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(54) **A cut diamond**

Geschliffener Diamant

Diamant taillé

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Description

[0001] The present invention concerns a cut diamond.

[0002] The quality and value of cut and polished diamonds for ornamental use is often described by the four C's:

- Carat
- Clarity
- Color
- Cut

[0003] Carat is the unit of weight of diamonds with one carat being equal to 200 mg. Traditionally the value of a diamond has been determined by its size or weight expressed in carats. The larger the stone, the higher its value.

[0004] Clarity refers to the imperfections and inherent impurities that are already present in the raw stone.

[0005] Color is also determined by the raw stone. The colorless and transparent stones are scarcer and thus more valuable.

[0006] Cut refers to the cutting and polishing of the stone in a particular form having numerous facets. The way a stone is cut determines the path that light entering the stone will follow. Almost all of the light that enters the stone will also leave it again. The reflections, refraction and dispersion along the light path will determine the brilliance and the fire of the stone.

[0007] Color and clarity are intrinsic properties of the stone, for which grading scales have been established. Their values cannot be changed to augment the value of the stone.

[0008] Historically, the stones were cut and polished in ways that tried to preserve the maximum of the weight during the process while faulty places like spots or grains could be removed. Since the play of light in the stone was not coordinated, the light did not produce much fire, nor brilliance in the stone.

[0009] Over the last centuries, the brilliance and the fire exhibited by a cut stone became features that were more appreciated than the mere weight of the stone.

[0010] Even with modern techniques, the cutting and polishing of a diamond crystal always results in dramatic loss of weight: this loss is rarely less than fifty percent.

[0011] When the crystal is an octahedron, the round brilliant cut is often preferred as often two stones can be cut from one crystal. As its name suggests the brilliant cut is characterized by much brilliance and fire.

[0012] In the middle of the seventeenth century, the first diamonds were cut in a form that was a precursor of the present-day brilliant cut, the so-called mazarins or double-cut brilliants. Since then the design of the brilliant cut has further evolved.

[0013] The different dimension and angles of a brilliant cut to maximize the brilliance were determined by skill rather than by science. In 1912 Marcel Tolkowsky published his book "Diamond design, A study of Reflection and Refraction in Diamond". This book contains a mathematical study to determine the optimal angles and dimensions to achieve the maximum brilliance with the brilliant cut.

[0014] Tolkowsky's ideal model did not take all the aspects into consideration: it was a two-dimensional model, did not consider the effects of the girdle. Since then the model has been slightly fine-tuned. But nevertheless investigation of diamonds that were considered to be cut and polished very well and that were obtained by mere skill were found to have almost the same dimensions and angles as predicted by Tolkowsky,s ideal model. An example can be found in EP1181875. An alternative construction to the traditional ideal-cut brilliant can be found in US20060086143 disclosing eight extra facets on the crown and sixteen extra facets on the pavilion.

[0015] We can conclude that the value of a stone of given size can be influenced by differing the way that it is cut. The purpose is to obtain a maximum of brilliance and fire in the stone while preserving the maximum of weight possible.

[0016] The problem is that these are conflicting requirements.

[0017] It is therefore an objective of the present invention to provide a solution that at least alleviates the above-mentioned and other disadvantages.

[0018] Thereto the present invention discloses a cut diamond, characterized in that it is a convex polyhedron and has eighty-nine facets, which are thirty-two facets more than a traditional ideal-cut brilliant, in particular eight extra facets on the crown by substituting each of the eight kite facets of a traditional ideal-cut brilliant diamond by two triangular facets, namely a table break facet and a girdle break facet, which have a common edge namely the girdle break which lies in a plane parallel to the table, and whereby twenty-four of the thirty-two extra facets are added in the pavilion by substituting each of the eight lower main facets of a traditional ideal-cut brilliant with four facets, namely a bottom star pavilion, two bottom star halves, and bottom girdle pavilion, touching each other in a point, namely the meeting point, and whereby the pavilion height is approximately three percent longer than the pavilion height in the corresponding traditional ideal-cut brilliant.

[0019] A cut diamond according to the invention does further enhance the brilliancy and fire of such a diamond and

at the same time allows to preserve more of the weight of the raw stone compared to the brilliant cut design.

[0020] The most important technical feature of a cut diamond according to the invention lies thus in the weight preservation compared to the ideal-cut brilliant.

[0021] An esthetical and quality feature of the invention is the augmented brilliance and fire exposed by such a cut diamond according to the invention.

[0022] Another esthetical feature is the eight-pointed star shape that can be observed in the diamond.

[0023] With the intention of better showing the characteristics of the invention, hereafter, as an example without any limitative character, a preferred form of embodiment is described of a cut diamond, with reference to the accompanying drawings, wherein:

figure 1 schematically represents a front elevational view of a cut diamond according to known ideal-cut brilliant;
figure 2 is a top plan view of the diamond in figure 1;
figure 3 is a bottom plan view of the diamond in figure 1;
figure 4 shows a partial cross section along line IV-IV in figure 2;
figure 5 schematically represents a front elevational view of a cut diamond according to the invention;
figure 6 is a top plan view of the diamond in figure 4;
figure 7 is a bottom plan view of the diamond in figure 4;
figure 8 shows a partial cross section along line VIII-VIII in figure 6;
figure 9 represents the diamond in figure 5 with some light rays indicated.

[0024] Since the shape of a cut diamond according to the invention can be most easily explained starting from the shape of an ideal-cut brilliant, we will first explain the geometry of such an ideal-cut brilliant 1.

[0025] An ideal-cut brilliant 1 consists of fifty-seven facets when no culet is present. The shape of such a diamond can be deducted from the figures 1 to 4.

[0026] An ideal-cut brilliant 1 consists of an upper part, called the crown 2, and a lower part, called the pavilion 3. These two parts are separated by a relative thin disk, called the girdle 4. For the purpose of the invention, it is not necessary that the girdle 4 is present. When no girdle 4 is present the horizontal plane common to the crown 2 and the pavilion 3 can still be called the girdle plane. The girdle 4 itself may be facetted or not. This is not relevant to the present invention.

[0027] The crown 2 comprises thirty-three facets.

[0028] The top facet of the crown 2 lies in a horizontal plane and is called the table 5.

[0029] There are eight crown kite facets 6, eight crown star facets 7 and sixteen top halve facets 8.

[0030] The pavilion 3 comprises 16 bottom halve facets 9 and eight lower main facets 10. The pavilion 3 may also contain a culet facet, which is a facet located near the apex of the pavilion 3 and which is parallel to the table 5.

[0031] In an ideal-cut brilliant 1 the axis through the center of the table 5 and through the apex of the pavilion 3, or the center of the culet, if present, is, as known, an eight-fold symmetry axis.

[0032] The shape of the ideal-cut brilliant 1 can be described by eight independent parameters. Other proportions can be easily calculated from the independent parameters. The following table 1 summarizes in a known manner, the most important parameters with indication of their ranges and a reference to the figures.

Table 1

	Min	**Max**	**Ref.**
Diameter in girdle plane	100%	100%	R
Total Depth	59,80%	62,40%	d
Table	53,00%	57,40%	f
Crown Height	13,80%	15,90%	a
Girdle	2,80%	4,00%	b
Pavilion Depth	42,00%	43,50%	c
Star Angle	23.0°	24.4°	D
Top Halves Angle	41.0°	42.9°	C
Crown Angle	33.7°	35.4°	A
Bottom Halves Angle	41.9°	42.0°	E

(continued)

	Min	Max	Ref.
Pavilion Angle	40.5°	41.1 °	B
Star Length %	52%	56%	j/h
Top Halves Length %	54%	58%	i/h
Bottom Halves Length %	76%	78%	e

[0033] Less important is the measure g, which indicates the minimum height of the girdle 4 as can be seen in figure 1.

[0034] In the figures an ideal-cut brilliant 1 with no culet is shown.

[0035] A diamond cut according to the invention 11 without a culet facet is also a convex polyhedron but it has eighty-nine facets. This is thus thirty-two more than a traditional ideal-cut brilliant 1.

[0036] Eight of these extra facets are added on the crown 2 by substituting each of the eight kite facets 6 of a traditional ideal-cut brilliant diamond by two triangular facets, namely a table break facet 12 and a girdle break facet 13, which have a common edge namely the girdle break that lies in a plane parallel to the table 5.

[0037] The word substituting is in this context merely used to indicate the facets of traditional ideal-cut brilliant 1 where the modifications take place. It does certainly not indicate that a cut diamond according to the invention 11 is meant to be obtained starting from an ideal-cut brilliant 1.

[0038] The other twenty-four of the thirty-two extra facets are added in the pavilion 3 by substituting each of the eight lower main facets 10 of a traditional ideal-cut brilliant 1 with four facets, namely a bottom girdle pavilion 14, two bottom star halves 15 and a bottom star pavilion 16.

[0039] As can be seen, for example in figure 5, these four facets touch each other in one point that lies out of the plane of the lower main facet 10 of the corresponding ideal-cut brilliant 1. These points should be chosen so that the cut diamond according to the invention 11 is essentially a convex polyhedron.

[0040] The axis going through the center of the table 5 and through the apex of the pavilion 3, or through the center of the culet, if present, is preferably an eight-fold symmetry axis.

[0041] The following table 2 summarizes the most important parameters of a preferred embodiment of a cut diamond according to the invention 11 with indication of their ranges and a reference to the figures.

Table 2

	Min	Max	Ref
Diameter in girdle plane	100,00%	100,00%	R
Total Depth	62,00%	66,00%	d
Table	57,00%	62,00%	f
Crown Height	11,50%	16,50%	a
Girdle	1,50%	5,10%	b
Pavilion Depth	45,00%	47,50%	c
Crown Break	35,00%	40,00%	k
Girdle Break	60,00%	65,00%	l
Girdle Halve	45,00%	47,00%	n
Meeting point	62,00%	64,00%	m
Top Table Break Angle	28.0°	33.5°	F
Top Girdle Break Angle	35.5°	38.5°	G
Top Halves Angle	41.5°	42.5°	C
Crown Star Angle	22.0°	25.0°	D
Bottom Girdle Halves Angle	46.5°	48.5°	E
Bottom Girdle Pavilion Angle	44.0°	45.5°	H
Bottom Star Halves Angle	38.0°	40.0°	J

(continued)

	Min	Max	Ref
Bottom Star Pavilion Angle	37.0°	38.0°	l

[0042] Light is dispersed and refracted into the diamond at the crown break. The refracted light falls onto the additional twenty-four facets in the pavilion 3 and the star pattern explodes back to the table. Typically the pavilion 3 of a cut diamond according to the invention 11 is deeper than that of an ideal-cut brilliant 1, this makes that such a cut diamond holds the light longer in the diamond.

[0043] This 'Tube effect' is schematically represented in figure 9.

[0044] A diamond cut according to the invention 11 may have a facetted girdle 4 or not. Both cases are seen as alternatives that fall under the protection of the present invention. Hereby is, in the case of a facetted girdle 4, the number of girdle facets determined according to the state of art in the field.

[0045] In another alternative form, a diamond cut according to the invention 11 can have a culet facet added to the bottom of the pavilion 3.

[0046] The present invention is in no way limited to the form of embodiment described by way of an example and represented in the figures, however, such a cut diamond according to the invention 11 can be realized in various forms, without leaving the scope of the invention.

Claims

1. A cut diamond (11), **characterized in that** it is a convex polyhedron and has eighty-nine facets, which are thirty-two facets more than a traditional ideal-cut brilliant (1), in particular eight extra facets on the crown (2) by substituting each of the eight kite facets (6) of a traditional ideal-cut brilliant diamond (1) by two triangular facets, namely a table break facet (12) and a girdle break facet (13), which have a common edge namely the girdle break which lies in a plane parallel to the table (5), and whereby twenty-four of the thirty-two extra facets are added in the pavilion (3) by substituting each of the eight lower main facets (10) of a traditional ideal-cut brilliant (1) with four facets, namely a bottom star pavilion (14), two bottom star halves (15), and bottom girdle pavilion (16), touching each other in a point, namely the meeting point, and whereby the pavilion height is approximately three percent longer than the pavilion height in the corresponding traditional ideal-cut brilliant (1).

2. A cut diamond (11) according to claim 1, **characterized in that** the eight bottom star pavilion facets (16) join in the culet or in the apex of the pavilion (3) to form a symmetrical eight-pointed star shape when observed from the bottom.

3. A cut diamond (11) according to claim 1 or 2, **characterized in that** the different dimensions, relative to the girdle diameter, and angles are in accordance with the values given in the following table:

	Min	Max	Ref
Diameter in girdle plane	100,00%	100,00%	R
Total Depth	62,00%	66,00%	d
Table	57,00%	62,00%	f
Crown Height	11,50%	16,50%	a
Girdle	1,50%	5,10%	b
Pavilion Depth	45,00%	47,50%	c
Crown Break	35,00%	40,00%	k
Girdle Break	60,00%	65,00%	l
Girdle Halve	45,00%	47,00%	n
Meeting point	62,00%	64,00%	m
Top Table Break Angle	28.0°	33.5°	F

(continued)

	Min	Max	Ref
Top Girdle Break Angle	35.5°	38.5°	G
Top Halves Angle	41.5°	42.5°	C
Crown Star Angle	22.0°	25.0°	D
Bottom Girdle Halves Angle	46.5°	48.5°	E
Bottom Girdle Pavilion Angle	44.0°	45.5°	H
Bottom Star Halves Angle	38.0°	40.0°	J
Bottom Star Pavilion Angle	37.0°	38.0°	I

4. A cut diamond (11) according to one of the preceding claims, **characterized in that** the axis going through the center of the table (5) and through the apex of the pavilion (3), or through the center of the culet, is an eight-fold symmetry axis.

5. A cut diamond (11) according to one of the preceding claims, **characterized in that** the girdle (4) is not faceted.

6. A cut diamond (11) according to one of the preceding claims, **characterized in that** the girdle (4) is facetted.

7. A cut diamond (11) according to one of the preceding claims, **characterized in that** a culet facet is present.

Patentansprüche

1. Geschliffener Diamant (11), **dadurch gekennzeichnet, dass** er ein konvexer Polyeder ist und neunundachtzig Facetten aufweist, was zweiunddreißig Facetten mehr als ein traditioneller Idealschliff-Brillant (1) sind, spezieller acht extra Facetten am Oberteil (2) durch Ersetzen jeder der acht oberen Hauptfacetten (6) eines traditionellen Ideaischliff-Brilliantdiamanten (1) durch zwei dreieckige Facetten, nämlich eine Tafel-Kreuzfacette (12) und eine Rondist-Kreuzfacette (13), die eine gemeinsame Kante aufweisen, nämlich die Rondistkreuzlinie, die in einer Ebene parallel zur Tafel (5) liegt, und wobei vierundzwanzig der zweiunddreißig extra Facetten im Unterteil (3) hinzugefügt werden, indem jede der acht unteren Hauptfacetten (10) eines traditionellen Idealschliff-Brillanten (1) durch vier Facetten ersetzt wird, nämlich eine untere Sternunterteilfacette (14), zwei untere Sternkreuzfacetten (15) und untere Rondistunterteilfacette (16), die einander in einem Punkt, nämlich dem Berührungspunkt, berühren, und wobei die Unterteilhöhe ungefähr drei Prozent länger als die Unterteilhöhe im entsprechenden traditionellen Idealschliff-Brillanten (1) ist.

2. Geschliffener Diamant (11) nach Anspruch 1, **dadurch gekennzeichnet, dass** die acht unteren Sternunterteilfacetten (16) in der Kalette oder in der Spitze des Unterteils (3) zusammenkommen, um, von unten gesehen, eine symmetrische Sternform mit acht Spitzen zu bilden.

3. Geschliffener Diamant (11) nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die verschiedenen Abmessungen, bezüglich des Rondistdurchmessers, und Winkel in Übereinstimmung mit den in der folgenden Tabelle angegebenen Werten sind:

	Min.	Max.	Ref.
Durchmesser in Rondistebene	100,00%	100,00%	R
Gesamttiefe	62,00%	66,00%	d
Tafel	57,00%	62,00%	f
Oberteilhöhe	11,50%	16,50%	a
Rondiste	1,50%	5,10%	b

(fortgesetzt)

	Min.	Max.	Ref.
Unterteiltiefe	45,00%	47,50%	c
Oberteilkreuzfacetten	35,00%	40,00%	k
Rondistkreuzfacetten	60,00%	65,00%	l
Rondistkreuzfacetten	45,00%	47,00%	n
Berührungspunkt	62,00%	64,00%	m
Oberer Tafelkreuzfacettenwinkel	28,0°	33,5°	F
Oberer Rondistkreuzfacettenwinkel	35,5°	38,5°	G
Oberer Kreuzfacettenwinkel	41,5°	42,5°	C
Oberteilsternwinkel	22,0°	25,0°	D
Unterer Rondistkreuzfacettenwinkel	46,5°	48,5°	E
Unterer Rondistunterteilfacettenwinkel	44,0°	45,5°	H
Unterer Sternkreuzfacettenwinkel	38,0°	40,0°	J
Unterer Sternunterteilfacettenwinkel	37,0°	38,0°	I

4. Geschliffener Diamant (11) nach einem der vorgenannten Ansprüche, **dadurch gekennzeichnet, dass** die durch das Zentrum der Tafel (5) und durch die Spitze des Unterteils (3) oder durch das Zentrum der Kalette verlaufende Achse eine achtfache Symmetrieachse ist.

5. Geschliffener Diamant (11) nach einem der vorgenannten Ansprüche, **dadurch gekennzeichnet, dass** die Rondiste (4) nicht facettiert ist.

6. Geschliffener Diamant (11) nach einem der vorgenannten Ansprüche, **dadurch gekennzeichnet, dass** die Rondiste (4) facettiert ist.

7. Geschliffener Diamant (11) nach einem der vorgenannten Ansprüche, **dadurch gekennzeichnet, dass** eine Kalettenfacette vorhanden ist.

Revendications

1. Diamant taillé (11) **caractérisé en ce qu'**il s'agit d'un polyèdre convexe qui possède quatre-vingt-dix-neuf facettes, à savoir trente-deux facettes de plus que le nombre de facettes d'un brillant (1) de taille idéale, en particulier huit facettes supplémentaires sur la couronne (2) en remplaçant chacune des huit facettes principales de couronne (6) d'un brillant traditionnel (1) de taille idéale par deux facettes triangulaires, plus précisément une facette de latte de table (12) et une facette de première brisure (13), qui possèdent un bord commun, plus précisément la première brisure est disposée dans un plan parallèle à la table (5), et dans lequel on ajoute à la culasse (3) vingt-quatre des trente-deux facettes supplémentaires en remplaçant chacune des huit facettes principales inférieures (10) d'un brillant traditionnel (1) de taille idéale par quatre facettes, plus précisément une culasse inférieure en étoile (14), deux haléfis inférieurs en étoile (15) et une culasse de rondiste inférieur (16), qui se touchent respectivement en un point, plus précisément le point de rencontre, et dans lequel la hauteur de la culasse est supérieure à concurrence d'approximativement 3 % à la hauteur de culasse dans le brillant traditionnel correspondant (1) de taille idéale.

2. Diamant taillé (11) selon la revendication 1, **caractérisé en ce que** les huit facettes de culasse inférieure en étoile (16) se joignent dans la colette ou dans le sommet de la culasse (3) pour obtenir une configuration symétrique en étoile à huit pointes lorsqu'on regarde à partir du bas.

3. Diamant taillé (11) selon la revendication 1 ou 2, **caractérisé en ce que** les différentes dimensions par rapport au diamètre du rondiste et les différents angles sont indiqués conformément aux valeurs reprises dans le tableau suivant :

	Min	Max	Réf
Diamètre dans le plan du rondiste	100,00 %	100,00 %	R
Profondeur totale	62,00 %	66,00 %	d
Table	57,00 %	62,00 %	f
Hauteur de la couronne	11,50 %	16,50 %	a
Rondiste	1,50 %	5,10 %	b
Profondeur de la culasse	45,00 %	47,50 %	c
Brisure de couronne	35,00 %	40,00 %	k
Première brisure	60,00 %	65,00 %	l
Haléfi de rondiste	45,00 %	47,00 %	n
Point de rencontre	62,00 %	64,00 %	m
Angle supérieur de la latte de table	28,0°	33,5°	F
Angle supérieur de la première brisure	35,5°	38,5°	G
Angle des haléfis de la couronne	41,5°	42,5°	C
Angle des étoiles de la couronne	22,0°	25,0°	D
Angle inférieur des haléfis du rondiste	46,5°	48,5°	E
Angle inférieur culasse/rondiste	44,0°	45,5°	H
Angle inférieur des haléfis d'étoiles	38,0°	40,0°	J
Angle inférieur culasselétoile	37,0°	38,0°	I

4. Diamant taillé (11) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'axe passant par le centre de la table (5) et par le sommet de la culasse (3) ou par le centre de la colette, est un axe de symétrie octuple.

5. Diamant taillé (11) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le rondiste (4) n'est pas facetté.

6. Diamant taillé (11) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le rondiste (4) est facetté.

7. Diamant taillé (11) selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'**une facette de colette est présente.

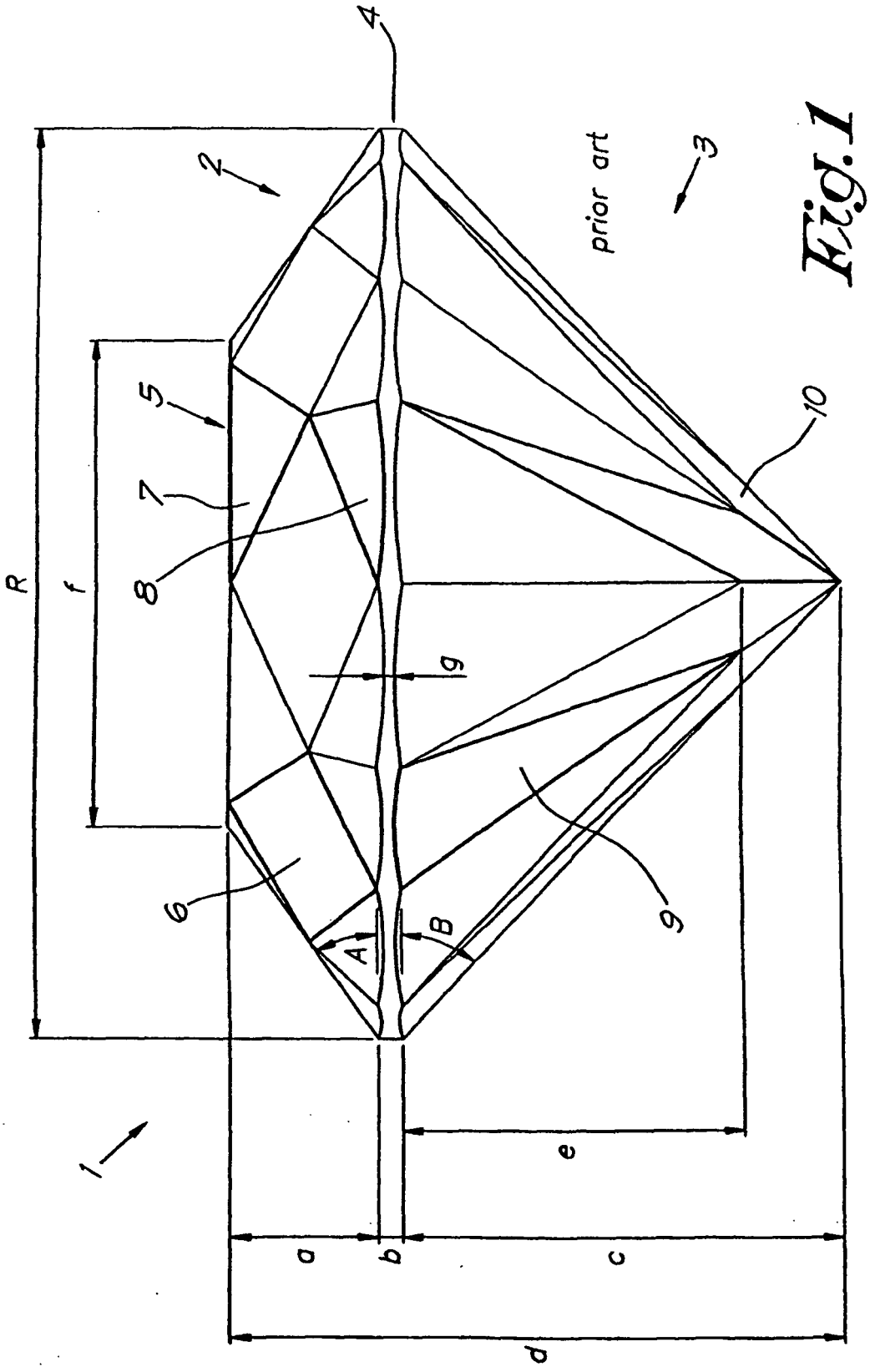
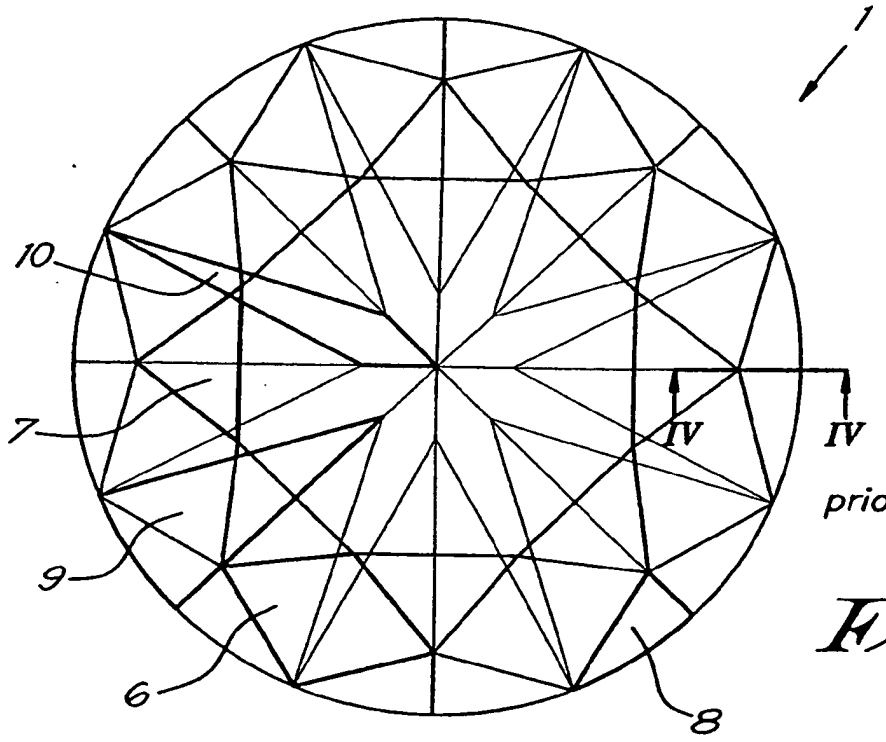
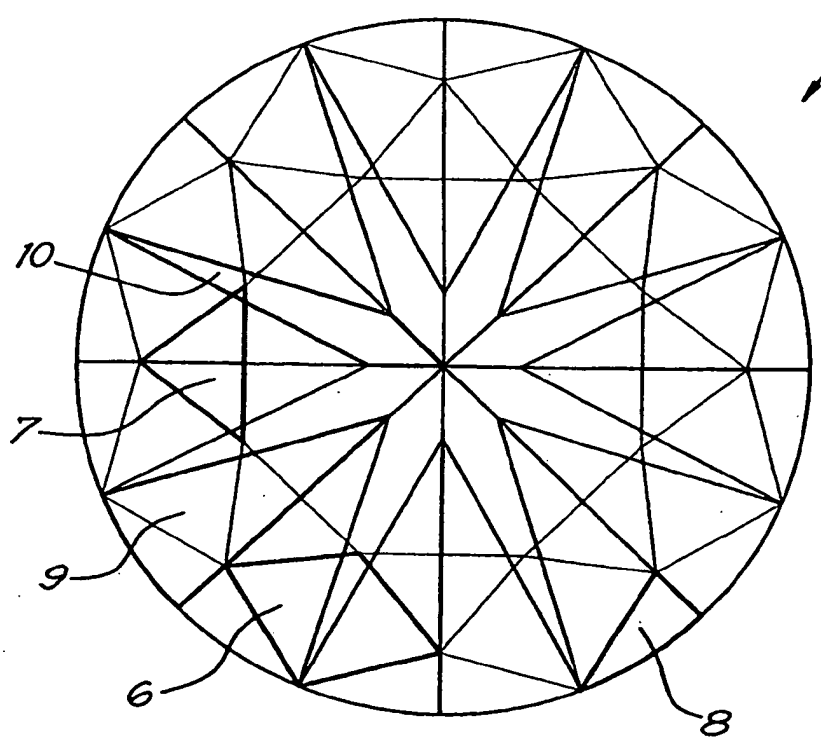


Fig.1



prior art

Fig.2



prior art

Fig.3

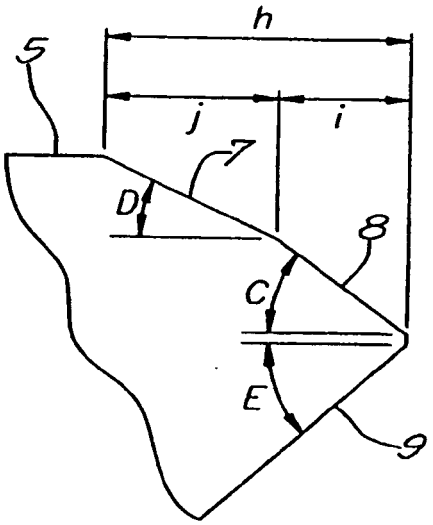


Fig.4

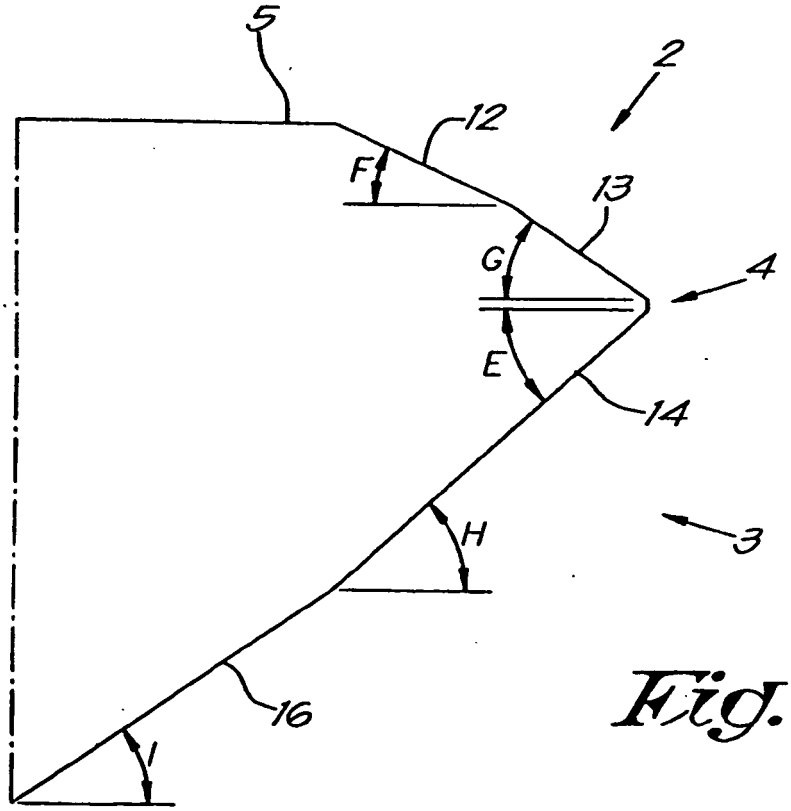


Fig.8

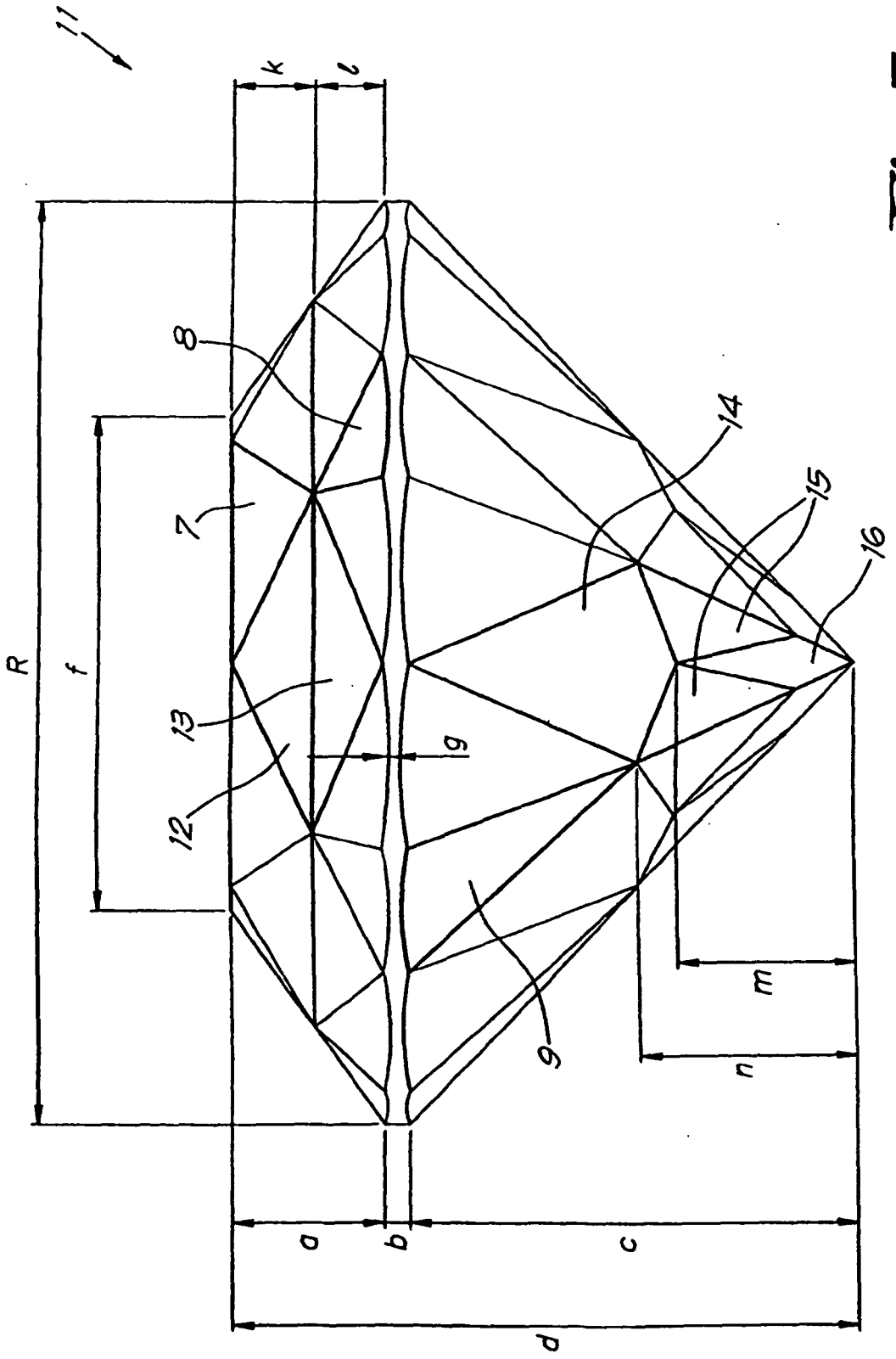


Fig.5

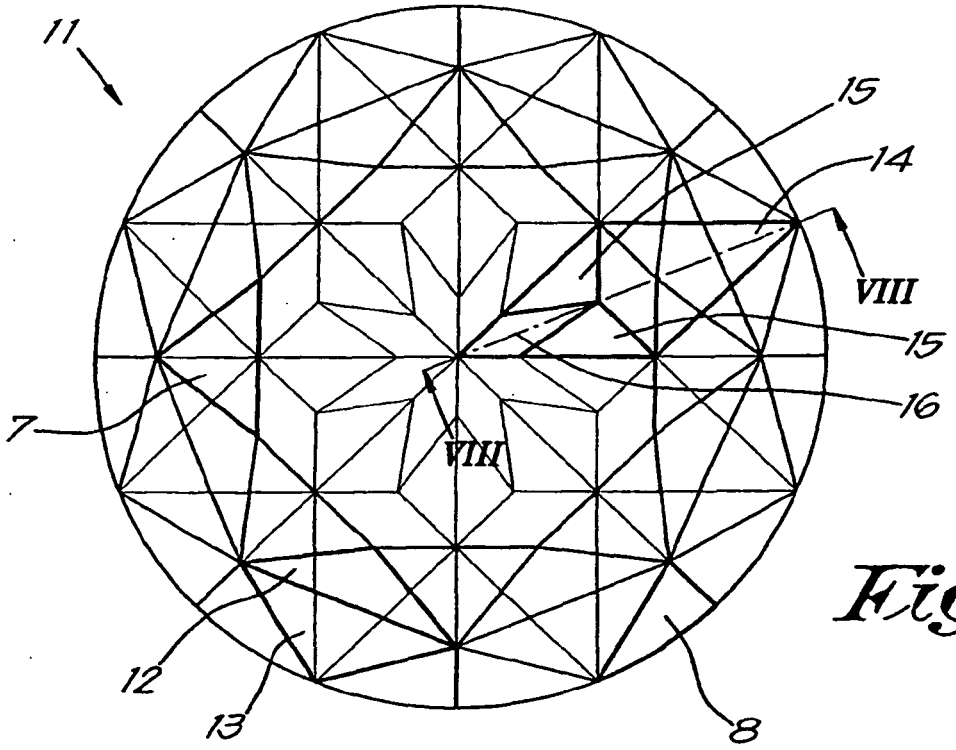


Fig.6

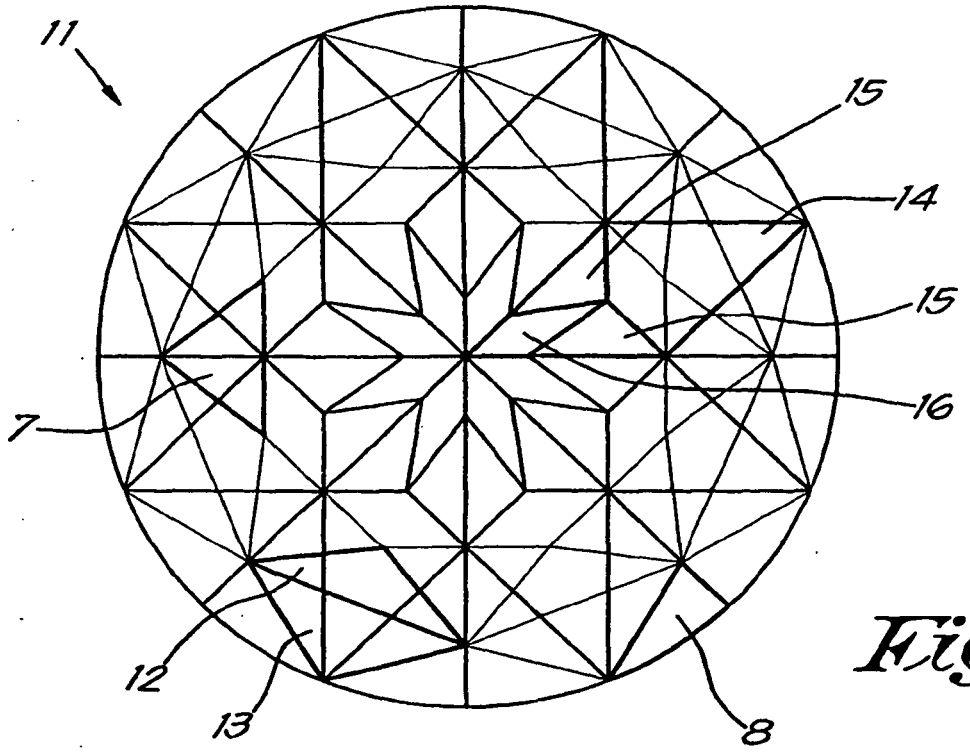


Fig.7

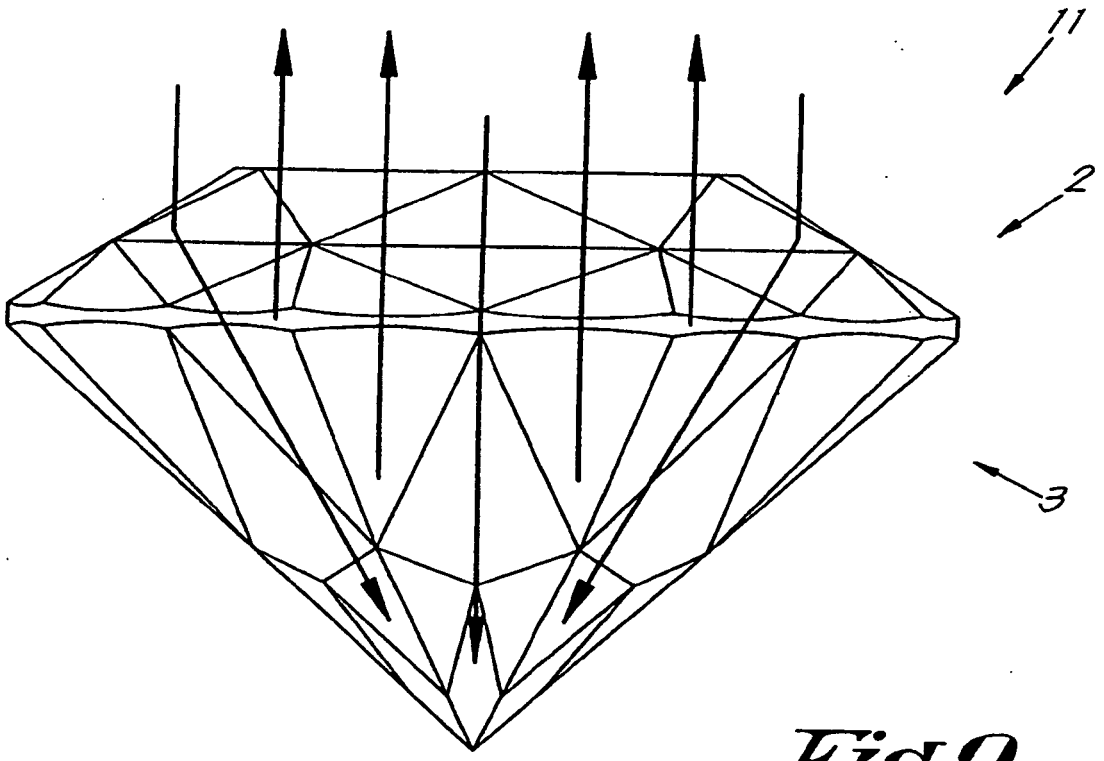


Fig.9

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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