exemplifying and therefore non-limiting embodiment thereof, illustrated in the appended drawings, in which:

Figure 1 is a side view of a precious stone with a faceted cut, according to the prior art;

Figure 2 is an exploded side view of an embodiment of a precious stone according to the prior art obtained by gluing of three crystals (Triplet);

Figure 3 is a perspective view illustrating a small-sized rough crystal and the crystal cut into a cube according to the method of the invention;

Figure 4 is a perspective view illustrating a large-sized cube obtained by assembling the cut crystals of Figure 3;

Figure 5 is a perspective view of the precious stone obtained with the method according to the invention; and

Figure 6 is an axial sectional view of the precious stone of Figure 5.

[0017] With reference to Figure 3, the starting point is a rough crystal 1 having an irregular shape. A small-sized rough crystal 1 is preferably taken, for example with a carat weight of about 5-10 points, it being understood that the method according to the invention can be used for crystals with a higher carat weight. The rough crystal 2 is cut and polished by means of cutting and polishing machines for precious and semi-precious stones, per se known, so as to form a polyhedron 2 with flat faces 3. The polyhedron 2 is preferably a prism and the prism 2

is preferably a cube or a parallelepiped or a pyramid so as to obtain the least waste of material.

[0018] The cut crystals 2 are glued together, so as to obtain a prism 4 with a substantially regular shape. The prism 4 is preferably a cube or a parallelepiped.

[0019] At least four cut crystals 2 are assembled to obtain the prism 4.

[0020] In the example in the figure, a cube 4 comprising twenty-seven cube-cut crystals 2 is shown. In this case, if each crystal 2 has a carat weight of about 8-10 points, the cube 4 (which in turn will be cut again) can reach a carat weight of about 240 points, that is, 2.4 carats.

[0021] To glue the cut crystals 2 together, a UV transparent glue is used, preferably a UV-A glue, that is, a liquid or fluid adhesive which is hardened (polymerised) by ultraviolet UV-A irradiation, generated by means of special lamps or ovens which give out a radiation in the range of UV-A ultraviolet rays with a wavelength between 320 and 400 nm. The UV glue is preferably a two-component, transparent acrylic glue.

[0022] This type of UV-A glue also allows precious or semi-precious crystals of different types, such as corundum, rubies, quartz, beryls, diamonds etc. to be glued together. Furthermore a minimum thickness of glue, in the order of a few microns, can be used, ensuring an optimal cohesion force and at the same time minimizing the translucid, diffraction effect of glue.

[0023] At this point, the prism 4 is cut in traditional manner, as if it were a single rough crystal, so as to obtain a finished precious stone 6 (Figures 5 and 6) which comprises a pavilion 61, a girdle 62 and a crown 63. As shown in Figure 6, the precious stone 6 which is obtained in the end comprises a plurality of cubes 2 of crystal glued together; many of said cubes (those highlighted in bold) have not been cut, so as to obtain a minimum waste of material.

[0024] Furthermore, the UV-A glue is perfectly transparent and does not become opaque over time. Therefore the visual effect of the precious stone 6 obtained with the method according to the invention is essentially the same as that of a precious stone obtained by cutting a single crystal.

[0025] Numerous variations and modifications of detail within the reach of a person skilled in the art can be made to the present embodiment of the invention without thereby departing from the scope of the invention as set forth in the appended claims.

Claims

1. A method for producing precious and semi-precious stones comprising the following steps:

- cutting and polishing of a rough crystal (1) so as to obtain a polyhedron of cut crystal (2);
- gluing together of at least four polyhedrons (2) of cut crystal so as to obtain a larger polyhedron

(4); and

- cutting of the polyhedron (4) of glued crystals so as to obtain a finished precious or semi-precious stone (6).

2. A method according to claim 1, **characterised in that** said gluing step comprises the application of a UV glue and the hardening or the polymerisation of said glue by means of UV irradiation.
3. A method according to claim 2, **characterised in that** said gluing step comprises the application of a UV-A glue.
4. A method according to claim 2 or 3, **characterised in that** said UV glue is transparent.
5. A method according to any one of claims 2 to 4, **characterized in that** a layer of UV glue having a thickness in the order of a few microns is applied to the faces (3) of said polyhedrons of cut crystal (2).
6. A method according to any one of the preceding claims, **characterised in that** said cut crystals (2) are shaped as a prism.
7. A method according to any one of the claims 1 to 5, **characterised in that** said cut crystals (2) are shaped as a cube or a parallelepiped.
8. A method according to any one of the claims 1 to 5, **characterised in that** said cut crystals (2) are shaped as a pyramid.
9. A method according to any one of the preceding claims, **characterised in that** said cut crystals (2) have a carat weight below 5 points.
10. A method according to any one of the preceding claims, **characterised in that** said polyhedron (4) of cut crystals is a cube or a parallelepiped.
11. A method according to any one of claims 1 to 9, **characterised in that** said polyhedron (4) of cut crystals is a pyramid.
12. A method according to any one of the preceding claims, **characterised in that** said polyhedron (4) of cut crystals comprises twenty-seven cut crystals.
13. A method according to any one of the preceding claims, **characterised in that** said polyhedron (4) of cut crystals has a carat weight of about 240 points.
14. A method according to any one of the preceding claims, **characterised in that** said polyhedron (4) of cut crystals comprises crystals (2) of the same nature.

15. A method according to any one of the claims 1 to 13, **characterised in that** said polyhedron (4) of cut crystals comprises crystals (2) of different natures.
16. A method according to any one of the preceding claims, **characterised in that** said finished precious or semi-precious stone (6) comprises a pavilion (61), a girdle (62) and a crown (63). 5
17. A method according to claim 16, **characterised in that** the crown (63) of said finished precious or semi-precious stone is cut with a faceted or mixed cut. 10
18. A method according to any one of claims 1 to 15, **characterised in that** said finished precious or semi-precious stone is cut with a cabochon cut. 15
19. A finished precious or semi-precious stone (6) **characterised in that** it is obtained with the method according to any one of the preceding claims. 20

Amended claims in accordance with Rule 137(2) EPC.

1. A method for producing precious and semi-precious stones comprising the following steps: 25
- cutting and polishing of rough crystals (1) so as to obtain polyhedrons (2) of cut crystal; 30
 - gluing together of said polyhedrons (2) of cut crystal ; and
 - cutting of the polyhedron (4) of glued crystals so as to obtain a finished precious or semi-precious stone (6) comprising a pavilion (61) and a crown (63), 35
- characterised in that**
at least four polyhedrons (2) of cut crystal are glued together, wherein at last two polyhedrons (2) are glued together side by side so as to obtain a larger polyhedron (4) forming at least one of said pavilion (61) or said crown (63). 40
2. A method according to claim 1, **characterised in that** said gluing step comprises the application of a UV glue and the hardening or the polymerisation of said glue by means of UV irradiation. 45
3. A method according to claim 2, **characterised in that** said gluing step comprises the application of a UV-A glue. 50
4. A method according to claim 2 or 3, **characterised in that** said UV glue is transparent. 55
5. A method according to any one of claims 2 to 4, **characterized in that** a layer of UV glue having a

thickness in the order of a few microns is applied to the faces (3) of said polyhedrons of cut crystal (2).

6. A method according to any one of the preceding claims, **characterised in that** said cut crystals (2) are shaped as a prism.

7. A method according to any one of the claims 1 to 5, **characterised in that** said cut crystals (2) are shaped as a cube or a parallelepiped.

8. A method according to any one of the claims 1 to 5, **characterised in that** said cut crystals (2) are shaped as a pyramid.

9. A method according to any one of the preceding claims, **characterised in that** said cut crystals (2) have a carat weight below 5 points.

10. A method according to any one of the preceding claims, **characterised in that** said polyhedron (4) of cut crystals is a cube or a parallelepiped.

11. A method according to any one of claims 1 to 9, **characterised in that** said polyhedron (4) of cut crystals is a pyramid.

12. A method according to any one of the preceding claims, **characterised in that** said polyhedron (4) of cut crystals comprises twenty-seven cut crystals.

13. A method according to any one of the preceding claims, **characterised in that** said polyhedron (4) of cut crystals has a carat weight of about 240 points.

14. A method according to any one of the preceding claims, **characterised in that** said polyhedron (4) of cut crystals comprises crystals (2) of the same nature.

15. A method according to any one of the claims 1 to 13, **characterised in that** said polyhedron (4) of cut crystals comprises crystals (2) of different natures.

16. A method according to any one of the preceding claims, **characterised in that** said finished precious or semi-precious stone (6) comprises, a girdle (62) between said pavilion (61) and said crown (63).

17. A method according to claim 16, **characterised in that** the crown (63) of said finished precious or semi-precious stone is cut with a faceted or mixed cut.

18. A method according to any one of claims 1 to 15, **characterised in that** said finished precious or semi-precious stone is cut with a cabochon cut.

19. A finished precious or semi-precious stone (6) comprising a pavilion (61) and a crown (63), **characterised in that** it comprises at least four polyhedrons (2) of cut crystal glued together, wherein at last two polyhedrons (2) of cut crystal are glued together side by side so as to obtain a larger polyhedron (4) and so as said pavilion (61) or said crown (63) comprises at last two polyhedrons (2) of cut crystal glued together side by side.

10

20. A finished precious or semi-precious stone (6) according to claim 19, **characterized in that** it further comprising a girdle (62) between said pavilion (61) and said crown (63).

15

20

25

30

35

40

45

50

55

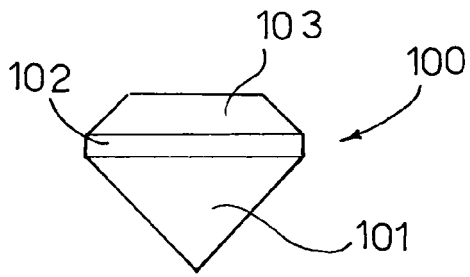


FIG. 1
PRIOR ART

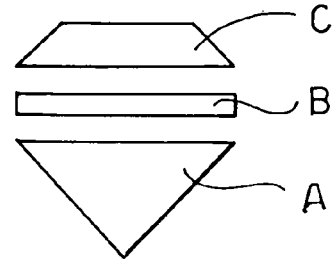


FIG. 2
PRIOR ART

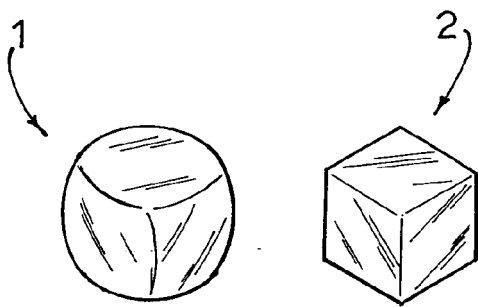


FIG. 3

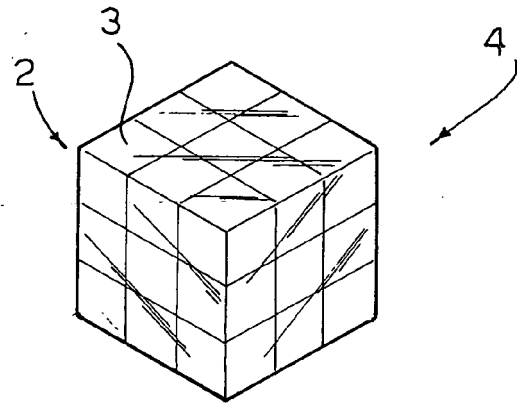


FIG. 4

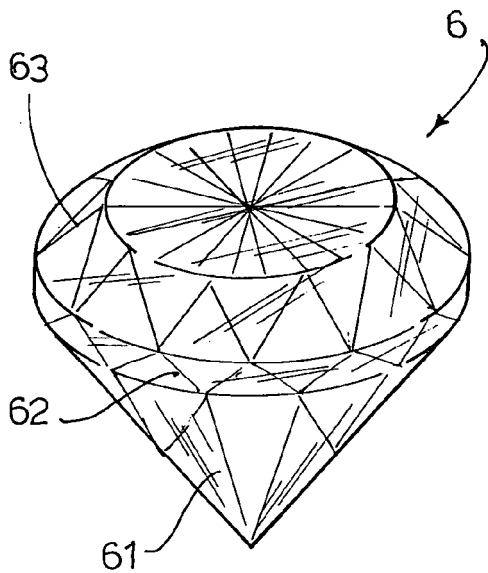


FIG. 5

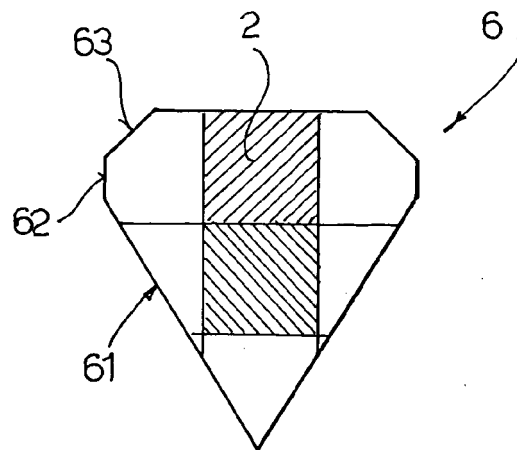


FIG. 6



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5203

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	FR 728 222 A (STRASBACH JEAN-BAPTISTE) 2 July 1932 (1932-07-02) * page 1, line 38 - line 52; figures 1-6 *	1-19	INV. A44C17/00
X	US 3 808 836 A (JONES H) 7 May 1974 (1974-05-07) * column 5, line 18 - line 28; figure 3 *	1,19	
A	US 4 262 497 A (MORRIS ROBERT C ET AL) 21 April 1981 (1981-04-21) * column 3, line 18 - line 34; figure 2 *	1-19	
A	US 138 314 A (BRUHL SIMON) 29 April 1873 (1873-04-29) * page 1; figures 1-6 *	1-19	
			TECHNICAL FIELDS SEARCHED (IPC)
			A44C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 July 2007	Examiner Horubala, Tomasz
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention 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	

1
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 42 5203

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

13-07-2007

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
FR 728222	A	02-07-1932	NONE	

US 3808836	A	07-05-1974	NONE	

US 4262497	A	21-04-1981	NONE	

US 138314	A		NONE	
