

DECLARATION OF THOMAS R. PARADISE IN SUPPORT OF
PETITION FOR INTER PARTES REVIEW OF
U.S. PATENT NO. 9,398,791

I, Thomas R. Paradise, declare as follows:

QUALIFICATIONS AND BACKGROUND INFORMATION

1. My education and experience are described more fully in the attached curriculum vitae (**Appendix A**). For ease of reference, I have highlighted certain information below that is relevant to this case.

2. I am currently a Distinguished Professor of Geosciences in the J. William Fulbright College of Arts and Sciences at the University of Arkansas, Fayetteville. I am a Fellow (FGA 1984) of the Gemmological Association of Great Britain (Gem-A), London; a Graduate Gemologist/GIA (GG 1980), a Certified Gemologist-Appraiser/AGS (CGA 1984), a Senior Member of the Accredited Gemologists Association (AGA), and a Registered Jeweler/RJ of the American Gem Society (AGS 1983).

3. I was the former Director of the Jewels, Gemstones, & Objets d'Art Department at Butterfield & Butterfield Auction House (it became Bonhams International) in San Francisco during the 1980s – the largest American Auction house at the time and one of the largest internationally today. I was the certified and accredited gemologist and appraiser for Arthur Gleim Jewelers in Palo Alto – the past President of the American Gem Society and a notable jeweler and gemologist.

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In addition, I was a regular gemological consultant and appraiser for jewels, gemstone, and related ‘objet d’arts’ for the I.R.S. (Atlanta), and U.S. Customs Agency (San Francisco). I have also testified on behalf of local, state, and federal agencies, corporations, and private individuals.

SCOPE OF RETENTION

4. I have been retained on behalf of Henri Daussi, LLC, to offer opinions relating to U.S. Patent No. 9,398,791 (“the ’791 Patent,” HDL-1001) and prior art references related to its subject matter. I have reviewed the ’791 Patent and the below listed prior art exhibits used for the invalidity grounds:

Exhibit No.	Description
HDL-1002	File History for U.S. Patent No. 9.398,791
HDL-1003	U.S. Design Patent No. 465,431 to Kanner
HDL-1004	CH 684301 A5 to Schmidt (original in German)
HDL-1005	Certified English Translation of HDL-1004
HDL-1007	U.S. Patent No. US4555916 to Grossbard
HDL-1008	U.S. Design Patent No. 463,315 to Greeff
HDL-1009	U.S. Design Patent No. 524,682 to Sung
HDL-1010	US Patent No. 4,708,001 to Alburger

5. Additionally, I reviewed the following related references that represent industry standards on diamond and gemstone identification, faceting, its history, and other related topics to this case:

- a. Manual of the Gemmological Association of Great Britain (Gem-A);
- b. The American Gem Society Manual (AGS);
- c. Diamonds (E. Bruton 1979);

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- d. GIA's Diamond Dictionary (R. Gaal 1993);
- e. Gemstone Faceting Guide volumes 1, 2 (T. Herbst 2014);
- f. The Book of Gem Cuts volumes 1, 2, 3 (G. Kleinpeter 1971);
- g. GIA's Diamonds (L. Copeland 1974);
- h. Gems (R. Webster 1975);
- i. Diamond Buying Guide (A. Matlins 2011);
- j. Gems (M. Donoghue 2005); and
- k. Practical Gemology (R. Webster 1976).

6. I have been informed by Counsel that I should consider these materials through the lens of a person of ordinary skill in the art ("POSITA") related to the '791 Patent at the time of the earliest possible priority date of the '791 Patent, and I have done so during my review of these materials. I have defined a POSITA below.

7. The '791 Patent claims the benefit of priority to an earliest date of January 26, 2015 ("the Critical Date"). Counsel has informed me that the Critical Date represents the earliest possible priority date to which the challenged claims of '791 Patent are entitled, and I have therefore used that Critical Date in my analysis.

8. In writing this declaration, I have considered my own knowledge and experience. In addition, I have analyzed various publications and materials described above.

9. My opinions, as explained below, are based on my extensive education in Geology, Gemology and Geosciences. My opinions are also based on my experience with and expertise in the diamond, gemstone, and jewelry industry since 1980. Unless otherwise stated, my testimony below refers to the knowledge of POSITA as of the Critical Date, or before. The figures that appear within this document have been prepared with the assistance of Counsel and reflect my understanding of the '791 Patent and the prior art as discussed below.

10. This declaration explains the conclusions that I have formed based on my analysis.

11. Although I am compensated for the time I work on this litigation, this compensation is not dependent on the outcome of this proceeding.

LEGAL PRINCIPLES

Anticipation

12. I have been informed that a patent claim is invalid as anticipated under 35 U.S.C. § 102 if each and every element of a claim, as properly construed, is found either explicitly or inherently in a single prior art reference. Under the principles of inherency, if the prior art necessarily functions in accordance with, or includes the claimed limitations, it anticipates.

13. In determining whether a single item of prior art anticipates a patent claim, one should consider what a POSITA would have understood from his or her

examination of that prior art. One should also consider not only what is expressly disclosed in the particular item of prior art, but also what is inherently present or disclosed in that prior art.

14. I have been informed that a claim is invalid under 35 U.S.C. § 102 if the claimed invention was known or used by others in the U.S., or was patented or published anywhere, before the applicant's invention. I further understand that a claim is invalid if the invention was patented or published anywhere, or was in public use, on sale, or offered for sale in this country, more than one year prior to the filing date of the patent application.

Obviousness

15. I understand that even though an invention may not have been identically disclosed or described before it was made by an inventor, in order to be patentable, the invention must also not have been obvious to a POSITA in the field of technology of the patent at the time the invention was made.

16. I have been informed, that unlike anticipation, which allows consideration of only one item of prior art, obviousness may be shown by considering more than one item of prior art in combination with one another, or one item of prior art in combination with the knowledge of a POSITA. In deciding obviousness, one must avoid using hindsight; that is, one should not consider what is known today or what was learned from the teachings of the patent. One should not use the patent as a road

map for selecting and combining items of prior art. One must put himself or herself in the place of a POSITA as of the time of the invention.

17. I have been informed that for determining whether an invention is obvious, there are four factors that should be considered: (1) the scope and content of the prior art, (2) the differences between the prior art and the claims, (3) the level of ordinary skill in the art, and (4) any “secondary considerations” of non-obviousness, which include: (i) “long felt need” for the claimed invention, (ii) commercial success attributable to the claimed invention, (iii) unexpected results of the claimed invention, and (iv) “copying” of the claimed invention by others.

18. I have been informed that invalidity based on obviousness cannot be sustained with mere conclusory statements. Instead, there must be articulated reasoning having a rational underpinning to support a legal conclusion of obviousness. I understand there must be some evidence or suggestion in the prior art of such a configuration and there must be a reasonable expectation of success in using the claimed invention. Also, I understand the proposed modifications to a reference cannot alter the principle of operation of a reference nor can there be significant structural alterations involved in the combination.

19. I have been informed there are several rationales that can be used to support a conclusions of obviousness. Those rationales include: combining prior art elements according to known methods to yield predictable results; simple substitution of one

known element for another to obtain predictable results; use of known technique to improve similar devices (methods, or products) in the same way; applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; “obvious to try” – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to a POSITA; some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

20. I understand that, in order to rely on a prior art reference as a basis for invalidity, the reference must either be in the field of the inventor’s endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned. I have been informed that a reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor’s attention in considering his problem.

LEVEL OF ORDINARY SKILL IN THE ART

21. I have been informed that the level of ordinary skill in the art is based on factors such as the educational level of the inventor, the educational level of those

who work in the industry, and the sophistication of technology involved, in addition to the type of problems encountered in the art, prior art solutions to those problems, and the rapidity with which innovations are made in the particular technology.

22. As of the Critical Date, a person with ordinary skill in the art or POSITA in the field of the '791 Patent would have (1) a Bachelor's Degree or Masters Degree in geology/mineralogy, (2) 6 months-1 year Degree from a gemology institute (i.e. GIA, Gem-A), or (3) 6 months-1 year of experience in faceting or cutting gemstones.

23. Based on my education and expertise, I have a good understanding of the capabilities of one of ordinary skill in the field of the invention as of the Critical Date. Furthermore, I possess those capabilities myself.

24. Indeed, I have taught at university undergraduate, graduate, and professional levels, participated in related appraisal and gemological organizations, and worked closely with many such persons (i.e. dealers, stone cutters, gemstone miners, gemologists, personal property appraisers, and related wholesalers and retailers) over the course of my career of 40 years.

25. Generally, the '602 Patent is in the field of gemstones, or more specifically, faceting gemstones.

26. In forming the opinions that I express herein, I have adopted the perspective of a person of ordinary skill in the art, as described in above paragraph.

TECHNICAL BACKGROUND - GEM CUTTING

27. In the early days of gemstone cutting, gemstone faceters relied on lithographs, handbook sketches, chromo-lithographs, word-of-mouth, and ‘scientific’ narratives to guide their cleaving, bruting, faceting, and polishing of all gemstones. From softer gem materials (i.e. Fluorite) to harder stones (i.e. Diamond, Sapphire), early stone cutters and polishers used community advice, calipers, compasses, and protractors to create fairly accurate stone measurements and angles that helped ensure the greatest weight retention from rough crystal into their era’s expectation of a sparkling and attractive gemstone.

28. However, it wasn’t until the mid-19th century into the early 20th century that we understood the relationship between gem materials and their specific optical qualities. All mineral-based translucent and transparent materials possess a specific refractive index (R.I.). For example, for Quartz it is always 1.54-1.55, while for Topaz it is always 1.61-1.62. This is the optical characteristic which determines how the light entering each gem is bent (refracted) and reflected. It was then that this RI was directly linked to the angles used in faceting that refracted and reflected the light through the gemstone’s top facets (i.e. table, crown).

29. In 1919, during his PhD research at the University of London, Marcel Tolkowsky – a Belgian student from a Polish family – calculated the ‘ideal’ angles and proportions for a diamond (in any shape) to reflect the maximum amount of light

through the crown of a gemstone. In his dissertation, he stated that he had created “*a mathematical formula for cutting and angling facets on diamonds to provide maximum reflected light and optimum brilliance*”.

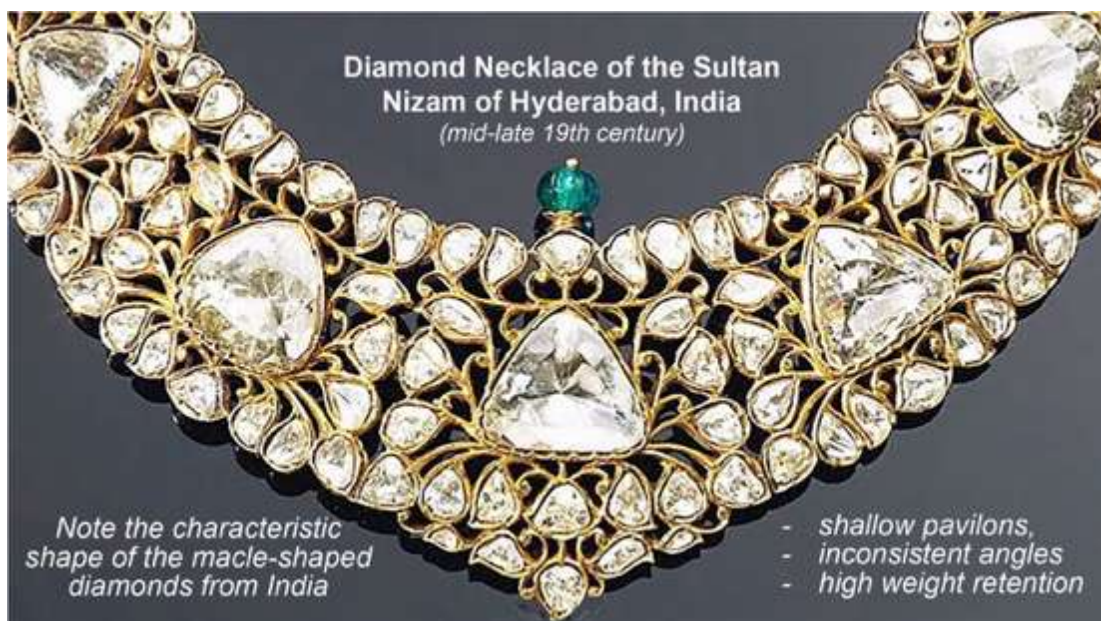
30. Originally, size was the primary focus and value consideration in the gemstone trade, but suddenly, in addition to size, the angles and proportions of the gemstone or ‘cut’ would also guide the trade, market desirability, and subsequently diamond sales. In fact, with diamonds, those angles and proportions would become the FOURTH ‘C’ after (1) *carat weight*, (2) *color*, (3) *clarity* (freedom of inclusions), and (4) *CUT*.

31. Tolkowsky’s work was based on the most common rough diamond crystal form – the octahedron (an 8-sided, double pyramid). However, before and after Tolkowsky’s work, many gemstones have been cut with angles and proportions that are different than those proposed by Tolkowsky’s work.

32. For example, other crystal shapes or habits were, and are still commonly found, especially the *macle* or diamond twin, that form a thin 3-sided (trigonal) shape akin to a throat lozenge shape.



33. These *macles* cannot be cleaved, bruted, or faceted in the same manner as octahedra since they are too thin and lack predictable cleavage planes for slitting; they lend themselves to thin, large-tabled, nearly glass-pane like gems that were commonly used in the early (pre-South African) Indian jewels of the Maharajahs either roughly polished or mounted as a crystal rough or '*polki*' (see below).



34. Even after Tolkowsky's research, macles were used as *polki* or rarely faceted due to their unconventional shape, and even less to ideal proportions due to their typically thin structure. Since the earliest days of the India diamond trade about 4th-

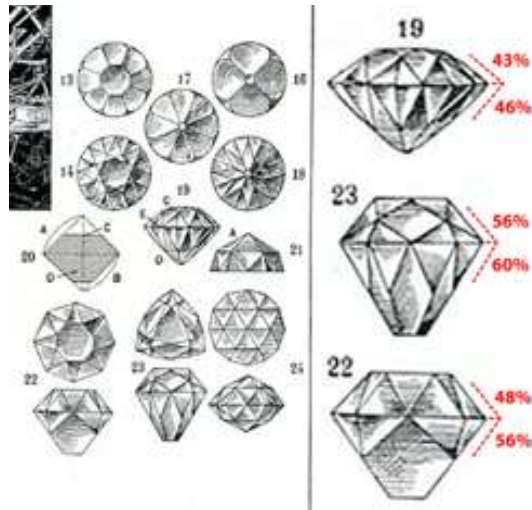
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3rd BC, macles were commonly set as rough *polki* stones or faceted into flat stones with broad tables and shallow pavilions.

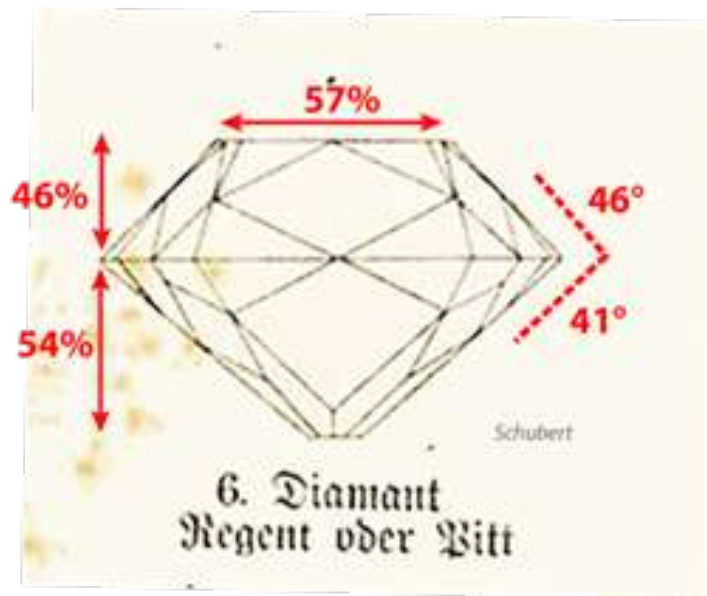
35. Then in the 1960s, with a surplus of macles in the trade, brilliantly faceted triangular '*trilliant*' and '*trillion*' shapes were developed to exploit the macle's flat form. Suddenly popular, faceters created a relatively 'brilliant' gemstone with a large table, steep crown, and shallow pavilion, all different than Tolkowsky's angles and proportions for the 'ideal' diamond, but highly sought across the trade from mine to store.

36. In addition to macle diamond's unusual shape and difficulty in conforming to Tolkowsky's proportions, the use of steep crown angles, large tables, and shallow pavilion angles were and are still relatively widespread in the diamond trade. This is the case for diamonds cut before and after Tolkowsky's dissertation was published.

37. Early lithographs from the 17th to 19th centuries frequently illustrated these early gemstone proportions so they could be measured for cutting and polishing. In this closeup of the attached lithograph from 1889, the '*brilliant*' diamonds #22 and # 23, revealed angles far exceeding Tolkowsky's 'ideals' 30 years later.



38. As another example, in G. H. von Schubert's *Treatise on Rocks & Minerals* (1878), a diamond is shown in profile, labeled as the Regent Diamond – discovered in 1698 in Golconda, India – with proportions widely used during the 18th -19th centuries and far from the proportions suggested in 1919 by Tolkowsky.



39. Tolkowsky's proportions produce great amount of reflected and refracted light as brilliance and scintillation, but this is not the only objective demanded by

the diamond market. The diamond market is driven by several factors, including the size of the diamond. Therefore, retaining weight from the crystal rough has been and still is an important objective for faceters.

40. The ‘magic’ size represents even carat amounts (i.e. 1-carat, 5-carats, etc.) but also the desirable quarter sizes (i.e. 0.25, 0.50 carats, etc.).

41. In the industry and marketplace over the past 50-60 years (post-WWII), the range of diamond proportions and angles has ranged from 30°-45° (crown) and 30°-45° (pavilion), with an assortment in total depth proportions from 30%-80%. This is the reality of the market—not the exception. These parameters can be found and measured in actual stones sold decades ago.

42. The consumers are interested in the sparkle of a diamond, but also demand a larger stone, especially with a ‘magic’ weight (i.e. 0.50, 1.00 carats). Hence, many faceters cut diamonds in accordance with consumer preferences.

43. Few recently engaged couples will purchase a diamond of 0.94 carats, when a slightly less brilliant stone of 1 carat is offered at the same price – which may indeed display a large table (>60%), a steeper (> 35°) or shallow (<30°) crown, or a deep (>40-42°) or shallow pavilion (<40°).

44. Tolkowsky’s ‘ideal’ diamond was not based on weight retention from crystal to faceted gem. Weight retention, however, is still and will remain a major concern in the diamond market. Indeed, many faceters are paid by the weight.

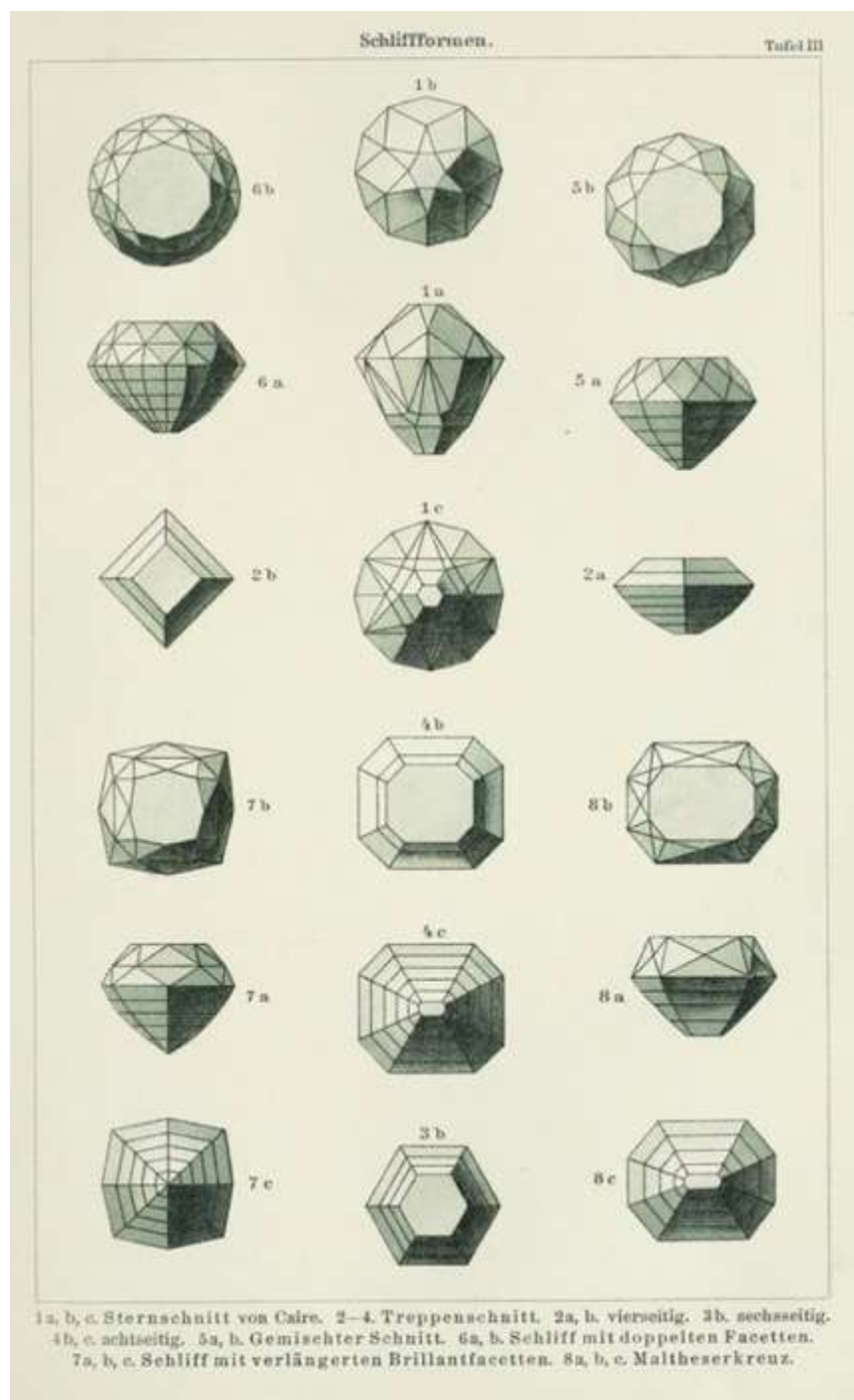
45. Weight retention from rock to gem is habitually the primary goal of gem cutters since the earliest days of the Indian, Greco-Roman, and early Chinese pieces of jewelry or objects involving the gem-cutting craft. However, as the craft and art of gem-cutting moved from simply polishing rocks to faceting gemstones by the 15th to 17th centuries, the importance of retaining gem weights was and is still crucial.

46. Marcel Tolkowsky proposed a set of diamond proportions to enhance gem brilliance and sparkle. Tolkowsky's proportions, however, are not the only factor the faceters consider, and the deviations and assortments found in diamond and gemstone dimensions have been well-known and widespread, over 2,300 years of gemstone enhancement. This shows that Tolkowsky's proportions are not the only factor in cutting a rough gem.

47. I will review several of gem cuts and faceting styles prior to and after Tolkowsky's dissertation.

48. For example, the following book illustrations (1870s) were commonly used for gem 'community' stone proportion measurements and faceting guidance, in addition to the modern 'Amateur Faceter's Guide' – the familiar 'bible' of stone faceting today.

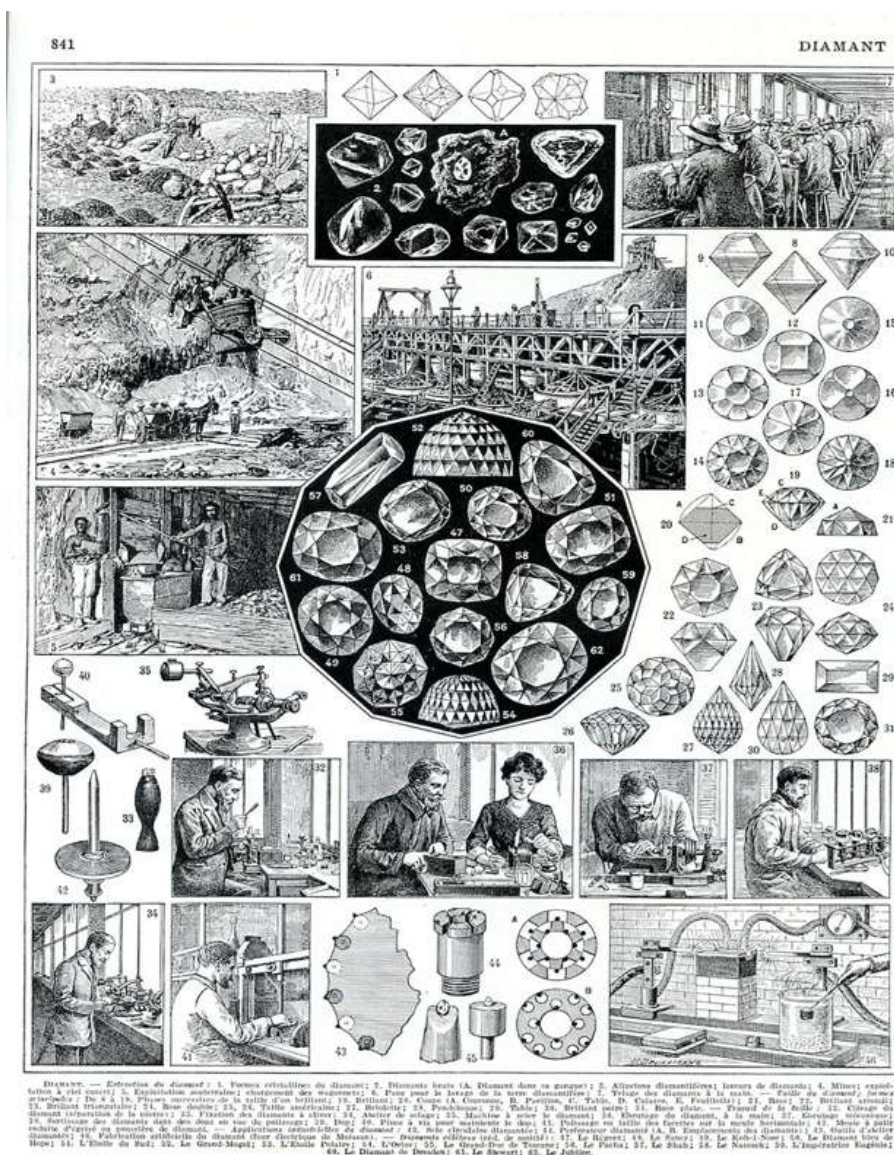
49. 19th century diagrams of popular gem faceting styles, both in face-up images and profiles were commonplace. Note the angles of the pavilion and crown are dramatically different than Tolkowsky's recommendations for the 'ideal diamond'.



50. Below is a German Lithograph of 'Great Diamonds of the World' (1889) that illustrated diamond (a) mining and extraction, (b) cleaving, bruting, faceting, and polishing, and (c) notable diamonds of the period (India and South Africa), and their

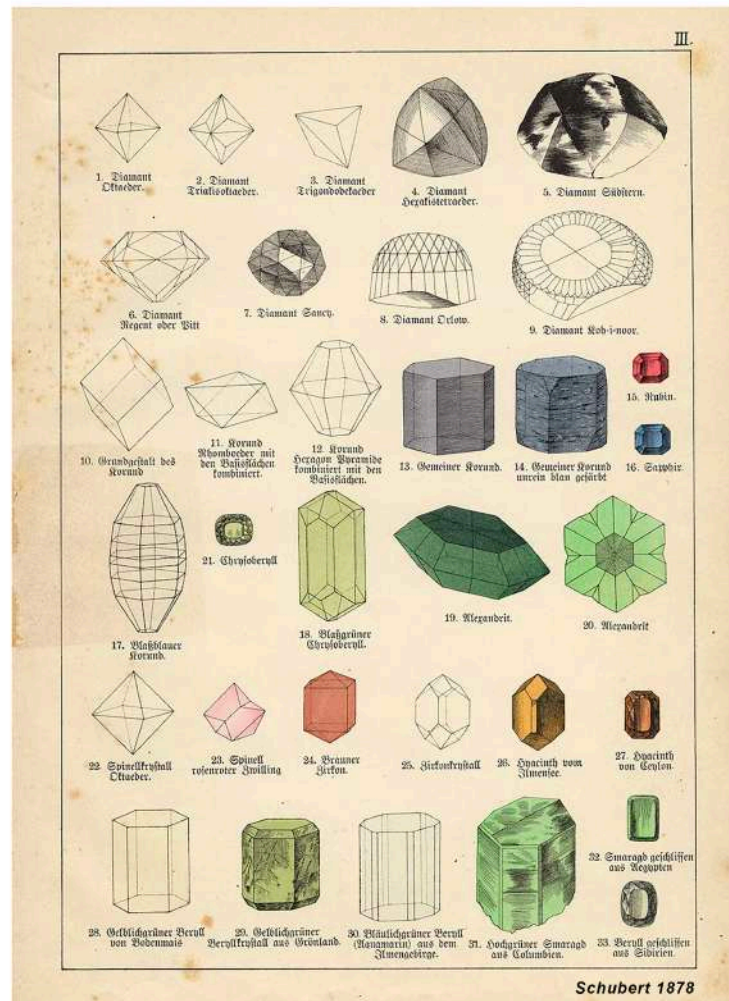
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‘face-up’ appearance and profile. Note the variation in diamond proportions as a function of weight retention from crystal rough to polished gemstone. This was illustrated 30 years before Tolkowsky’s dissertation on the ‘ideal cut’ (1919).



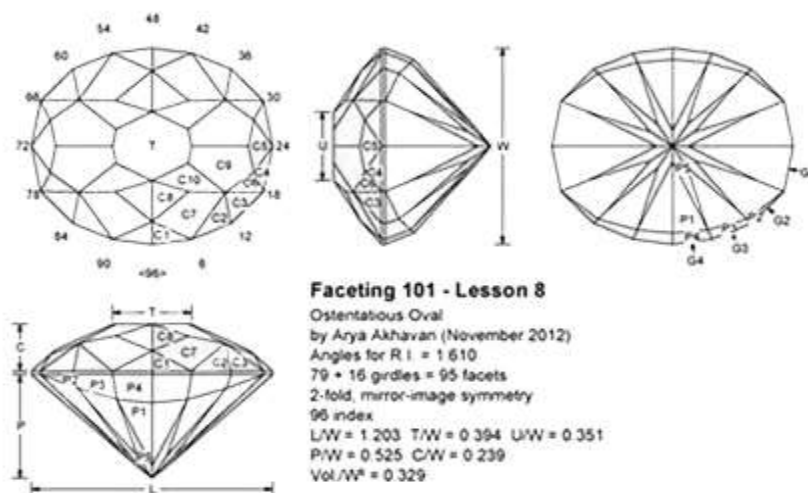
51. The following chromo-lithograph is from H.G. Schubert’s tome on Gems, Minerals, and Natural History (1878). Note his meticulous profile sketch of the Regent Diamond (#6) and its proportions (discussed in the text). It was said that the

Regent was superbly brilliant, and so symmetrical in its cutting that it could ‘stand on its culet’! The ‘Regent’ (lefthand, 2nd row) is currently displayed in the Louvre Museum, Paris, and displays proportions far from Tolkwosky’s ideal cut but still frequently used to fashion and facet gems (then and now).



52. Following is a page from Thomas Herbst’s Amateur Faceter’s Handbooks: volumes 1 & 2 (2014) (that I note predates the Critical Date), which explains the common ranges used in faceting a unique oval stone called the ‘Ostentatious Oval’.

This faceting style recommends crown angles ranging from 25° to 52° as shared from master faceter, Arya Akhavan (November 2012). These variations in gemstone and diamond proportions (crown and pavilion angles and percentages) were/are used to retain the greatest weight differences in faceting from rough gemstone crystal to polished gemstone.



PAVILION			
P1	42.02°	03-09-15-21-27-33-39-45-51-57-63-69-75-81-87-93	Cut to centerpoint
G1	90.00°	21-27-69-75	Set stone width
G2	90.00°	12-36-60-84	Meet P1, G1 (continue false girdle)
G3	90.00°	06-42-54-90	Meet P1, G2 (continue false girdle)
G4	90.00°	02-46-50-94	Meet P1, G3 (continue false girdle)
P2	65.02°	12-36-60-84	Level girdle
P3	66.71°	06-42-54-90	Level girdle
P4	67.42°	02-46-50-94	Level girdle
P5	41.02°	06-12-18-30-36-42-54-60-66-78-84-90	Meet P1, P3, P4 (only 4 facets meet)

CROWN			
C1	42.08°	02-46-50-94	Set girdle width
C2	42.08°	06-42-54-90	Level girdle
C3	47.09°	12-36-60-84	Level girdle
C4	52.05°	21-27-69-75	Level girdle
C5	42.08°	24-72	Meet G1, C4
C6	42.18°	15-33-63-81	Meet G1, G2, C3, C4
C7	36.99°	04-44-52-92	Meet G3, G4, C1, C2, C3, C6
C8	33.46°	03-45-51-93	Meet C1, G7
C9	25.00°	21-27-69-75	Meet C2, C3, C6, C4, C5, C8
C10	24.55°	07-41-55-89	Meet C2, C3, C6, C7, C9
T	0.00°	Table	Meet C8, C10

Lesson 8 teaches the last concept of this unit, cutting a staggered barion (G1 - P4). As opposed to a geometric barion, a staggered barion chain-cuts the girdle and barion facets, and is usually used in ovals or cushions. This lesson also teaches cutting codependent facets/meets (C9), a facet that hits two meets at once.

53. It should be noted that gemstone cutting shapes and styles were historically a function of the original crystal rough shape and dimensions, long before the design proposed by Tolkowsky in 1919. Since diamonds and several gemstone families,

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species, and varieties naturally occur in flat, disc-like shapes (i.e. diamond macles, India's *polki*), it has been common practice for 100s of years to cleave, brute, and facet diamonds into flat finished diamonds with low crown angles and/or shallow pavilions. For example, the everyday occurrence of macle-shaped diamonds spawned the plentiful commercial faceting, marketing, and popularity of *princess* and *radiant* diamond shapes in the 1970s with depth percentages commonly <60% of the total gem length-width and crown angles <35-40°.

54. It is my opinion that, based on this background, which would be known to a POSITA, the claimed invention of the '791 Patent is nothing more than a predictable, and therefore, obvious variant of known gem cutting techniques that are well-established both historically and currently, far before the '791 Patent was issued. A POSITA would be motivated to try the wide variety of well-known gem cutting techniques to achieve a cut with a desired set of characteristics claimed in the '791 Patent.

55. Specifically, cutting, faceting, and polishing a gem with a certain angular relationship between the crown and pavilion angles to obtain increased light amplification for an oblong gemstone as claimed in the '791 Patent (*see* claim 1, element [1h], reproduced below) was well within the level of skill of a POSITA and is little more than a well-known, predictable result that a POSITA cutting a gem would want to achieve.

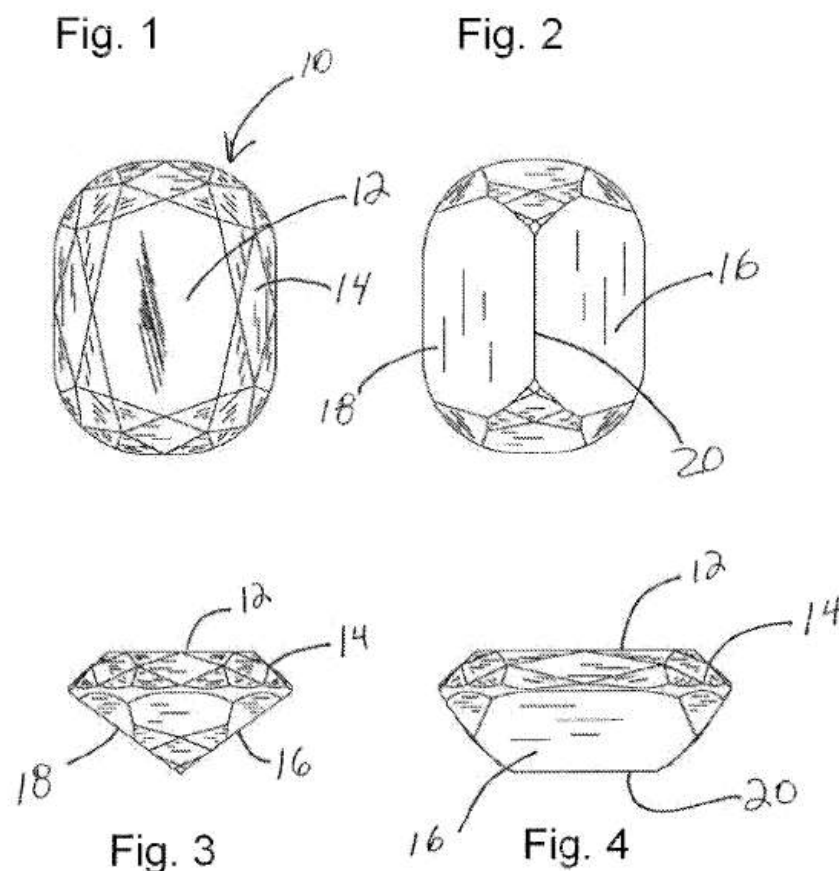
THE '791 PATENT

56. The '791 Patent states that it offers a cut for flat or shallow diamonds which allegedly enhances the brilliance of the stone. *See* HDL-1001, 2:48-55 (“In marked departure from the prior art, the instant inventor has discovered that a brilliant-like reflection pattern can be obtained by providing an emerald cut stone with a very shallow underside” (emphasis added)).

57. The '791 Patent further discloses in its abstract:

A sparkling, oblong-shaped precious stone, such as an emerald or cushion cut diamond is formed by providing these diamonds with two long crown surfaces extending at a crown angle and two long pavilion surfaces extending at a pavilion angle, where the crown angle is in the range of 30-36 and the pavilion angle is in the range of 30-34. The crown angle and the pavilion angle are so formed that the crown angle is either equal to or larger than the pavilion angle by an angle that does not exceed 6 degrees.

58. Figures 1-4 of the '791 Patent are reproduced below.



59. The figures are described as follows in the patent at 2:38-48:

Referring to FIGS. 1-4, one can note the cushion-cut diamond 10 in FIG. 1, its table 12, crown 14 extending adjacently to the table and left and right side oblong pavilions 16, 18 extending adjacently to the oblong pavilion, the pavilion meeting at a culet-like line 20. FIG. 3 shows that the oblong pavilions 16, 18 extending at a distinct pavilion angle relative to the table surface (or to a line passing through the girdle) of the precious stone. Similarly, the crown angle is also

indicated, although it is noted that the crown angle is more definitively provided in an emerald cut diamond.

60. I noted that the '791 Patent contains 14 total claims, with claim 1 being the sole independent claim. I have reproduced claim 1 below with the various elements tagged with reference labels which I will use throughout this declaration:

[1a] An oblong precious stone elongated in one direction and defining a length of the precious stone in said one direction and a width in a direction perpendicular to said one direction, the precious stone having a left side and a right side both of which extend along the length of the stone, the precious stone comprising:

[1b] a table having a table plane, elongated in the one direction, a girdle, and said precious stone having a shape and configuration that results in a specific total depth percentage, a specific crown height percentage, a specific girdle height percentage and a specific table percentage;

[1c] a first crown surface, elongated in the one direction and extending at the left side of the stone and located between the table and the girdle and extending at a crown angle to the table plane;

[1d] a second crown surface, elongated in the one direction and extending at the right side of the stone and located between the table

and the girdle and opposed to the first crown surface and extending at said crown angle relative to the table plane;

[1e] a first pavilion surface, elongated in the one direction and extending at the left side of the stone and at a pavilion angle relative to the table plane;

[1f] a second pavilion surface, elongated in the one direction and extending at the right side of the stone and extending oppositely to the first pavilion surface and extending at said pavilion angle relative to the table plane;

[1g] wherein said crown angle is in the range of 30-36 degrees and wherein said pavilion angle is in the range of 30-34 degrees; and

[1h] wherein said crown angle and said pavilion angle are so formed that the crown angle is either equal to or larger than said pavilion angle by an angle that does not exceed 6 degrees, to attain increased light amplification.

61. Below, I have included an annotated version of Fig. 8 (which “replicates Fig. 3”; *see* 2:31-32) below to visually represent the limitations of claim 1 to aid in understanding the elements of the claim and also to support the discussion of the Grounds of Rejection that follow:

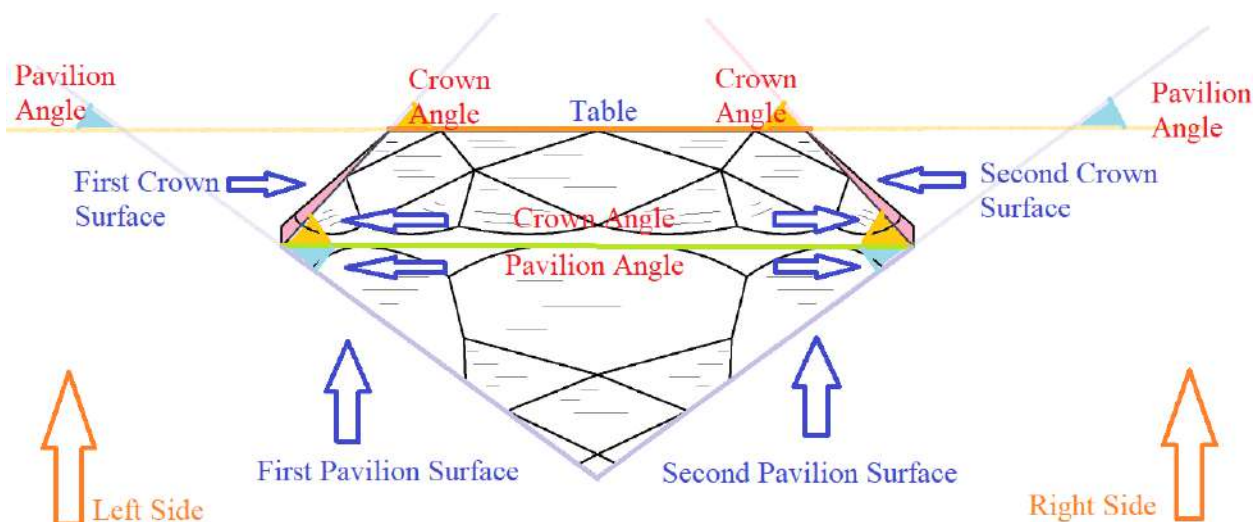


FIG. 8

PRIOR ART ANALYSIS AND GROUNDS OF REJECTION

62. My analysis is based on the below Grounds of Rejection.

Ground	Claims	Basis for Rejection
1	1-14	35 U.S.C. § 103 based on Kanner (HDL-1003) in view of Schmidt (HDL-1004 (original language); HDL-1005 (translation)) and/or the applicant admitted prior art
2	1, 5, and 6	35 U.S.C. § 102 based on Grossbard (HDL-1007)
3	1, and 5-12	35 U.S.C. § 103 based on Greeff (HDL-1008) in view of Grossbard (HDL-1007) and/or the applicant admitted prior art
4	1, and 5-12	35 U.S.C. § 103 based on Sung (HDL-1009) in view of Grossbard (HDL-1007) and/or the applicant admitted prior art
5	2-4, 13, and 14	35 U.S.C. § 103 based on Grossbard (HDL-1007) in view of Schmidt (HDL-1004)
6	2-4, 13, and 14	35 U.S.C. § 103 based on Greeff (HDL-1008) and Grossbard (HDL-1007) in view of Schmidt (HDL-1004)

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Ground	Claims	Basis for Rejection
7	2-4, 13, and 14	35 U.S.C. § 103 based on Sung (HDL-1009) and Grossbard (HDL-1007) in view of Schmidt (HDL-1004)
8	2-4, 13, and 14	35 U.S.C. § 103 based on Grossbard (HDL-1007) in view of Alburger (HDL-1010)
9	2-4, 13, and 14	35 U.S.C. § 103 based on Greeff (HDL-1008) and Grossbard (HDL-1007) in view of Alburger (HDL-1010)
10	2-4, 13, and 14	35 U.S.C. § 103 based on Sung (HDL-1009) and Grossbard (HDL-1007) in view of Alburger (HDL-1010)

GROUND 1: Claims 1-14 Are Obvious Over Kanner In View of Schmidt (HDL-1003/HDL-1004)

63. It is my opinion that the combination of Kanner and Schmidt renders claims 1-14 obvious either explicitly or combined with the knowledge of a POSITA. The motivation for combining the references is provided below in the discussion of the rejection.

Kanner

64. Kanner is a U.S. Design Patent No. D465,431 to Kanner (“Kanner”). (HDL-1003). It has a patent grant date of November 12, 2002 and was filed on December 19, 2001. I was informed that it therefore qualifies as prior art to the ’791 Patent under 35 U.S.C. § 102(a)(1).

65. Similar to the ’791 Patent, Kanner offers an emerald cut for a diamond. HDL-1003; *see* HDL-1001 (claim 8). Figs. 1-6 of Kanner show various views of the diamond. Figs. 1 and 2 of the reference are included below.

HDL-1006

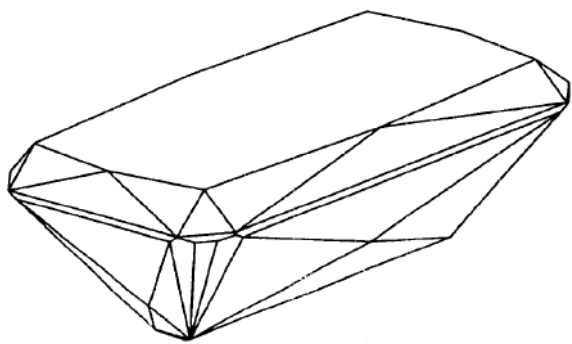


FIG.1

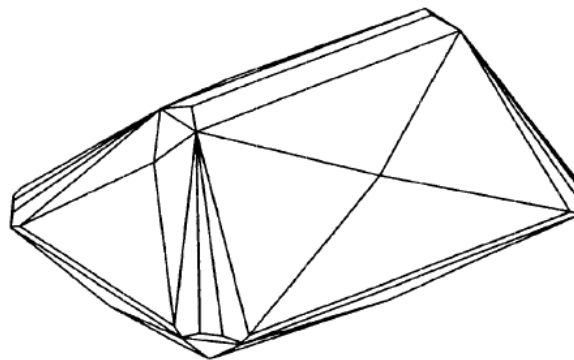


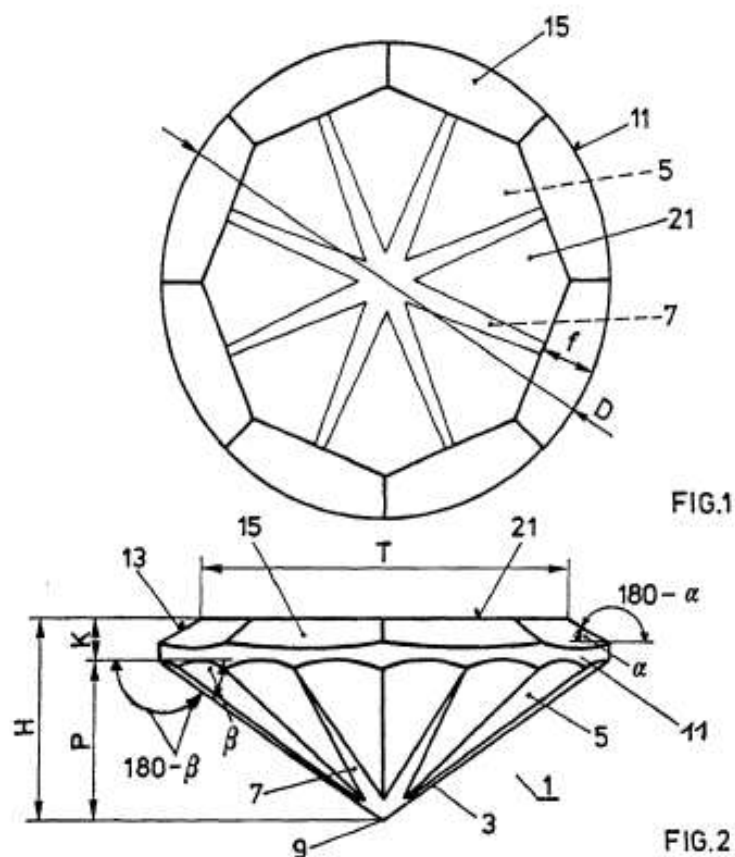
FIG.2

Schmidt

66. The second prior art applied in this Ground is Patent No. CH 684301 to Schmidt (“Schmidt”). (HDL-1004). This is a Swiss Patent Publication in German and the certified translation thereof is included as HDL-1005. It has a patent grant date of August 31, 1994 and was filed on March 19, 1991. I have been informed that it therefore qualifies as prior art to the ’791 Patent under 35 U.S.C. § 102(a)(1).

67. Similar to the ’791 Patent, Schmidt offers a cut for “a precious stone or diamond which is relatively *flat*” HDL-1005, 2:25-28 (emphasis added). Schmidt’s cut offers “good brilliance” and a “large appearance” for the stone. HDL-1005, 2:25-28. Schmidt explains that “it has been shown that despite the choice of a relatively small angle between the surface of the pavilion and the girdle plane, excellent brilliance can be produced in a cut precious stone if the table plane of the crown is kept large at the same time.” HDL-1005, 2:38-46.

68. In this regard, Schmidt discloses “diamond 1” which has “a downwardly oriented pavilion 3 and an upwardly formed crown 13. The girdle plane, which is formed peripherally by the circular girdle line 11, is positioned centrally between the crown and the pavilion.” HDL-1005, 3:52-57. The two figures of Schmidt are included below:



69. According to Schmidt, the angle α between “the facets 15 of the crown 13 and the girdle plane is preferably $28-32^\circ$ ” and the angle β between “the pavilion surface or lower girdle facets 5 and the girdle plane is preferably less than 38° ” HDL-

1005, 4:14-17; 4:23-26. Schmidt further discloses that the angle β can be 32–37°.
HDL-1005, 3:15-17.

70. Schmidt further qualifies the broad applicability of its invention to a variety of stones and shapes:

The examples of diamonds cut according to the invention, as shown in Figures 1–2, can be varied or modified in any way. It is irrelevant whether an eight-, sixteen-, or thirty-two-side cut (8/8; 16/16; 32/24) is used, whether it is a diamond, a sapphire, a ruby, or an emerald, or whether it is a semi-precious, a colored stone, or a gemstone. It goes without saying that the cuts proposed in accordance with the invention can be used on any precious, semi-precious, or gemstones in order to solve the problem posed in accordance with the invention. Ultimately, it is also a question of optimizing the selected stone and the design of the girdle line, whether circular, square, rectangular, trapezoidal, etc., how the various angular dimensions of α and β are selected, as well as the size ratios of the table diameter to the diameter of the girdle line and the depth of the pavilion, etc.

HDL-1005, 5:15-40.

71. Accordingly, Schmidt discloses a diamond with crown angle α of 32° and a pavilion angle β of 32°. HDL-1005, 3:15-17, 4:14-17, 4:23-26. Schmidt also

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explains that its disclosure can be broadly applied to “any” precious gemstone, inducing oblong shapes such as circular, square, rectangular, trapezoidal shapes to solve the problem addressed in the reference, which is enhancing the brilliance of flat or shallow stones. HDL-1005, 5:15-40, 2:25-28, 2:38-46.

Kanner and Schmidt Teach Each Element of Independent Claim 1

72. ***Claim element [1a]:*** Fig. 1 of Kanner discloses these limitations of claim 1. (HDL-1003, Fig. 1 (annotated)). Kanner discloses an emerald diamond, which is an oblong precious stone. HDL-1003, Fig. 1 (annotated). The diamond of Kanner is elongated in one direction, which defines the length of the diamond. (HDL-1003, Fig. 1 (annotated)). The diamond also has a width in a perpendicular direction to the one direction, and a left side and a right side, both extending along the length of the stone. HDL-1003, Fig. 1 (annotated).

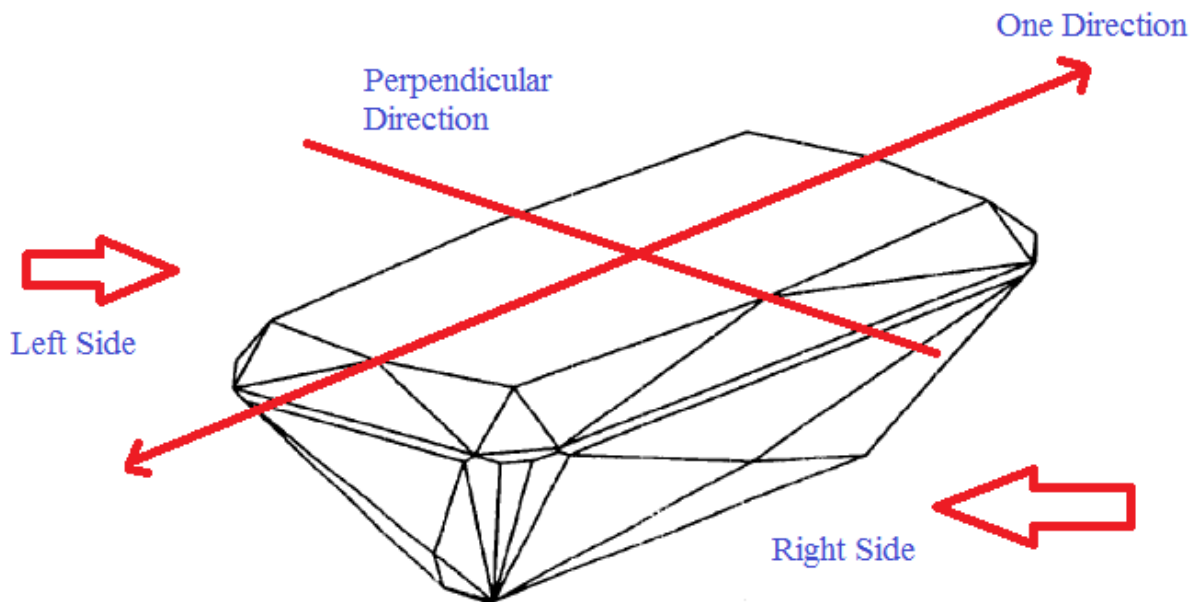


FIG.1

73. Fig. 1 as well as the specification of Schmidt also disclose these limitations of claim 1. HDL-1005, Fig. 1. In particular, Fig. 1 of Schmidt teaches a precious stone that has a length in one direction and a width in a direction perpendicular to the one direction. Fig. 1 (reproduced and annotated below) also shows a left side and a right side, both of which are extended along the one direction. The left side and the right side are also annotated in Fig. 1.

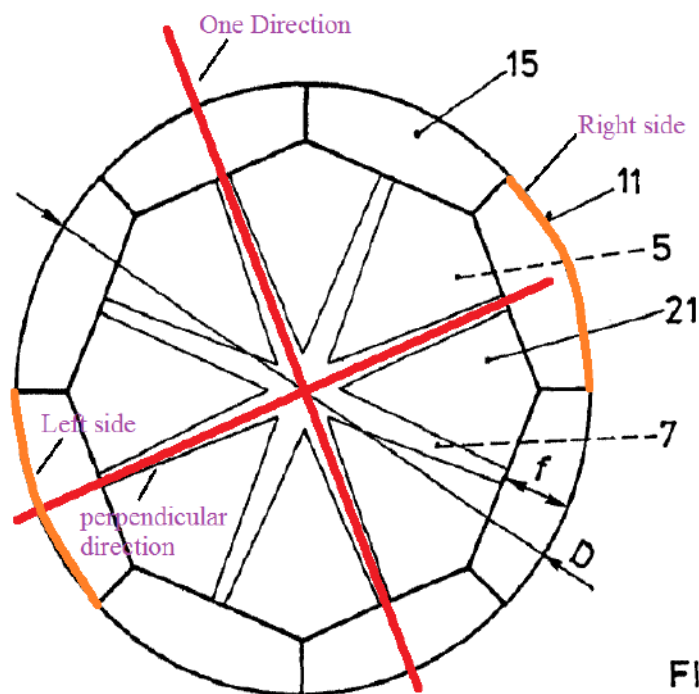


FIG.1

74. While the precious stone in Fig. 1 appears to be round, Schmidt further disclosed that the precious stone can have any shape, including **rectangular**. HDL-1005, 5:15-40 (“Ultimately, it is also a question of optimizing the selected stone and the design of the girdle line, whether circular, square, rectangular, trapezoidal, etc., how the various angular dimensions of α and β are selected, as well as the size ratios of the table diameter to the diameter of the girdle line and the depth of the pavilion, etc.”)). A rectangular shape is oblong and elongated in one direction, defining a length and width as described in the claim element. Further, the mention of “rectangular” implies a shape with left and right sides extending along the length of the stone. Schmidt also discloses that the stone can be substantially circular. HDL-1005, 3:23-25 (“the girdle of the precious stone is substantially circular.”). While in

a circular stone the length of the stone in any direction is the same (by definition), in a substantially circular stone, the length of the stone is not the same at least in one direction. Therefore, a substantially circular stone must be elongated in at least one direction, and thus, Schmidt discloses an oblong precious stone.

75. Moreover, during prosecution of the '791 Patent, I understand from Counsel that the examiner took official notice during examination of the patent application, and the Patent Owner did not traverse that official notice, that oblong shapes such as cushion, emerald, radiant, oval, marquise, or princess are “extremely well-known in the gemstone art.” HDL-1002, pp.52-53; 56; 63-73; 94-95 (“common knowledge statement is taken to be admitted prior art”). Thus, a POSITA would have shaped the stone into one of these shapes because, as noted by the examiner during examination of the application, “there is no invention in merely changing the shape or form of an article without changing its function” HDL-1002, pp.52-53; 56; 94-95. The reason for this implementation would have been to provide the “good brilliance” and a “large appearance” of the design in Schmidt to non-circular designs. Such a change would have been obvious for a POSITA.

76. ***Claim element [1b]:*** Kanner discloses a table having a table plane, which is elongated in the one direction and a girdle. (HDL-1003, Fig. 1 (annotated)).

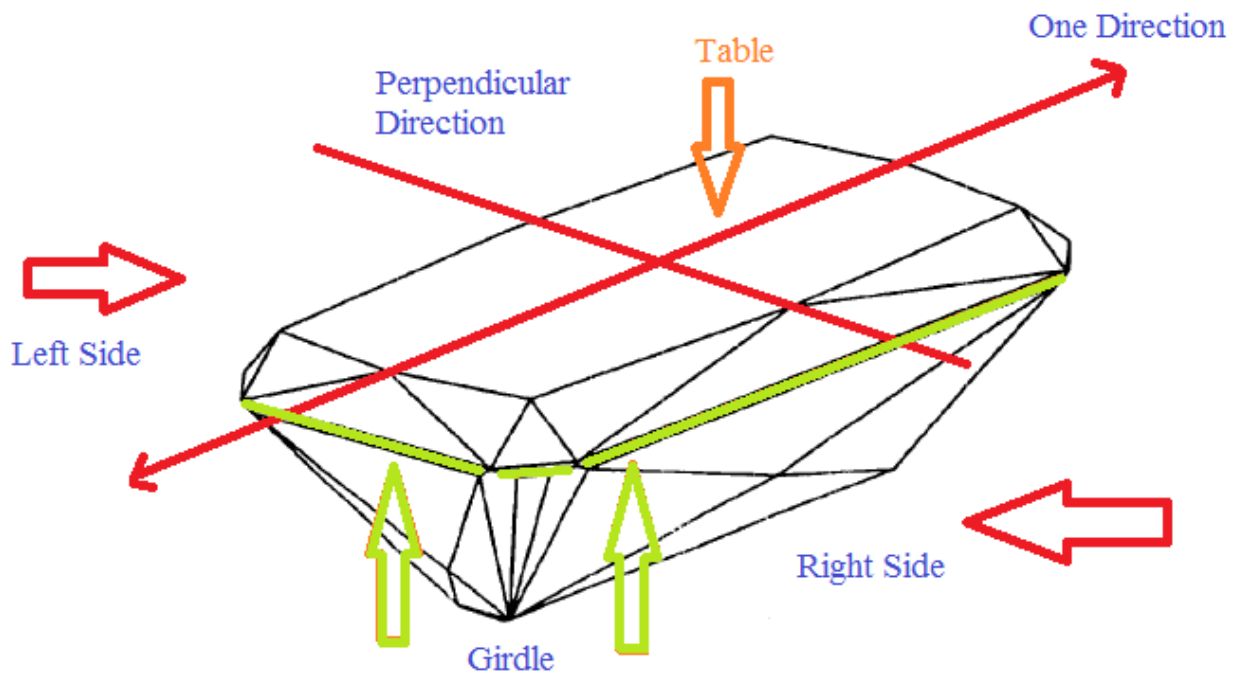


FIG.1

77. Schmidt also discloses a table and a girdle. Specifically, Schmidt discloses a table plane 21 and a girdle line 11. Schmidt discloses that “[t]he diamond 1 according to the invention has a downwardly oriented pavilion 3 and an upwardly formed crown 13. The girdle plane, which is formed peripherally by the circular girdle line 11, is positioned centrally between the crown and the pavilion.” HDL-1005, 3:53-57. Schmidt further discloses that “[o]n the upper side, the crown 13 has the so-called table plane 21.” HDL-1005, 4:12-13. As explained regarding element [1a], and as shown in the annotated Fig. 1, the stone disclosed in Schmidt can be elongated in the “one direction,” and thus, the table 21 is elongated in the “one direction.” Accordingly, Schmidt discloses a girdle line or girdle between the crown and

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pavilion and an elongated table on the top of the crown. These descriptions are consistent with the claim element's description of a precious stone with a table and girdle.

78. Claim 1 further requires a specific total depth percentage, a specific crown height percentage, a specific girdle height percentage and a specific table percentage, but does not define any value for these parameters. These parameters are merely characteristics that a POSITA would understand all stones to have, and, critically, are well known and conventional as admitted by the '791 Patent.

79. Indeed, in the background section of the '791 Patent, the Patent Owner admitted that it is “*well known*” that “emerald and cushion cut diamonds have associated therewith certain parameters.” HDL-1001, 1:29-33 (emphasis added). The '791 Patent further admitted that “[t]hese parameters include the crown angle, the crown height percentage, the girdle height percentage, the pavilion angle, the table percentage and the total depth percentage.” HDL-1001, 1:29-33. The '791 Patent continues to define the “conventional[]” values for these parameters. HDL-1001, 1:33-36. Similarly, during prosecution of the '791 Patent, Patent Owner further admitted that “parameters such as the various angles associated with a diamond, for example, the crown angle, and the parameters such as ‘total depth percentage’ ‘crown height percentage’; ‘girdle height percentage’; and ‘table

percentage' are *well known, basic* parameters in the art of diamonds.” HDL1002, p.70 (emphasis added).

80. In any event, for a diamond, the total depth percentage, the crown height percentage, the girdle height percentage, and the table percentage are calculated by dividing the total depth, crown height, girdle height, and table diameter by width of the diamond. Schmidt further discloses that:

Various parameters are essential for the sizing of a precious stone or diamond, which are also shown in Figs. 1 and 2. The initial measurement is the diameter D of the girdle line 11, which is usually given as 100%. The diameter of the table plane 21 is designated as T, wherein this size refers to the distance between two opposite corner points of the table plane 21. The height of the crown 13 is designated K and refers to the distance of the table plane 21 from the girdle surface formed by the girdle line 11. Similarly, P denotes the depth of the pavilion 3, *i.e.*, the distance of the tip 9 from the girdle surface. The height H of the precious stone or diamond is made up of K and P.

HDL-1005, 4:38-51.

81. This excerpt directly addresses the specific percentages mentioned in the claim element. It describes how the dimensions of the gemstone are measured, including the crown height (K), pavilion depth (P), and total height (H), which

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correspond to the crown height percentage, pavilion depth percentage, and total depth percentage mentioned in the claim element. The table diameter (T) is also specifically mentioned, which relates to the table percentage.

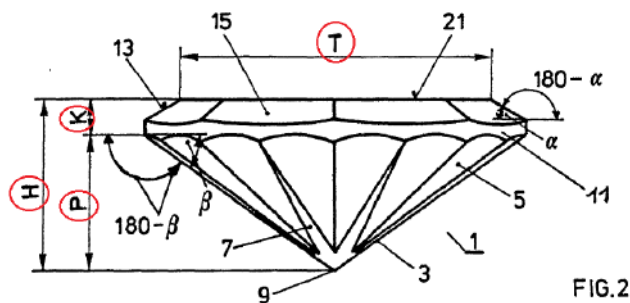


FIG.2

HDL-1005, Fig. 2 (annotated).

82. A POSITA would have also been able to measure the girdle height (G) for the stone in Schmidt, and thus, could have calculated the total depth percentage, the crown height percentage, the girdle height percentage, and the table percentage for the diamond in Schmidt using K, P, H, T and G. Similarly, a POSITA would have also been able to measure K, P, H, T and G for the stone in Kanner, and thus, could have calculated the total depth percentage, the crown height percentage, the girdle height percentage, and the table percentage for the diamond in Kanner using K, P, H, T and G. A POSITA is motivated to make these calculations because these parameters are a function of the physical attributes of the diamond. Therefore, Kanner and Schmidt disclose element [1b] of the '791 Patent.

83. **Claim element [1c]:** Kanner discloses a first crown surface in Fig. 3 (reproduced below and annotated in pink), which is elongated in the one direction.

(HDL-1003, Figs.3; 6 (annotated)). The crown surface of Kanner extends at the left side of the stone and is located between the table and the girdle. (HDL-1003,Figs. 3;6(annotated)). As shown in Fig. 6, the first crown surface of Kanner extends at a crown angle relative to the table.

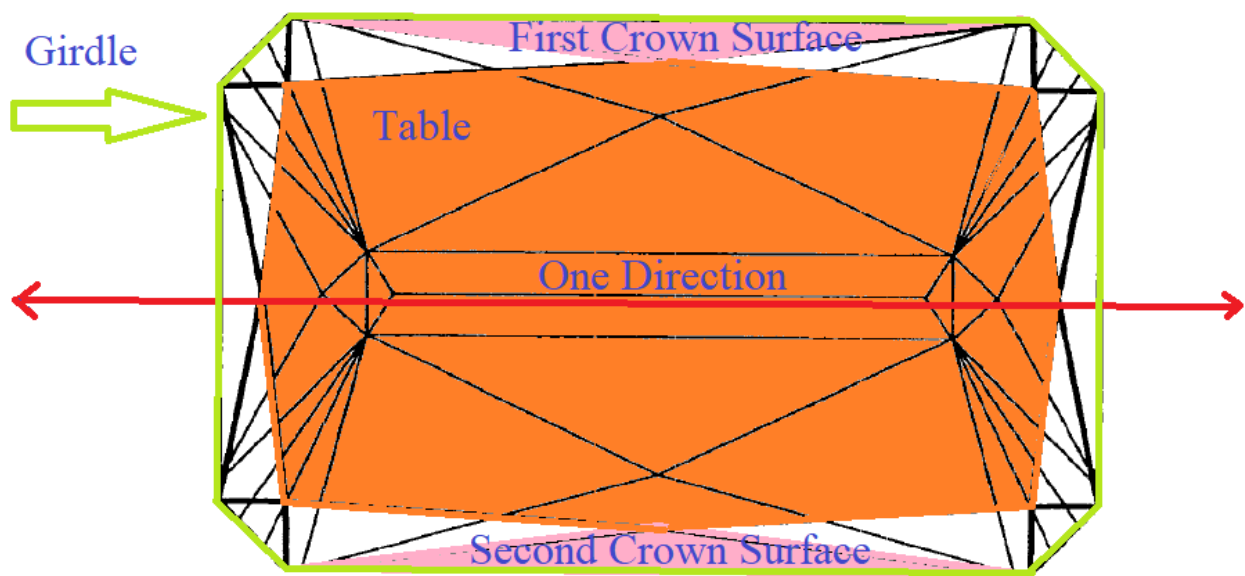


FIG.3

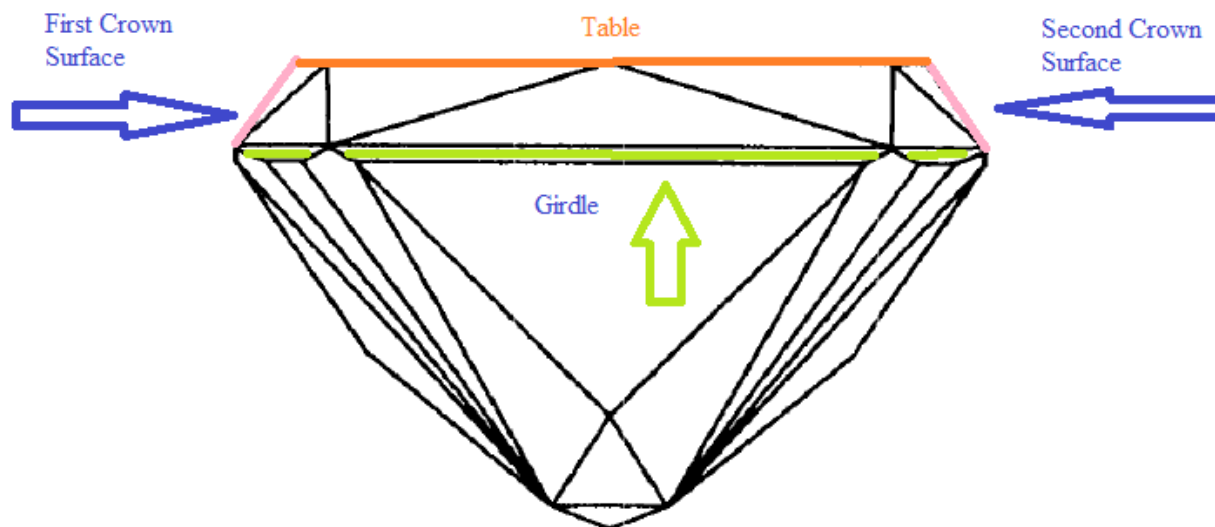


FIG. 6

84. Also, Schmidt discloses eight side facets for crown 13:

The crown 13 has eight side facets, which have been formed using a so-called octagonal cut according to a known technique. It is of course possible to increase the number of facets accordingly by doubling or quadrupling the cut. On the upper side, the crown 13 has the so-called table plane 21, which is uniformly octagonal in the example shown. According to the invention, the angle α included between the facets 15 of the crown 13 and the girdle plane is preferably $28-32^\circ$ and is 30° in the example shown in Figs. 1 and 2.

HDL-1005, 4:1-10. This excerpt describes a crown that extends between the table and the girdle line at a specific angle. The crown is described as having facets, which

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would be elongated in one direction when applied to an oblong stone.¹ (See *claim element* [1a] (annotated Fig. 1)). The angle between the crown facets and the girdle plane is specified as preferably 28-32°, which corresponds to the “crown angle” mentioned in the claim element because the girdle plane and the table are parallel.

85. ***Claim element [1d]***: Kanner discloses a second crown surface in Figs. 1, 3, and 6 (reproduced below and annotated in pink). HDL-1003, Figs. 1; 3; 6 (annotated). The second crown surface is elongated in the one direction and extends at the right side of the stone. The second crown surface is on the opposite side of the first crown surface. The second crown surface is located between the table and the girdle and extends at the crown angle relative to the table plane.

¹ Schmidt further provides that “[t]he diamond shown in Figs. 1 and 2 is a circular diamond with a so-called octagonal cut, wherein the diamond in the example shown has eight side facets on its crown. However, it can of course also have more than eight side facets.” (HDL-1004,3:38-42). This excerpt further supports the presence of multiple crown surfaces elongated in the one direction.

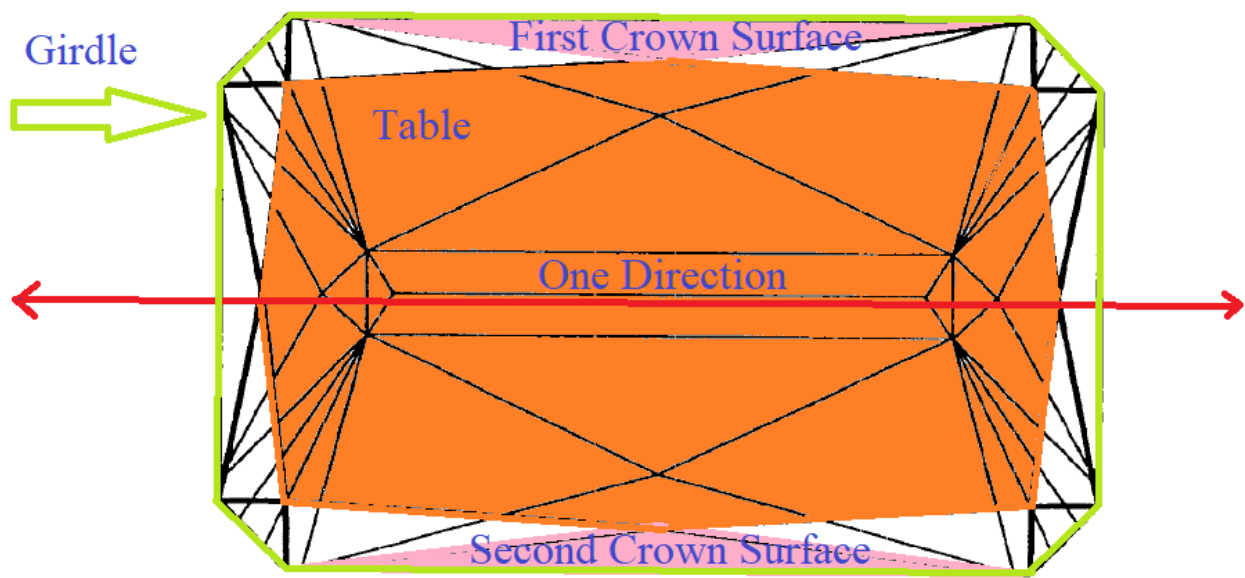


FIG. 3

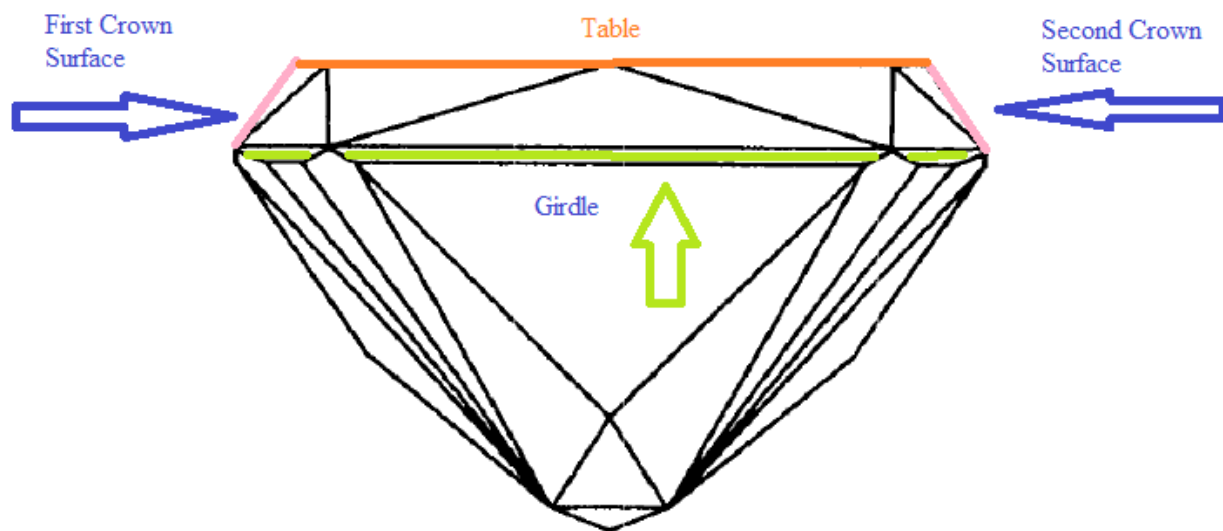


FIG. 6

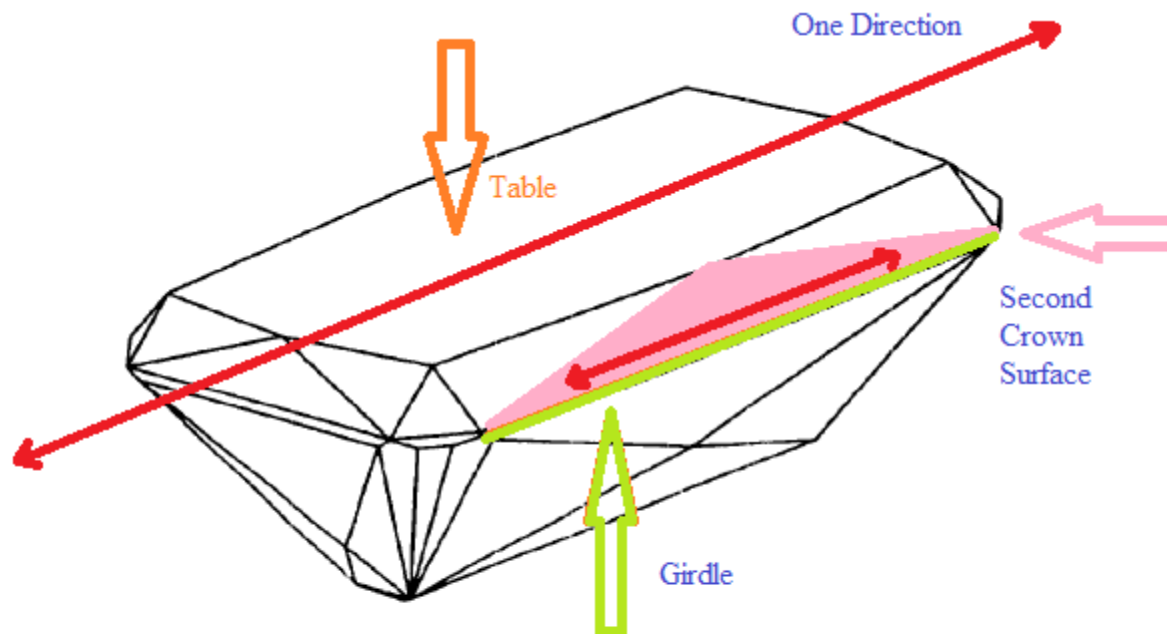


FIG.1

86. Also, Schmidt discloses:

The crown 13 has eight side facets, which have been formed using a so-called octagonal cut according to a known technique. It is of course possible to increase the number of facets accordingly by doubling or quadrupling the cut. On the upper side, the crown 13 has the so-called table plane 21, which is uniformly octagonal in the example shown. According to the invention, the angle α included between the facets 15 of the crown 13 and the girdle plane is preferably 28–32° and is 30° in the example shown in Figs. 1 and 2.

HDL-1005, 4:1-10. This excerpt describes a crown surface of a gemstone. The crown 13 has side facets that extend between the table (table level 21) and the girdle (belt plane). The angle between these facets and the belt plane is specified as preferably 28-32°, which corresponds to the “crown angle” mentioned in the claim element because the table and girdle plane are parallel. One of these facets extends in the “one direction. (See claim element [1a], above, (annotated Fig. 1)). While the excerpt does not explicitly mention a “second” crown surface, it discloses that the diamond has multiple side facets on its crown, which would include surfaces on both the left and right sides of the stone. It also describes the general structure of the crown surface that matches the claim element with respect to one facet. A POSITA recognizes that the crown angle described with respect to one facet can be applied to any crown facet. Indeed, the '791 Patent only describes the crown angle and pavilion angle with respect to one of the facets. See, e.g., HDL-1001, Fig.5 (showing the angle only with respect to the left side of the stone); 2:48-60 (providing a description that is agnostic as to the side on which the facet appears))

87. I understand from Counsel that a mere duplication of parts has no patentable significance unless a new and unexpected result is produced. Here, I do not see any new or unexpected result. Accordingly, Kanner and Schmidt describe this element of claim 1. See also claim element [1c].

88. **Claim element [1e]:** Kanner in Fig. 4 displays a first pavilion surface (reproduced below and annotated in purple), which is elongated in the one direction. HDL-1003, Figs. 4; 6 (annotated). The first pavilion surface of Kanner extends on the left side of the stone. As shown in Fig. 6, the first pavilion surface extends at a pavilion angle relative to the table plane.

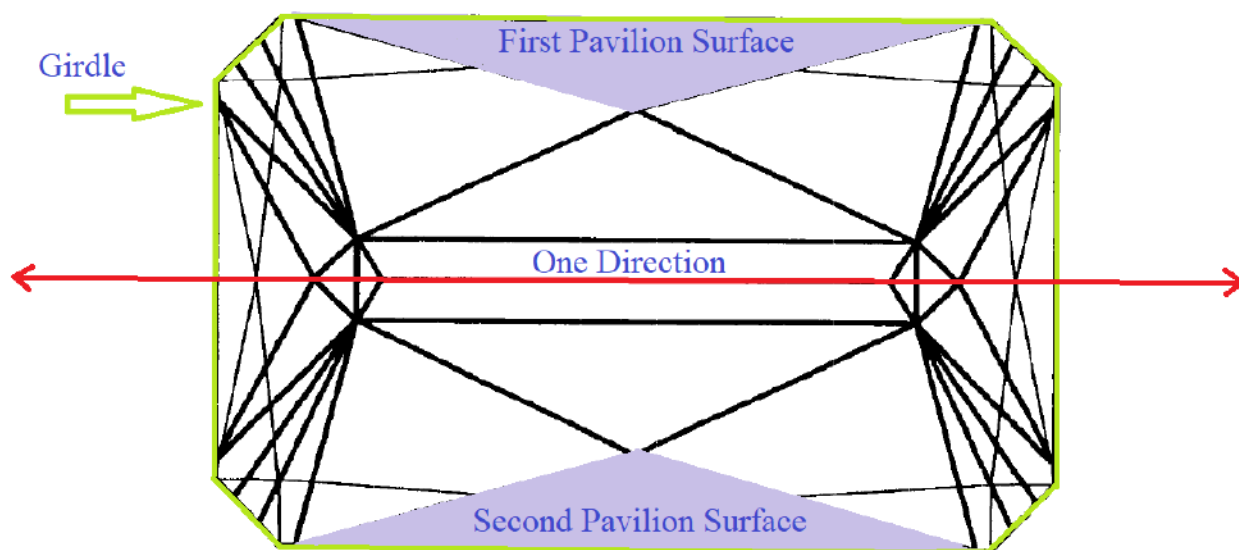


FIG.4

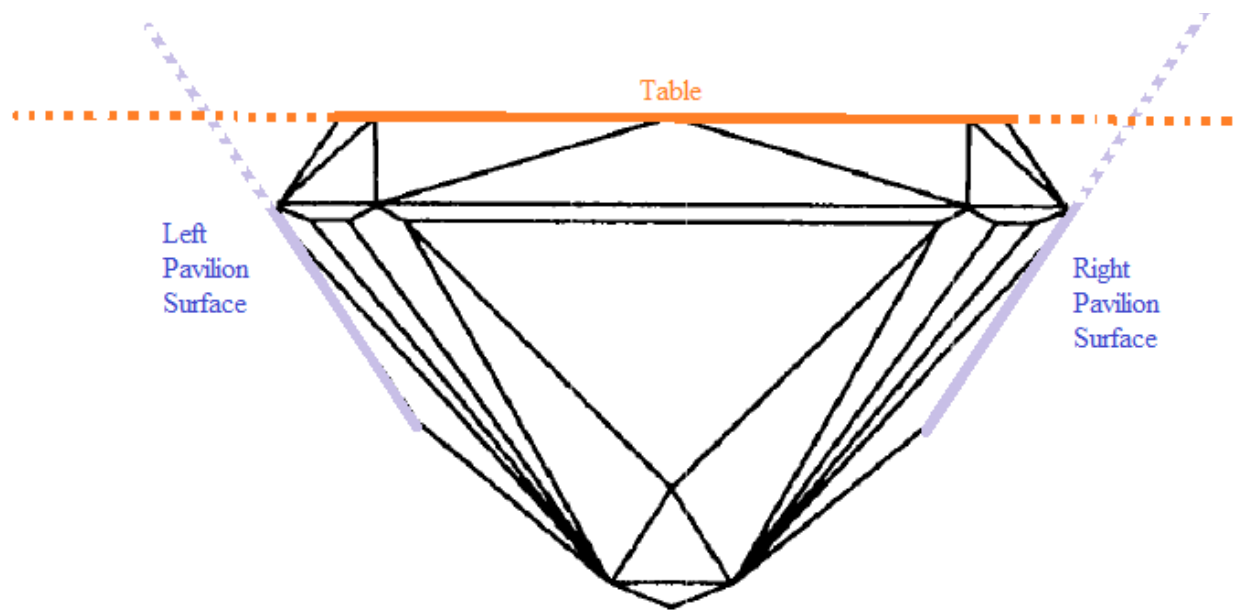


FIG.6

89. Also, Schmidt discloses:

The pavilion 3 has lower girdle facets 5 on its surface, as well as main facets 7, which, as can be seen in Fig. 2, are visible shimmering through the table plane 21. The pavilion 3 preferably has a tip (culet) 9 at its lower end, but this can be very finely ground depending on requirements and the appearance to be created. According to the invention, the angle β between the pavilion surface or lower girdle facets 5 and the girdle plane is preferably less than 38° and is 35° in the example shown in Figs. 1 and 2.

HDL-1005, 4:11-19. This excerpt describes a pavilion surface of a gemstone. The pavilion surface extends at an angle β relative to the belt plane (which is analogous to the table plane in the claim element because the belt plane and table plane are parallel). The angle β is described as being less than 38° , which corresponds to the “pavilion angle” mentioned in the claim element. While the excerpt does not explicitly state that the pavilion surface is elongated in one direction or extends at the left side of the stone, these characteristics can be inferred from the overall description of the gemstone’s structure. *See also claim element [1a]* (explaining that the stone is oblong).

90. ***Claim element [1f]***: Kanner in Figs. 1, 4 and 6 displays a second pavilion surface. HDL-1003, Figs.1; 4; 6 (annotated). The second pavilion surface is elongated in the one direction and extends at the right side of the stone. The second pavilion surface extends opposite to the first pavilion surface and extends at the pavilion angle relative to the table plane.

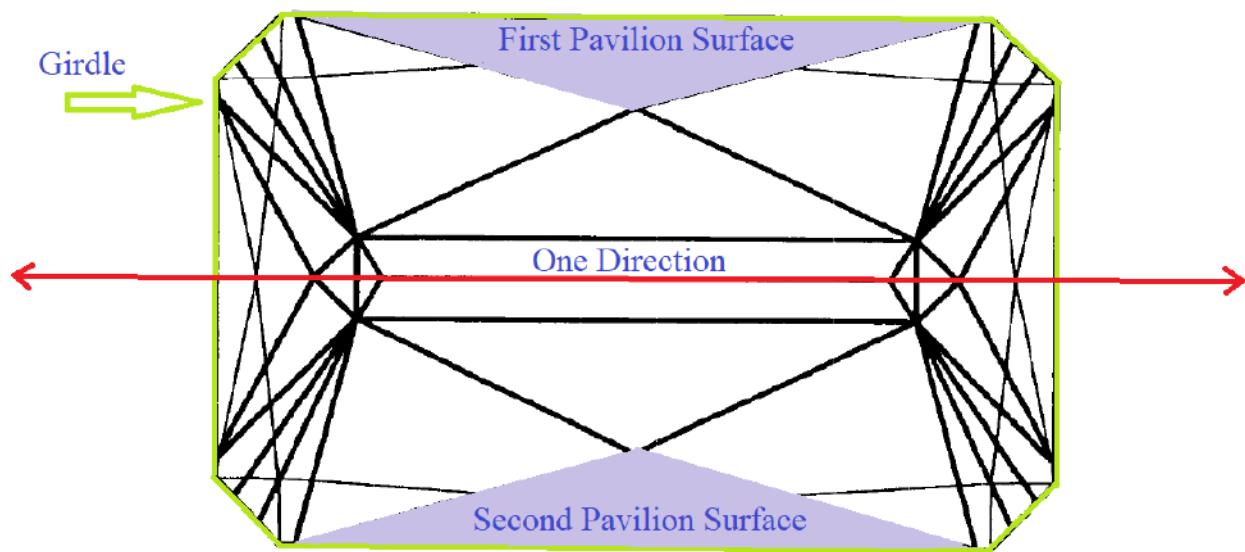


FIG. 4

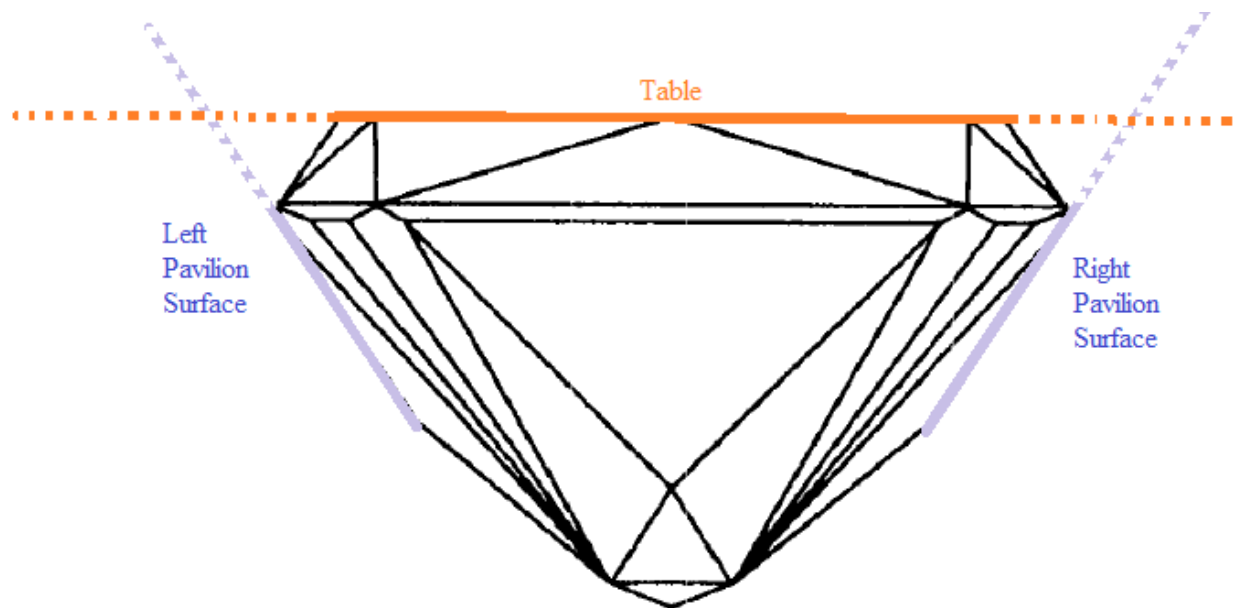


FIG. 6

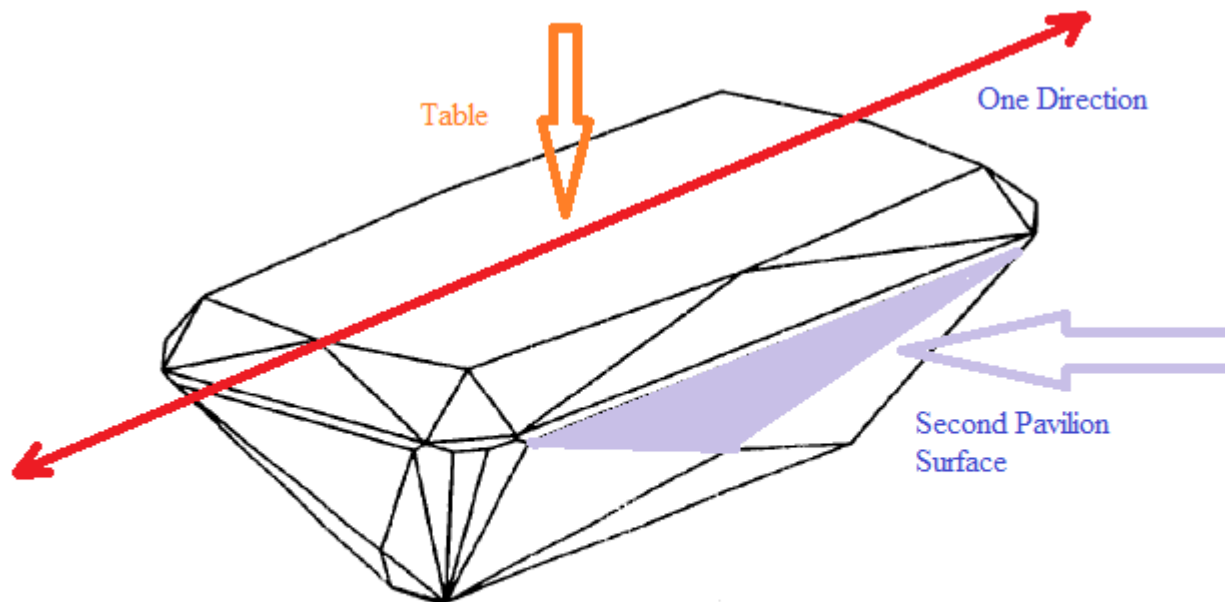


FIG.1

91. Also, Schmidt discloses

The pavilion 3 has lower girdle facets 5 on its surface, as well as main facets 7, which, as can be seen in Fig. 2, are visible shimmering through the table plane 21. The pavilion 3 preferably has a tip (culet) 9 at its lower end, but this can be very finely ground depending on requirements and the appearance to be created. According to the invention, the angle β between the pavilion surface or lower girdle facets 5 and the girdle plane is preferably less than 38° and is 35° in the example shown in Figs. 1 and 2.

HDL-1005, 4:11-19. This excerpt describes the pavilion surface of the gemstone, which corresponds to the second pavilion surface in the claim element. The excerpt mentions that the angle β between the pavilion surface and the belt plane is preferably less than 38° . This angle corresponds to the pavilion angle in the claim element, which is measured relative to the table plane (since the belt plane is parallel to the table plane). While the excerpt does not explicitly state that the pavilion surface is elongated in one direction or extends at the right side of the stone, these characteristics can be inferred from the overall description of the gemstone's structure. *See also claim element [1a]* (explaining that the stone is oblong).

92. While Schmidt does not explicitly mention a “second” pavilion surface extending oppositely to a “first” pavilion surface, it is clear, as shown in the figures and description of Schmidt, that a circular or oblong cut gemstone has opposing pavilion surfaces.

93. ***Claim element [1g]:*** Kanner does not disclose the crown and pavilion angles for its emerald cut diamond. Schmidt, however, discloses that the angle α between “the facets 15 of the crown 13 and the girdle plane is preferably $28-32^\circ$ ” and that the angle β between the pavilion surface or lower girdle facets 5 and the girdle plane is $32-37^\circ$. HDL-1005, 3:15-17; 4:14-17; 4:23-26. Accordingly, Schmidt discloses a diamond with crown angle α of $28-32^\circ$ and a pavilion angle β of $32-37^\circ$. HDL-1005, 3:15-17; 4:14-17; 4:23-26. These ranges overlap with the crown angle range of 30-

36 degrees and the pavilion angle range of 30-34 degrees, as required by claim 1. Therefore, Schmidt discloses this limitation of claim 1.

94. A POSITA would have been motivated to cut the diamond of Kanner with the parameters of Schmidt to enhance its brilliance, provide it with a large appearance and preserve the raw material as much as possible.

95. ***Claim element [1h]:*** Referring back to claim element [1g], Schmidt discloses a crown angle of 28-32° and a pavilion angle of 32-37°. HDL-1005, 3:15-17; 4:14-17; 4:23-26. More specifically, Schmidt discloses a diamond with a crown angle α of 32 and a pavilion angle β of 32°. Trying this angle would have been a matter of routine optimization for a POSITA. Accordingly, this disclosure by Schmidt meets the claim limitation that the crown angle and the pavilion angle are equal.

96. Finally, the claim requires the angle relationship that is recited is “*to attain increased light amplification.*” Schmidt discloses a goal of its invention is “to create a precious stone or diamond which is relatively flat, has good brilliance and, analogous to the above-mentioned task, has a large appearance relative to the stone.” HDL-1005, 2:25-29. Schmidt further discloses that “the diamond proposed according to the invention, are suitable for any application where flat, relatively large-looking precious stones with excellent brilliance are used.” HDL-1005, 3:25-29. Thus, Schmidt provides a design that enhances the brilliance of the stone. A

POSITA would understand that this brilliance would be achieved through “increased light amplification” as recited.

Motivation to Combine Kanner and Schmidt

97. As explained above, Kanner discloses a relatively flat emerald cut diamond with first and second crown surfaces extending in the elongated direction of the diamond. Kanner also discloses first and second pavilion surfaces extending in the elongated direction of the diamond. Kanner, however, does not disclose any crown or pavilion angles for the crown surface or the pavilion surfaces. A POSITA would have been motivated to look at Schmidt to cut the diamond in Kanner in accordance with the angle parameters provided in Schmidt.

98. A POSITA would have had several reasons to make this combination. For example, a POSITA would have utilized Schmidt to achieve “good brilliance” and a “large appearance” for a relatively flat stone. HDL-1005,2:25-28. Indeed, Schmidt offers a cut for “a precious stone or diamond which is relatively *flat*” HDL-1005, 2:25-28 (emphasis added). Schmidt explains that “it has been shown that despite the choice of a relatively small angle between the surface of the pavilion and the girdle plane, excellent brilliance can be produced in a cut precious stone if the table plane of the crown is kept large at the same time.” HDL-1005, 2:38-46. Schmidt also explains that its disclosure can be broadly applied to “any” precious gemstone, inducing oblong shapes such as circular, square, rectangular, trapezoidal

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shapes to solve the problem addressed in the reference, which is enhancing the brilliance of flat or shallow stones. HDL-1005, 5:15-40; 2:25-28; 2:38-46). Therefore, a POSITA would have utilized the teachings in Schmidt to cut a brilliant diamond with a large appearance for a relatively flat cut diamond described in Kanner.

99. Schmidt discloses that the crown angle can be in the range of 28-32° and the pavilion angle can be in the range of 32-37°. HDL-1005, 3:15-17; 4:14-17; 4:23-26). More specifically, Schmidt discloses a diamond with a crown angle α of 32° and a pavilion angle β of 32°. These ranges overlap with the ranges provided in claim 1, and the crown angle of 32° and pavilion angle of 32° falls squarely within the claimed limitations of claim 1.

100. It would have been a matter of routine optimization to try this angle. Indeed, Schmidt explains that “it is also a question of optimizing the selected stone and the design of the girdle line, whether circular, square, rectangular, trapezoidal, etc., how the various angular dimensions of α and β are selected, as well as the size ratios of the table diameter to the diameter of the girdle line and the depth of the pavilion, etc.” HDL-1005, 5:26-32.

101. A POSITA would have been particularly motivated to try the 32° angle because it is the upper limit for the crown angle and the lower limit for the pavilion angle taught by Schmidt. For a rough gem with a relatively large crown and a

relatively small pavilion, a POSITA would have tried the upper limit of the crown angle to maximize the yield of the rough gem. A POSITA would also have tried the lower limit for the pavilion angle to ensure that the contemplate design fits within the rough gem. Therefore, cutting the rough gem at 32° would have been a routine optimization by a POSITA.

102. During prosecution of the '791 Patent, I have been informed by Counsel that the Patent Owner submitted a declaration to the examiner which alleges that the ranges specified in claim 1 provide an unexpected result. HDL-1002, pp.234-236. I understand from Counsel that this declaration, however, is deficient for several reasons and fails to establish any unexpected results. I reviewed this declaration myself and agree with Counsel's assessment that the declaration does not present anything new or unexpected regarding the ranges specified in claim 1. It is my opinion that Patent Owner's declaration is not relevant, particularly in the context is this Ground.

Schmidt Teaches Claim 2: "The precious stone of claim 1, wherein said total depth percentage is in the range of 36.00 to 57.00."

103. Schmidt discloses the following parameters for the exemplary stone cut according to its disclosure:

$$D = 1.70 (\pm 0.05) \text{ mm}$$

$$T = 1.45 (\pm 0.05) \text{ mm}$$

$$H = 0.7 (\pm 0.05) \text{ mm}$$

HDL-1006

$$K = 0.11 (\pm 0.01) \text{ mm}$$

$$P = 0.59 (\pm 0.01) \text{ mm.}$$

HDL-1005, 5:1-15. Of particular interest is the total height (H) of 0.7 mm and the diameter (D) of 1.70 mm. HDL-1005, 4:31-44; 5:1-15. These measurements can be used to calculate the total depth percentage, which is calculated by dividing the total depth by width of the diamond. *See also* HDL-1002, p.76. Accordingly, to calculate the total depth percentage, we need to divide the total height H by the diameter D: $(0.7 \text{ mm} / 1.70 \text{ mm}) * 100 \approx 0.4118$ or 41.18%. Thus, the calculated total depth percentage of approximately 41.18% falls within the claimed range of 36 to 57.

Schmidt Teaches Claim 3: “The precious stone of claim 1 wherein the total depth percentage is in the range of 40 to 50.”

104. As explained above in connection with claim 2, Schmidt discloses the total depth percentage of 41.18%, which falls within the claimed range of 40 to 50.

Schmidt Teaches Claim 4: “The precious stone of claim 1, wherein said crown angle is in the range of 31-34 degrees.”

105. Schmidt discloses “the angle α included between the facets 15 of the crown 13 and the girdle plane is preferably 28–32°” HDL-1005, 4:5-10. Thus, Schmidt disclose a crown angle in the range of 28-32° which overlaps with the claimed range of 31-34 degrees. As explained above in connection with motivation to combine the references and as I have been informed by Counsel, there is a presumption of

obviousness, and Patent Owner has not shown any unexpected results to rebut this presumption.

Schmidt Teaches Claim 5: “The precious stone of claim 1, wherein said pavilion angle is in the range of 31 to 33 degrees.”

106. Schmidt discloses that “[i]t is further proposed that the angle between the surface of the pavilion and the girdle plane is 32–37° . . .” HDL-1005, 3:9-11. Thus, Schmidt discloses a pavilion angle with a range between 32-37°, which overlaps with the claimed range of 31-34 degrees. As explained above in connection with motivation to combine the references and as I have been informed by Counsel, there is a presumption of obviousness, and Patent Owner has not shown any unexpected results to rebut this presumption.

Schmidt Teaches Claim 6: “The precious stone of claim 1, wherein said precious stone is a diamond.”

107. Schmidt discloses “[t]he precious stone can be a diamond” HDL-1005, 3:19-24.

Schmidt and the Applicant Admitted Prior Art Teach Claims 7-12: “The precious stone of claim 1, wherein said precious stone has a . . . [cushion-cut shape, emerald-cut shape, radiant shape, oval shape, marquise shape, or princess shape].”

108. Both admitted prior art and Schmidt disclose the features of these claims. During prosecution of the ‘791 Patent, the examiner took official notice, and the Patent Owner did not traverse, that shapes such as cushion, emerald, radiant, oval, marquise, or princess are “extremely well-known in the gemstone art.” HDL-

HDL-1006

1002,pp.52-53;56;63-73;94-95). I understand that this official notice is now admitted prior art. HDL-1002 ,pp. 94-95 (“common knowledge statement is taken to be *admitted prior art*”). Thus, a POSITA would have shaped the stone into one of these shapes because “there is no invention in merely changing the shape or form of an article without changing its function” HDL-1002, pp.52-53; 56; 94-95. The reason for this implementation would have been to provide the “good brilliance” and a “large appearance” of the design in Schmidt to cushion-cut shape, emerald-cut shape, radiant shape, oval shape, marquis shape, or princess shape designs. Such a change would have been obvious to a POSITA.

109. Schmidt also discloses “[u]ltimately, it is also a question of optimizing the selected stone and the design of the girdle line, whether circular, square, rectangular, trapezoidal, etc., how the various angular dimensions of α and β are selected, as well as the size ratios of the table diameter to the diameter of the girdle line and the depth of the pavilion, etc.” HDL-1005, 5:16-39. This excerpt broadly provides that the girdle line of the gemstone can have various widths and shapes, including square and rectangular. Accordingly, Schmidt’s design can be applied to non-circular shapes, and thus, a POSITA would have been motivated to cut the gemstones into the shapes provided by claims 7-12.

Schmidt Teaches Claim 13: “The precious stone of claim 1, wherein said crown height percentage in the range of 6-15, said girdle height percentage in the

range of 3-5, said table percentage in the range of 70-79, and said total depth percentage in the range of 36-57.”

110. Schmidt discloses “a cut, flat precious stone with a relatively large appearance in relation to the weight or thickness of the precious stone . . . in which the table diameter is at least 70% of the diameter of the girdle line.” HDL-1005, 2:5-12. Schmidt also discloses an exemplary embodiment in which the diameter of the girdle line (or girdle plane) is D and the height of the stone is H. HDL-1005, 4:30-45. Thus, Schmidt discloses a total depth percentage: $H/D = 0.7/1.70 \approx 41.18\%$, which falls within the claimed range of 36-57%. HDL-1005, 4:30-45. While Schmidt does not disclose a crown height percentage in the range of 6-15, or a girdle height percentage in the range of 3-5, Schmidt discloses a combined crown height percentage and girdle height percentage of: $K/D = 0.11/1.7 \approx 6.4\%$. HDL-1005,4:30-45.

111. It would have been obvious to a POSITA before the filing date of the ‘791 Patent to shape the gemstone, as claimed, to optimize the light properties of the precious stone. Discovering an optimum value of a result effective variable involves only routine skill in the art. It is further noted that Patent Owner has not disclosed that the crown height percentage and a girdle height percentage create any unexpected result, particularly as they relate to Schmidt.

Schmidt Teaches Claim 14: “The precious stone of claim 13, wherein said crown height percentage is in the range of 8-13, said girdle height percentage is

in the range of 3.5-4.5, said table percentage is in the range of 72-77, and said total depth percentage is in the range of 40-50.”

112. As explained above in connection with claim 13, Schmidt discloses a table percentage of at least 70%, and a total depth percentage of 41.18%, which overlap and fall within the claimed ranges, respectively. Schmidt also discloses a combined crown height percentage and a girdle height percentage: $K/D = 0.11/1.7 \approx 6.4\%$. HDL-1005, 4:30-45. It would have been obvious to a POSITA before the filing date of the '791 Patent to shape the gemstone, as claimed, to optimize the light properties of the precious stone. Discovering an optimum value of a result effective variable involves only routine skill in the art. It is further noted that Patent Owner has not disclosed that the crown height percentage and a girdle height percentage create any unexpected result.

GROUND 2: Claims 1, 5 and 6 Are Anticipated by Grossbard (HDL-1007)

113. It is my opinion that Grossbard anticipates claims 1, 5 and 6 of the '791 Patent.

Grossbard

114. U.S. Patent No. 4,555,916 to Grossbard was filed on July 20, 1982 and granted on December 3, 1985 (“Grossbard”). (HDL-1007). I have been informed that it therefore qualifies as prior art to the '791 Patent under 35 U.S.C. § 102(a)(1).

115. Similar to the '791 Patent, Grossbard offers a diamond cut that enhances the fire of a diamond. HDL-1007, 1:8-9. Grossbard recognizes that traditional brilliant “cut is the most wasteful of diamond raw material.” (HDL-1007, 1:10-12). Grossbard

HDL-1006

also explains that “step cut stones such as square cut diamonds and emerald cut diamonds while being more conservative of diamond raw material have none of the fire of brilliant cut diamonds.” HDL-1007, 1:13-16. Thus, Grossbard provides “a diamond which is, on the one hand, more brilliant than the heretofore known conventional or hybrid square or emerald cut colored diamonds and, on the other hand, is less wasteful of raw material than conventional brilliant cut or the aforementioned hybrid cut diamonds.” HDL-1007, 1:43-47.

116. The diamond 10 of Grossbard has “an octagonal girdle with straight edge long side facets 12 . . . ; a pyramidal base having . . . long side girdle breaks 18 . . . , culet breaks 20, and a culet 22 . . . ; and a crown having a girdle break 24, a table break 26 and a table 28.” HDL 1007, 2:14-21. “[T]he angle between the plane of the girdle break of the crown and the table should be in the range from 35° to 45°.” HDL-1007, 2:23-25. The angle between the plane of the culet break and the plane of the table is from 33° to 42°. HDL-1007, 2:28-29. Figs. 1 and 2 of Grossbard are provided below, which show the top and bottom view of an emerald cut diamond.

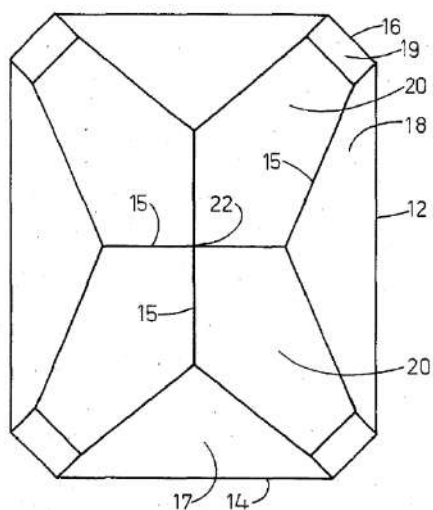


FIG. 1

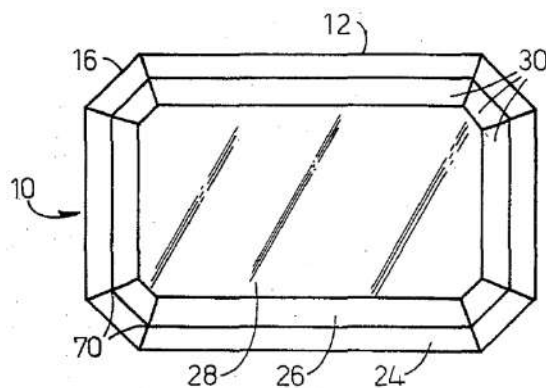
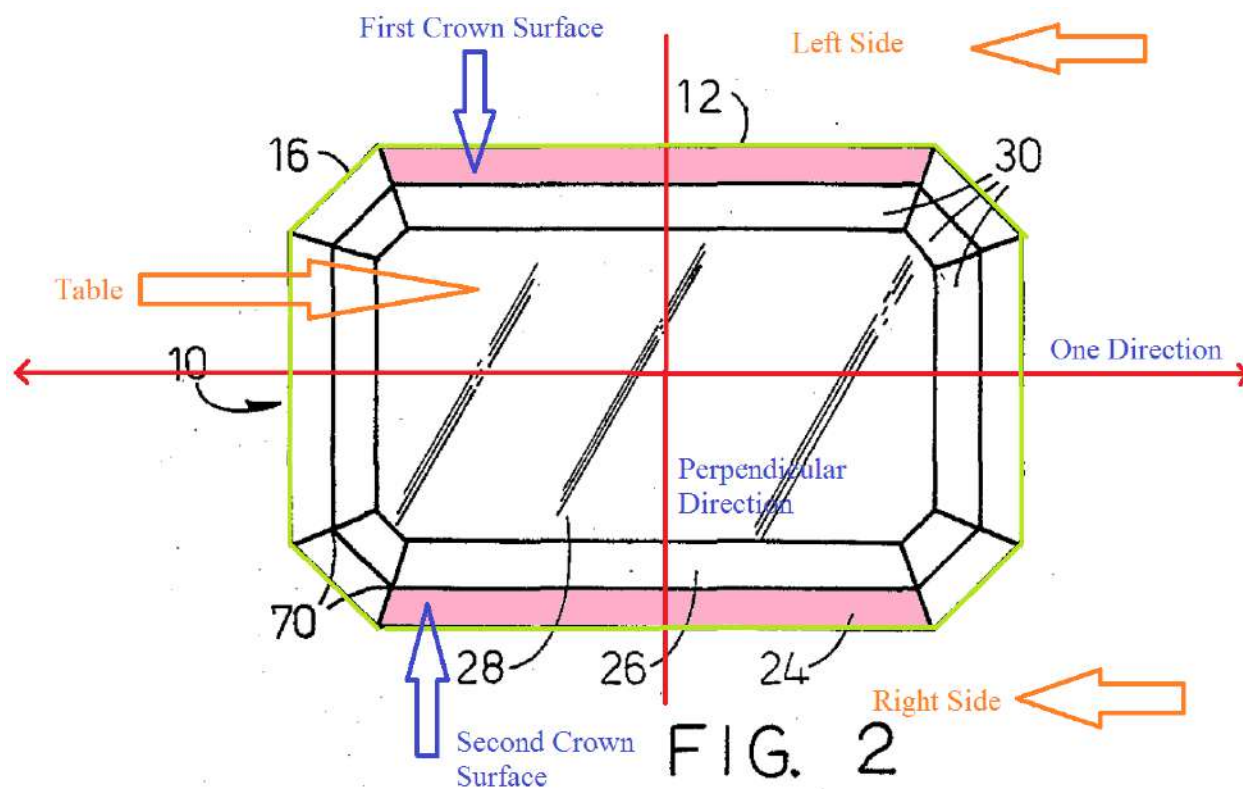


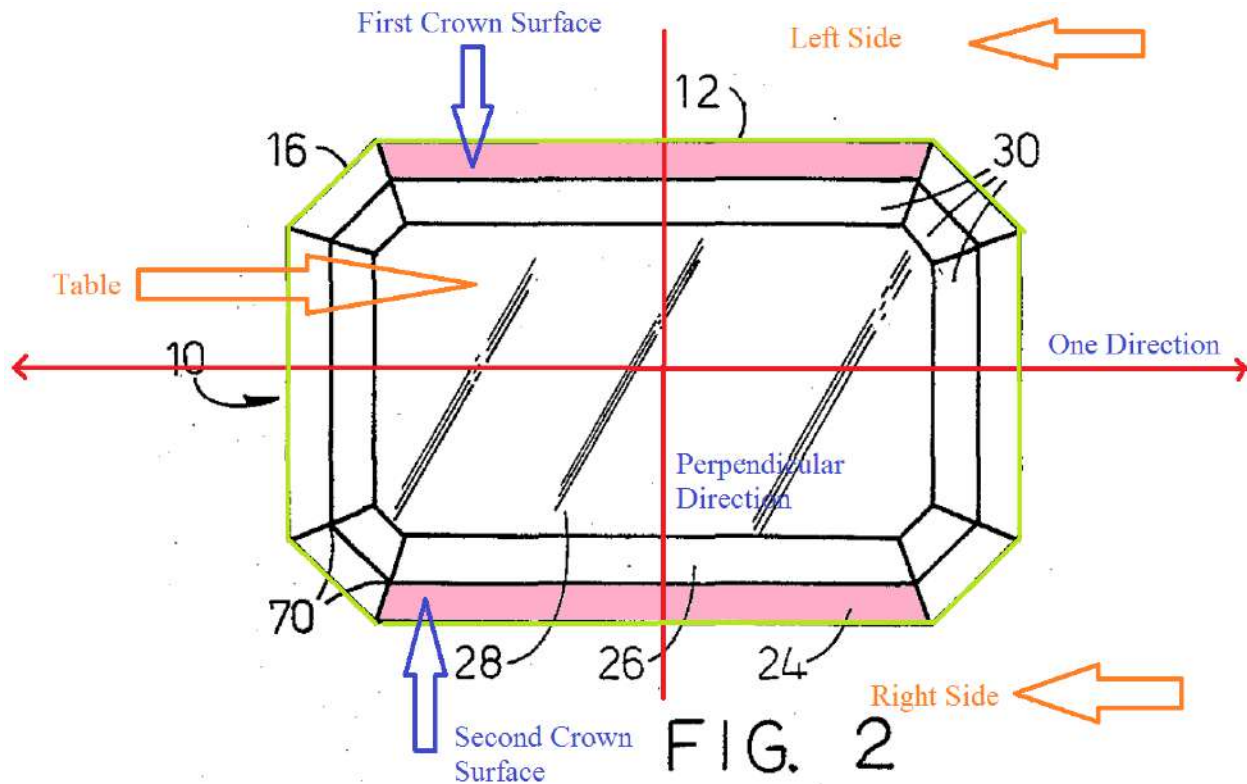
FIG. 2

Grossbard Discloses Each Element of Independent Claim 1

117. **Claim element [1a]:** Grossbard discloses emerald cut diamond 10, which is elongated in one direction and defines a length of the diamond in that direction. The diamond 10 has a width in a direction perpendicular to the one direction. The diamond 10 also has a left side and a right side, both of which extend along the length of the diamond. Annotated Fig. 2 of Grossbard shows these elements of claim 1.



118. **Claim element [1b]:** Diamond 10 of Grossbard has a table 28 with a table plane. HDL-1007, 2:14-21. The table 28 is elongated in the one direction. Diamond 10 also has an octagonal girdle.

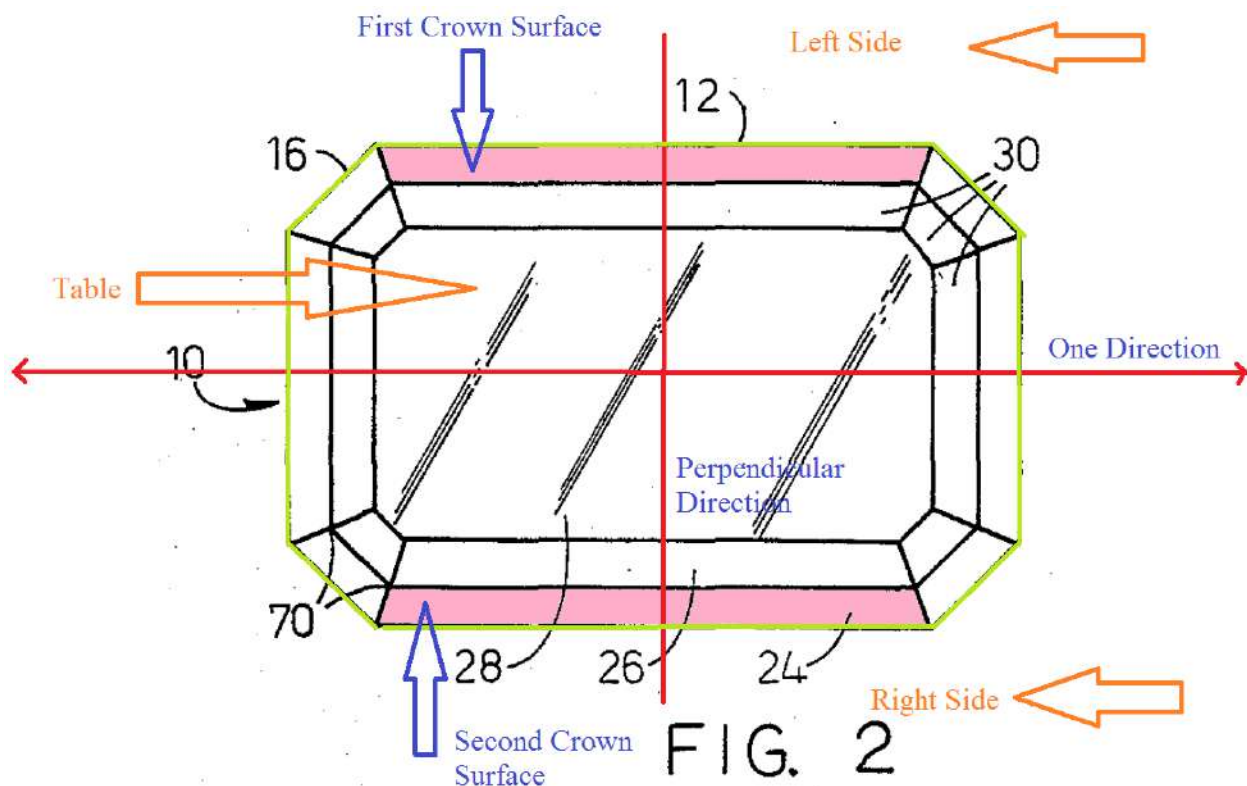


119. Claim 1 further requires a specific total depth percentage, a specific crown height percentage, a specific girdle height percentage and a specific table percentage, but does not define any value for these parameters. These parameters are merely characteristics that a POSITA would understand all stones to have and are well known and conventional, as admitted by the '791 Patent.

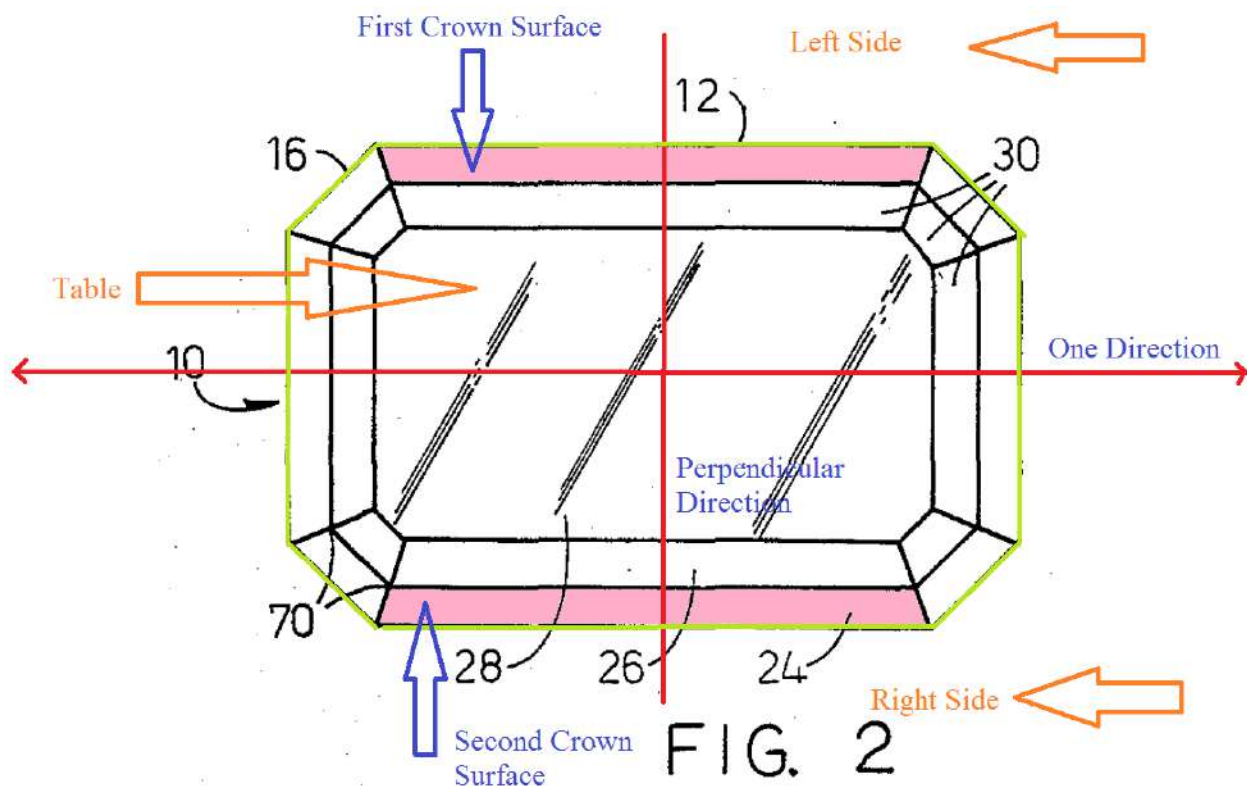
120. A POSITA, therefore, would have measured the total depth, crown height, girdle height, table diameter, and width of the diamond 10 of Grossbard, and calculated the total depth percentage, the crown height percentage, the girdle height percentage, and the table percentage for diamond 10. A POSITA is motivated to

make these calculations because these parameters identify the physical attributes of the diamond. Therefore, Grossbard discloses claim element [1b] of the '791 Patent.

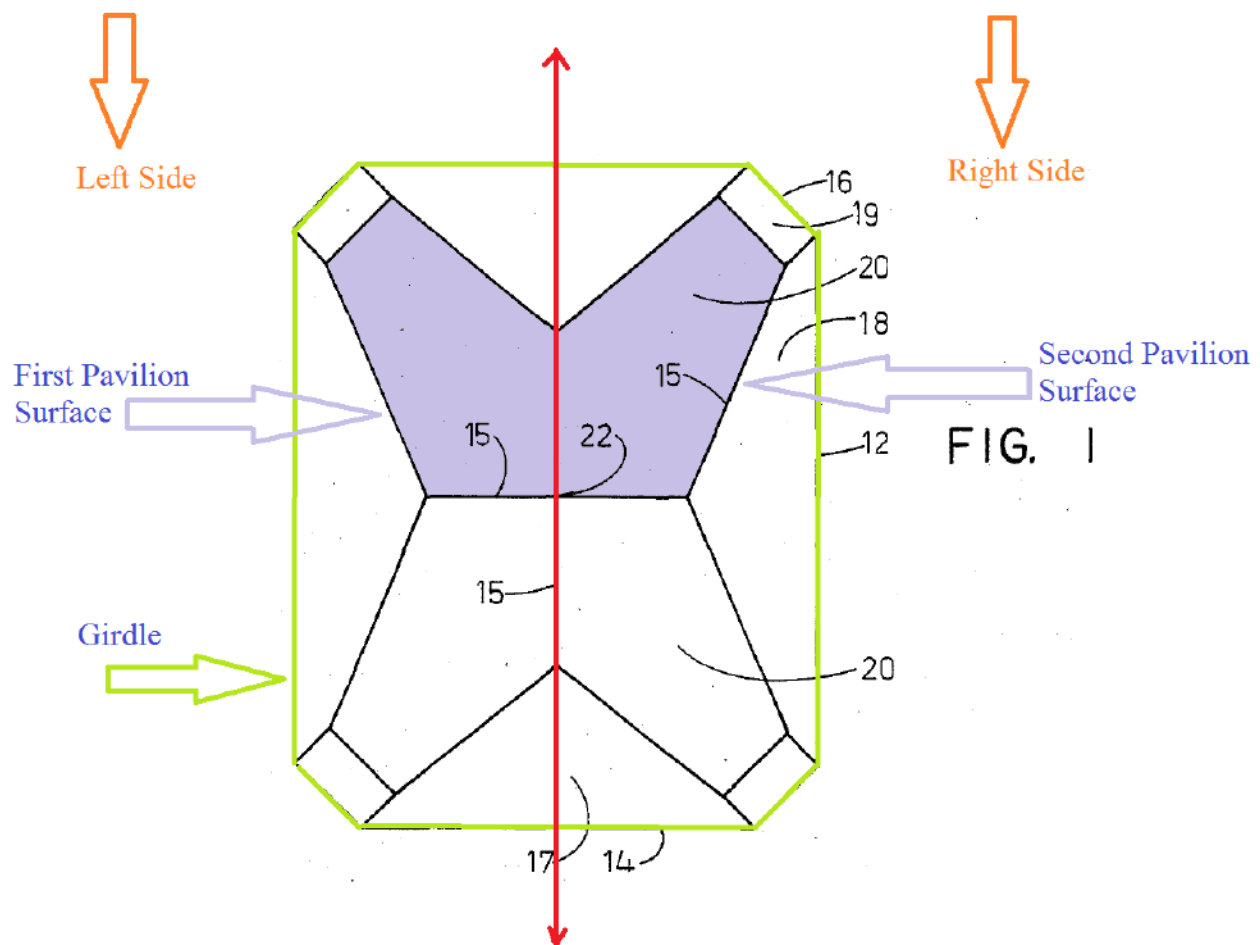
121. **Claim element [1c]:** Grossbard in Fig. 2 discloses a crown having a girdle break 24 (colored in pink), which is elongated in the one direction. The girdle break 24 extends at the left side of diamond 10 and is located between the table 28 and the octagonal girdle. The girdle break 24 refers to the first crown surface of claim 1. Grossbard also discloses that “the angle between the plane of the girdle break of the crown and the table should be in the range from 35° to 45°.” HDL-1007, 2:23-25. Therefore, this angle refers to the crown angle of claim 1.



122. **Claim element [1d]**: Grossbard in Fig. 2 discloses a crown having a girdle break 24 (or lateral lower crown facet colored in pink), which is elongated in the one direction. The girdle break 24 extends at the right side of diamond 10 and is located between the table 28 and the octagonal girdle. The girdle break 24 is on the opposite side to the girdle break on the left side. The girdle break 24 on the right side of diamond 10 refers to the second crown surface of claim 1. Grossbard also discloses that “the angle between the plane of the girdle break of the crown and the table should be in the range from 35° to 45°.” HDL-1007, 2:23-25. Therefore, this angle refers to the crown angle of claim 1.

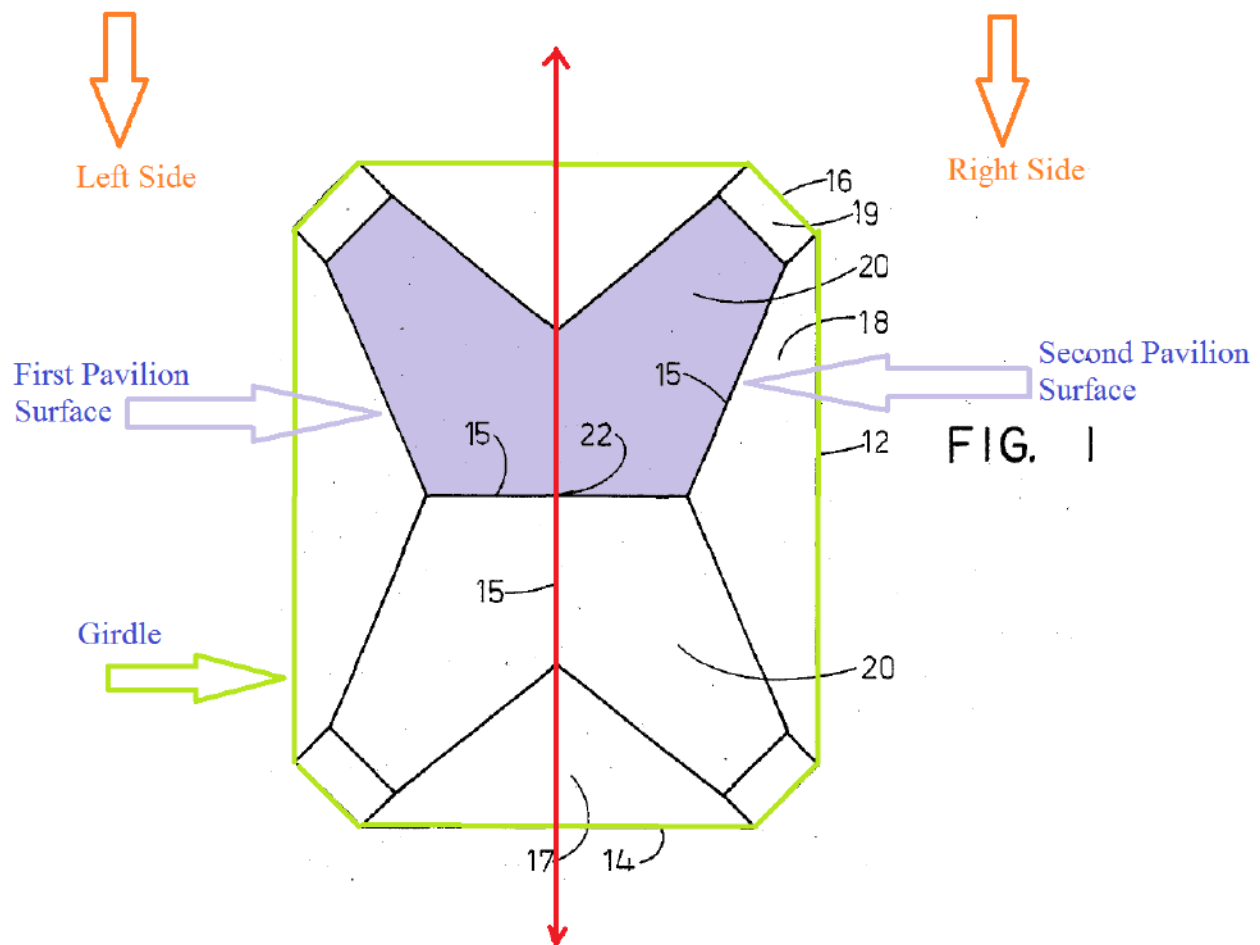


123. **Claim element [1e]:** Grossbard discloses a culet break 20 (see Fig.1, reproduced below and colored in purple), which is elongated in the one direction. The culet break 20 extends at the left side of the diamond 10. The culet break 20 refers to the first pavilion surface of claim 1. “The angle between the plane of the culet break and the plane of the table is from 33° to 42°.” HDL-1007, 2:28-29. This angle refers to the pavilion angle of claim 1.



124. **Claim element [1f]:** Grossbard discloses a culet break 20 (or pavilion main facet (see Fig.1, reproduced below and colored in purple), which is elongated in the

one direction. The culet break 20 extends at the right side of the diamond 10 and opposed to the first pavilion angle. The culet break 20 refers to the second pavilion surface of claim 1. “The angle between the plane of the culet break and the plane of the table is from 33° to 42°.” HDL-1007, 2:28-29. This angle refers to the pavilion angle of claim 1.



125. **Claim element [1g]:** Grossbard discloses that “the angle between the plane of the girdle break of the crown and the table should be in the range from 35° to 45°” and “[t]he angle between the plane of the culet break and the plane of the table is

from 33° to 42°.” HDL-1007, 2:23-25; 2:28-29. These angles refer to the crown angle and pavilion angle of claim 1, respectively, and they overlap with the ranges that claim 1 provides for the crown angle and the pavilion angle (*i.e.*, the crown angle overlaps in the 35°-36° range and the pavilion angle overlaps in the 33°-34° range). For the reasons explained above under Ground 1, Patent Owner has failed to identify any unexpected result in connection with this limitation, and thus, the overlapping ranges anticipate this claim.

126. ***Claim element [1h]:*** Grossbard discloses the crown angle in the 35°-36° range and the pavilion angle in the 33°-34° range. (*See claim element [1g]*). In these ranges, the crown angle can be greater than the pavilion angle by less than 6 degrees, *e.g.*, the crown angle of 35° and the pavilion angle of 33°. A POSITA would have been particularly motivated to try these angles because for a shallow or flat rough, these angles preserve most of the rough gemstone material.

Grossbard Discloses Claim 5: “The precious stone of claim 1, wherein said pavilion angle is in the range of 31 to 33 degrees.”

127. Grossbard discloses the pavilion angle of 33°. HDL-1007, 2:28-29.

Grossbard Discloses Claim 6: “The precious stone of claim 1, wherein said precious stone is a diamond.”

128. Grossbard shows a diamond 10 in Figs. 1 and 2.

GROUND 3: Claims 1 and 5-12 Are Obvious Over Greeff (HDL-1008) in View of Grossbard (HDL-1007)

129. It is my opinion that the combination of Greeff and Grossbard renders claims 1 and 5-12 obvious either explicitly or combined with the knowledge of a POSITA. The motivation for combining the references is provided below in the discussion of the rejection.

130. *See* Ground 2 for a description of Grossbard.

Greeff

131. The first prior art reference applied in this Ground is U.S. Design Patent No. 463,315 to Greeff (“Greeff”). (HDL-1008). It has a patent grant date of September 24, 2002 and was filed on May 14, 2001. I have been informed that it therefore qualifies as prior art to the ’791 Patent under 35 U.S.C. § 102(a)(1).

132. Similar to the ’791 Patent, Greeff offers an emerald cut for a gemstone HDL-1008; *see* HDL-1001 (claim 8). Figs. 1-6 of Greeff show various views of the gemstone. HDL-1008, Figs.1-6. Figs. 1, 3 and 5 of the reference are included below.

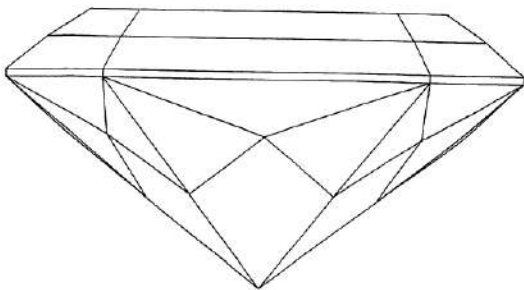


Figure 1

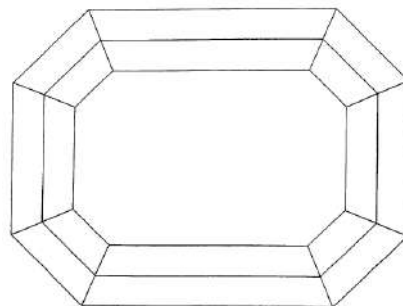


Figure 3

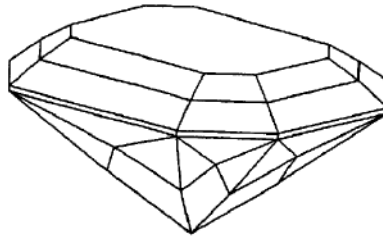


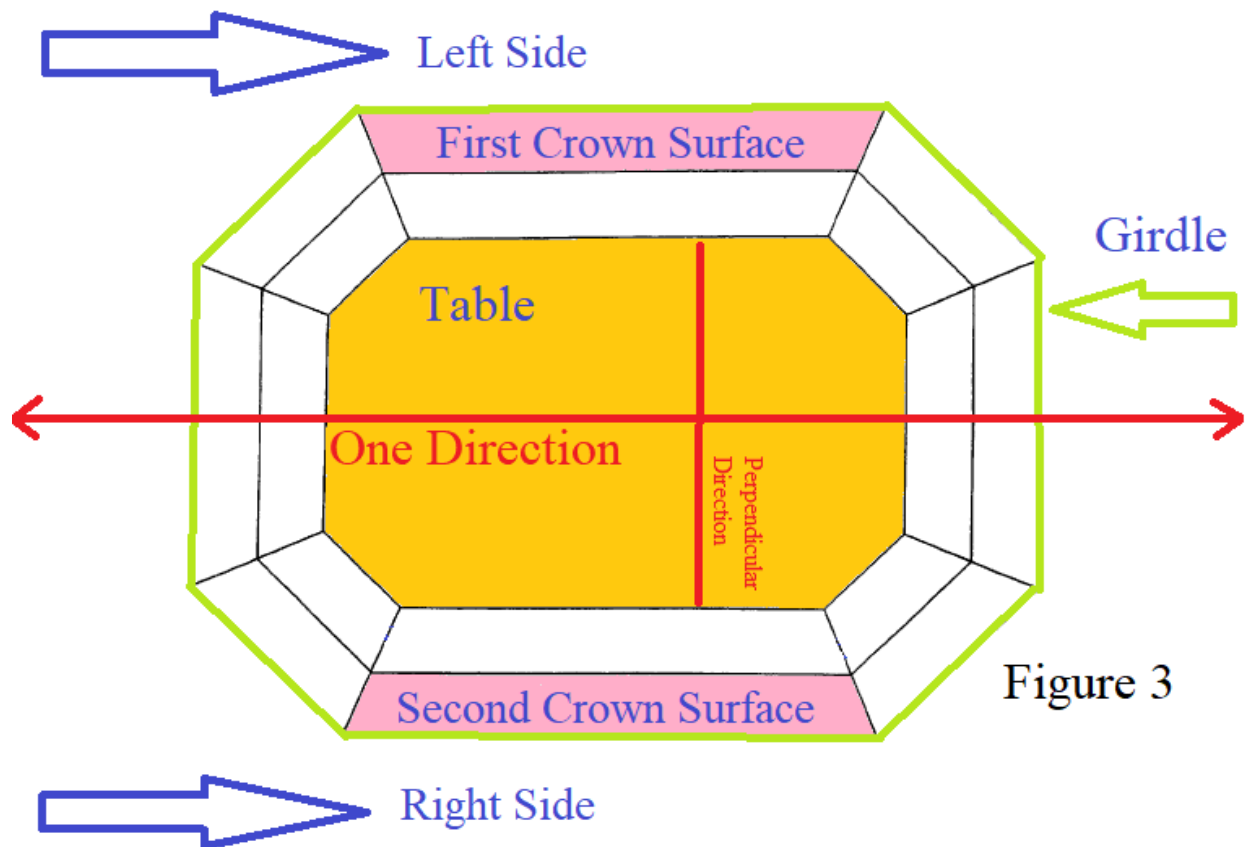
Figure 5

Greeff and Grossbard Render the Claims Obvious

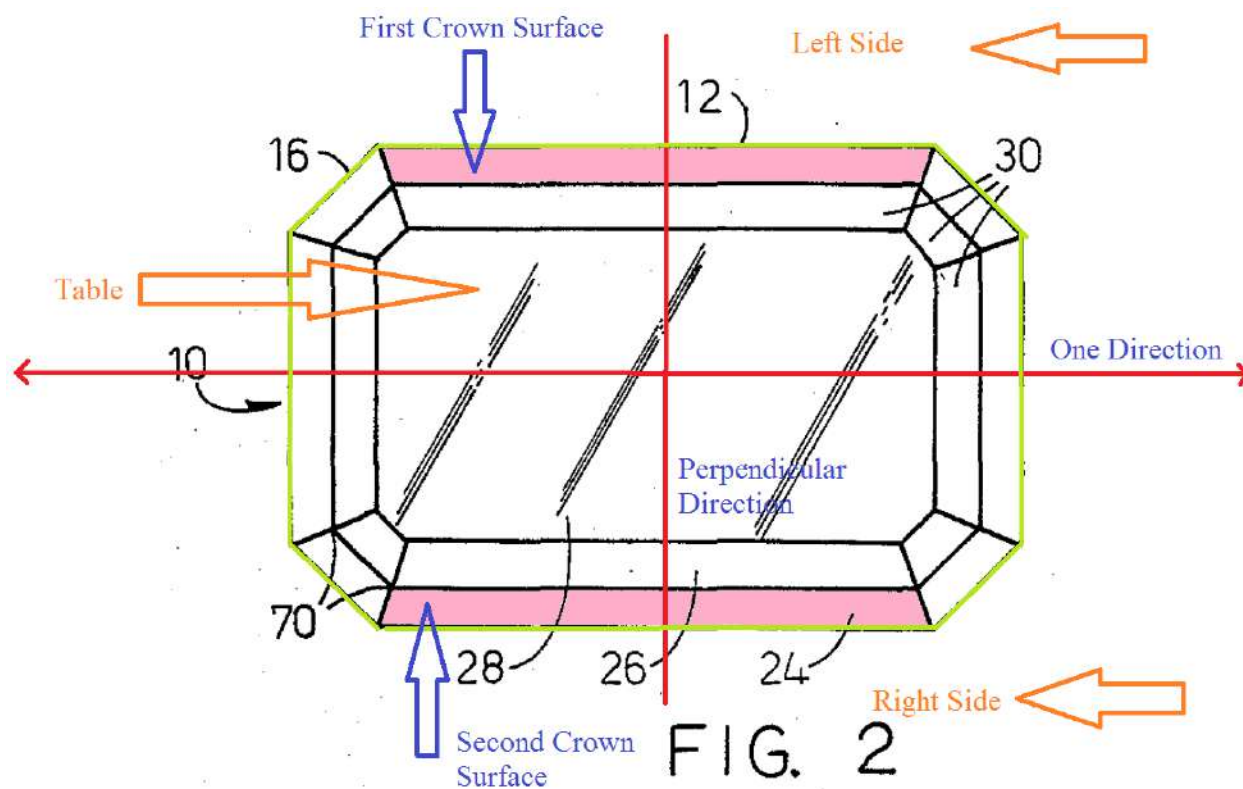
133. Greeff and Grossbard render claims 1 and 6-12 obvious either explicitly or combined with the knowledge of a POSITA.

Greeff and Grossbard Teach Each Element of Independent Claim 1

134. *Claim element [1a]*: Figs. 1, 3, and 5 of Greeff show an emerald cut gemstone, which is elongated in one direction and defining a length. HDL-1008, Figs.1; 3; 5. The gemstone has a width in a perpendicular direction. The gemstone has a left side and a right side, both of which extend along the length of the stone.



135. Grossbard also discloses this element. *See* Ground 2, claim element [1a].



136. **Claim element [1b]:** Figures 3 and 5 of Greeff show a gemstone with a table having a table plane, that is elongated in the one direction, and a girdle.

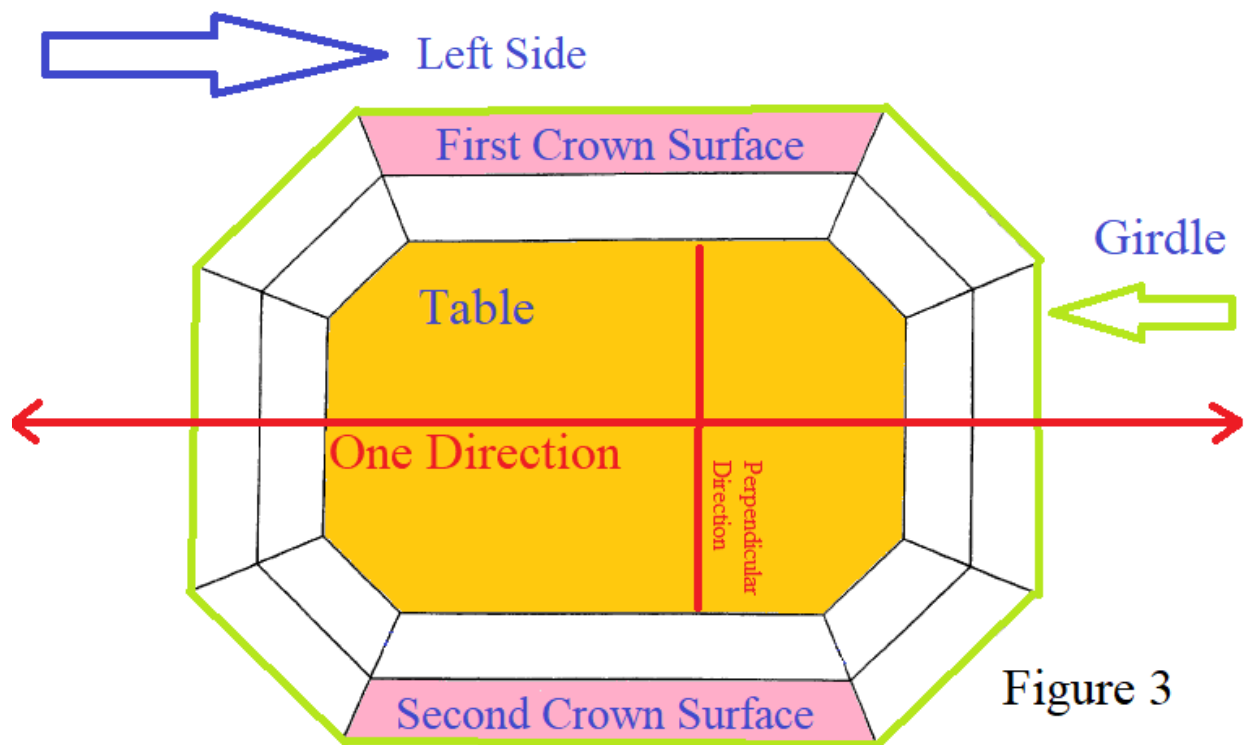


Figure 3

Right Side

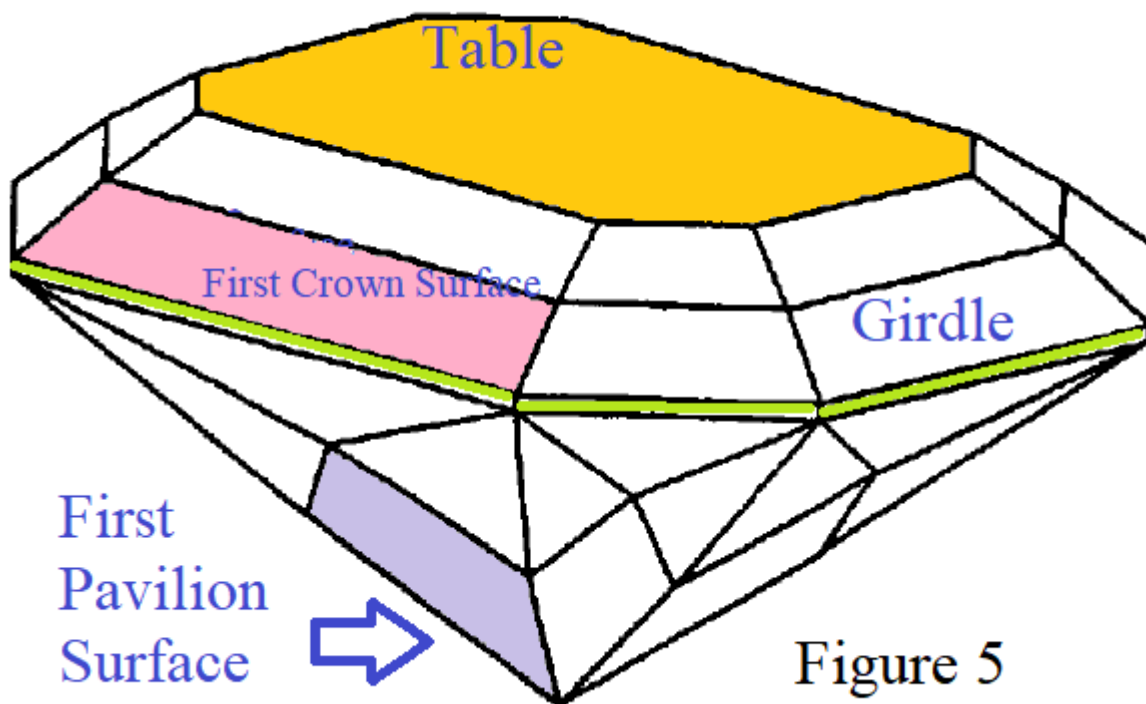
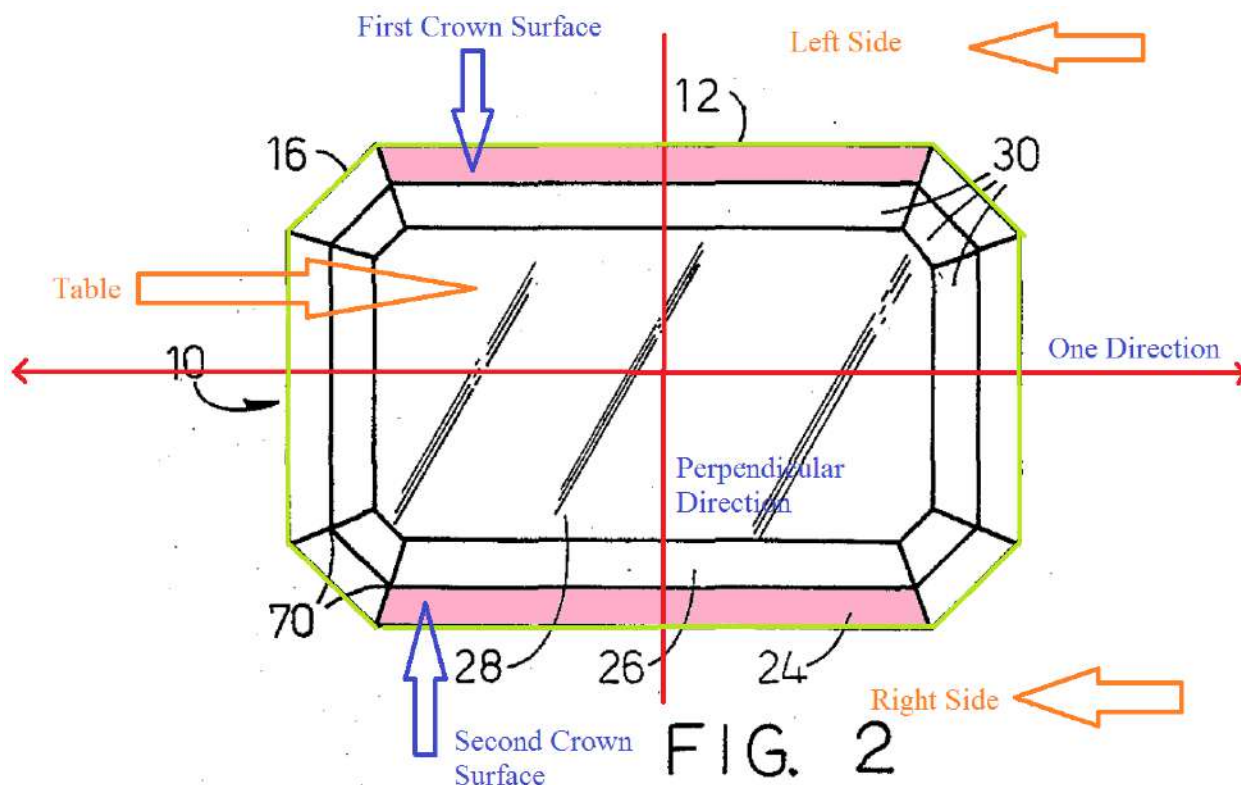


Figure 5

HDL-1006

137. Grossbard also discloses this element. *See* Ground 2, claim element [1b].



138. Claim 1 further requires a specific total depth percentage, a specific crown height percentage, a specific girdle height percentage and a specific table percentage, but does not define any value for these parameters. These parameters are merely characteristics that a POSITA would understand all stones to have and are well known and conventional, as admitted by the '791 Patent. *See also* Ground 1, claim element [1b] (discussing that these elements are well known for every emerald cut diamond).

139. **Claim element [1c]:** Fig. 3 of Greeff shows a first crown surface that is elongated in the one direction and extends at the left side of the gemstone. The first

crown surface of Greeff is located between the table and the girdle. As Fig. 2 of Greeff shows, the first crown surface extends at a crown angle relative to the table plane.

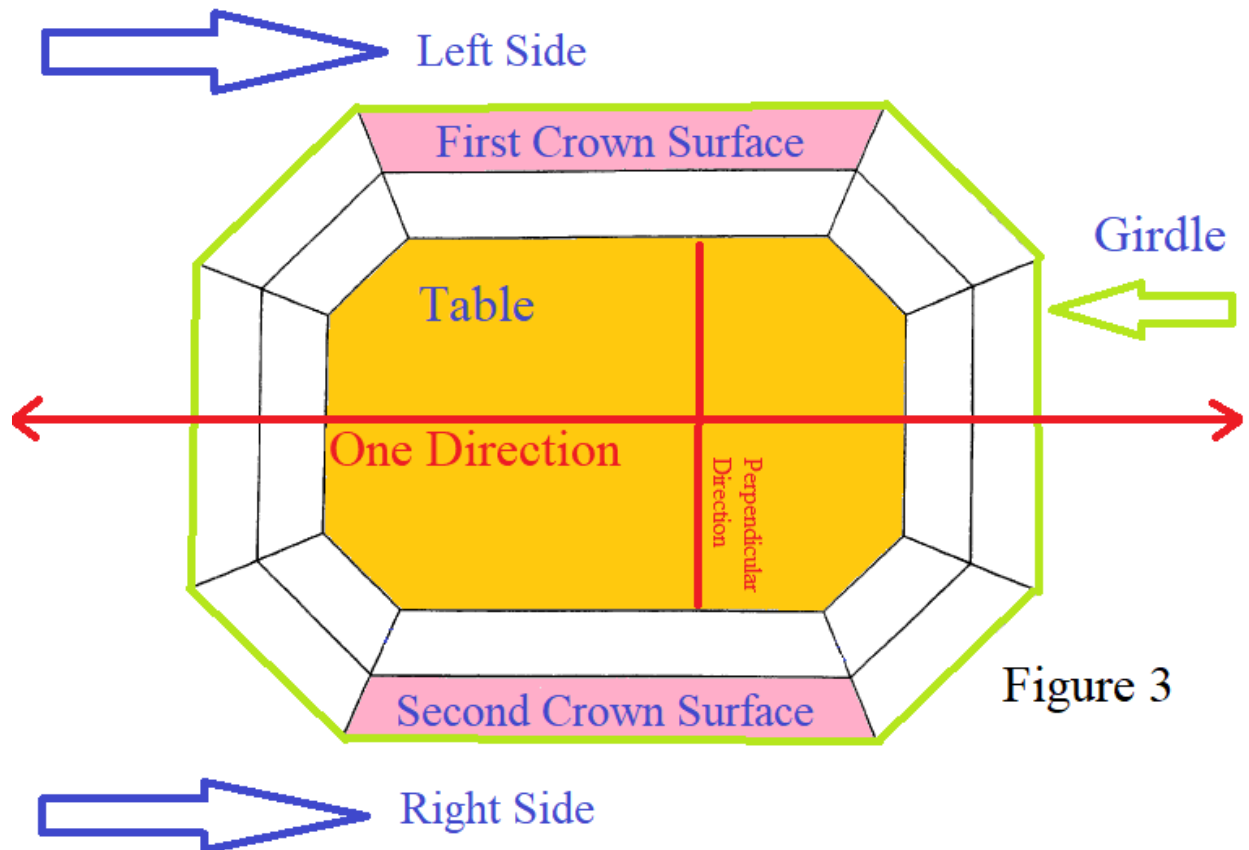
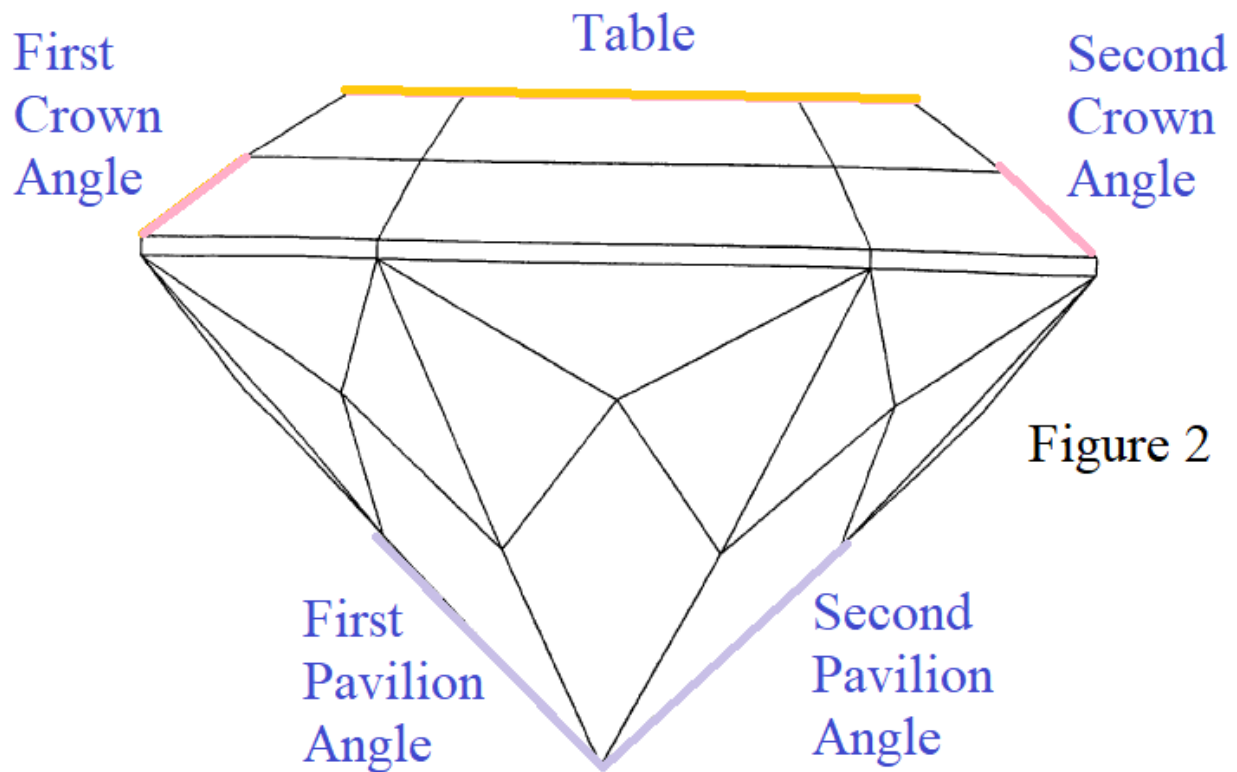
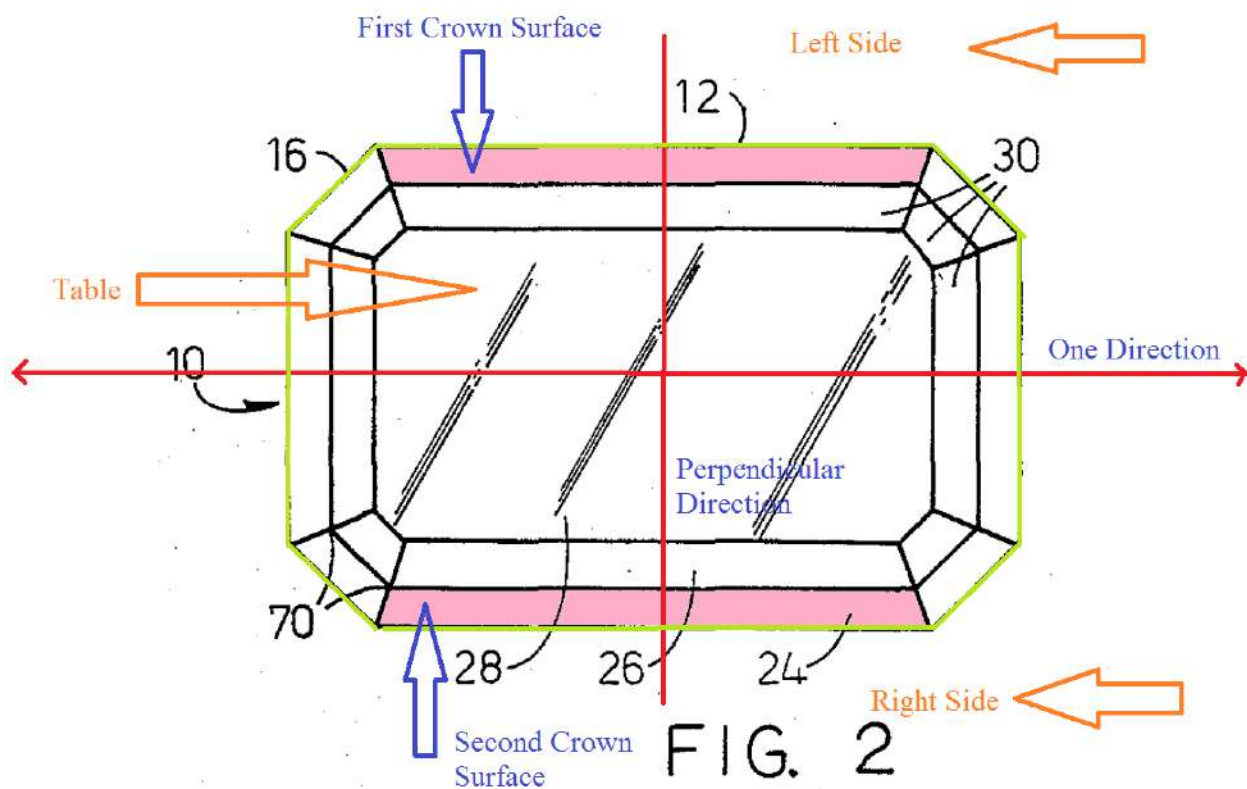


Figure 3

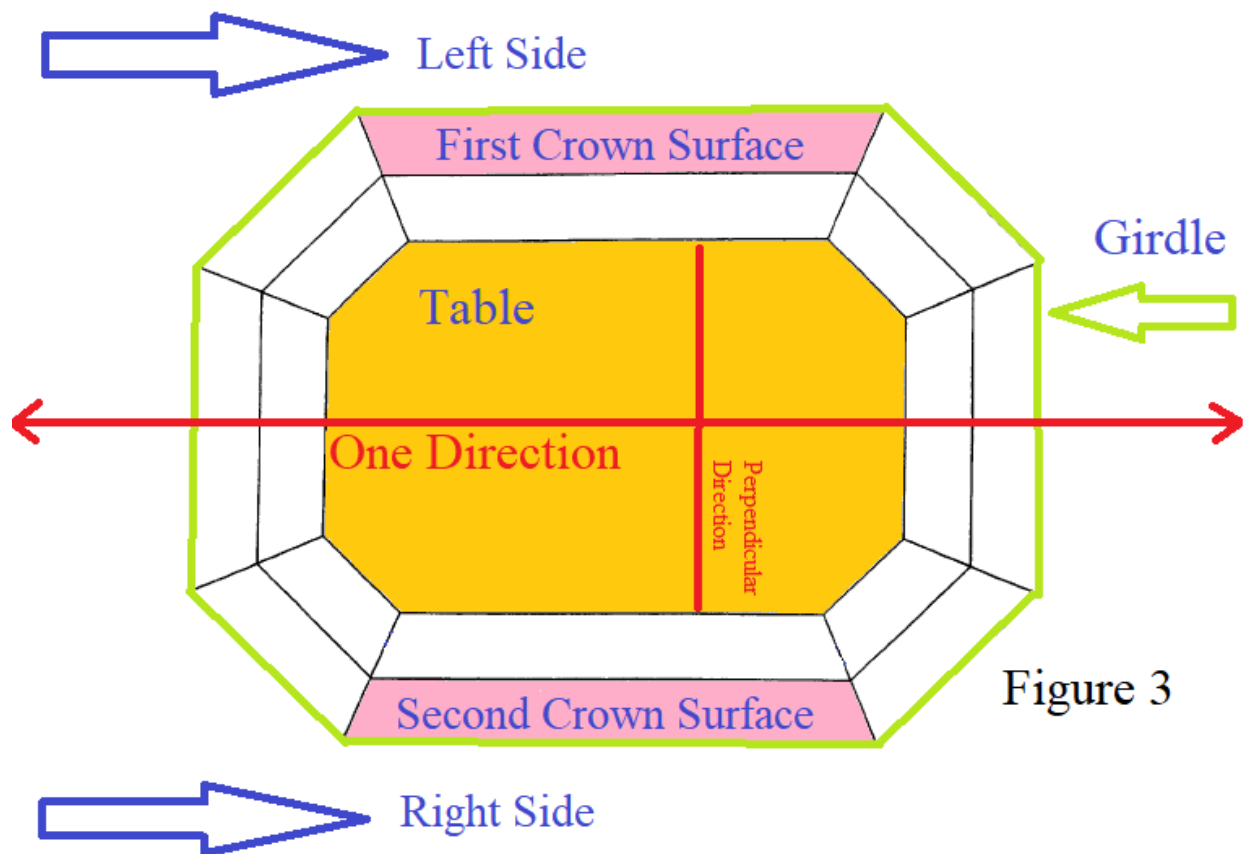


140. Grossbard also discloses this element. *See* Ground 2, claim element [1c].

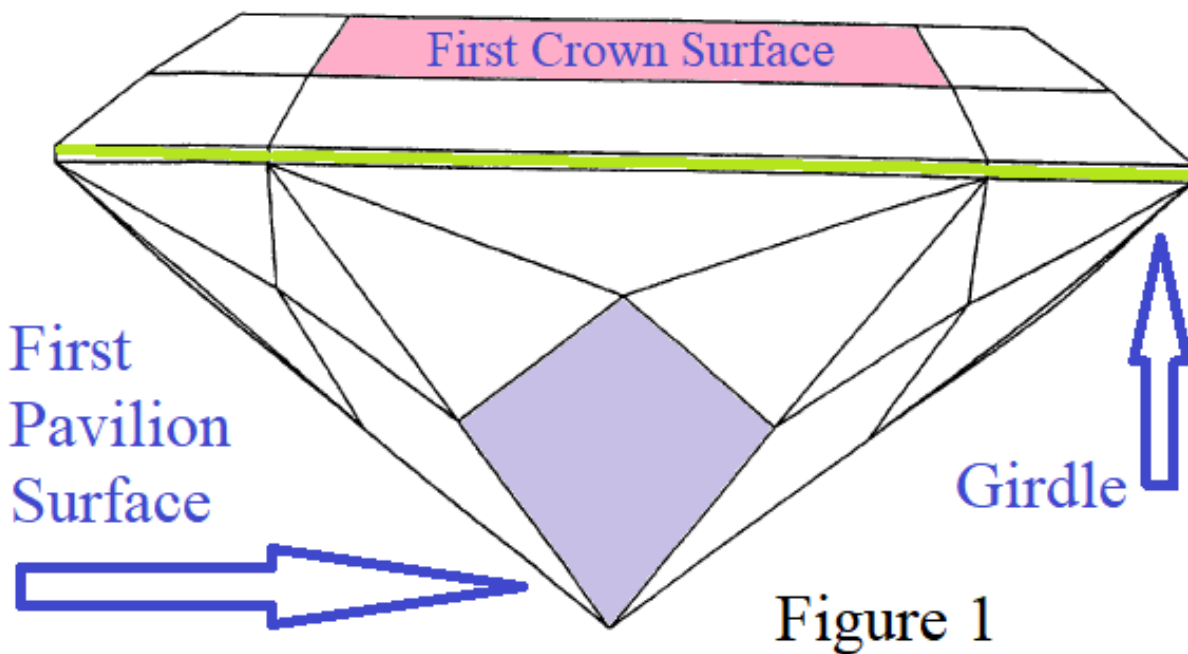


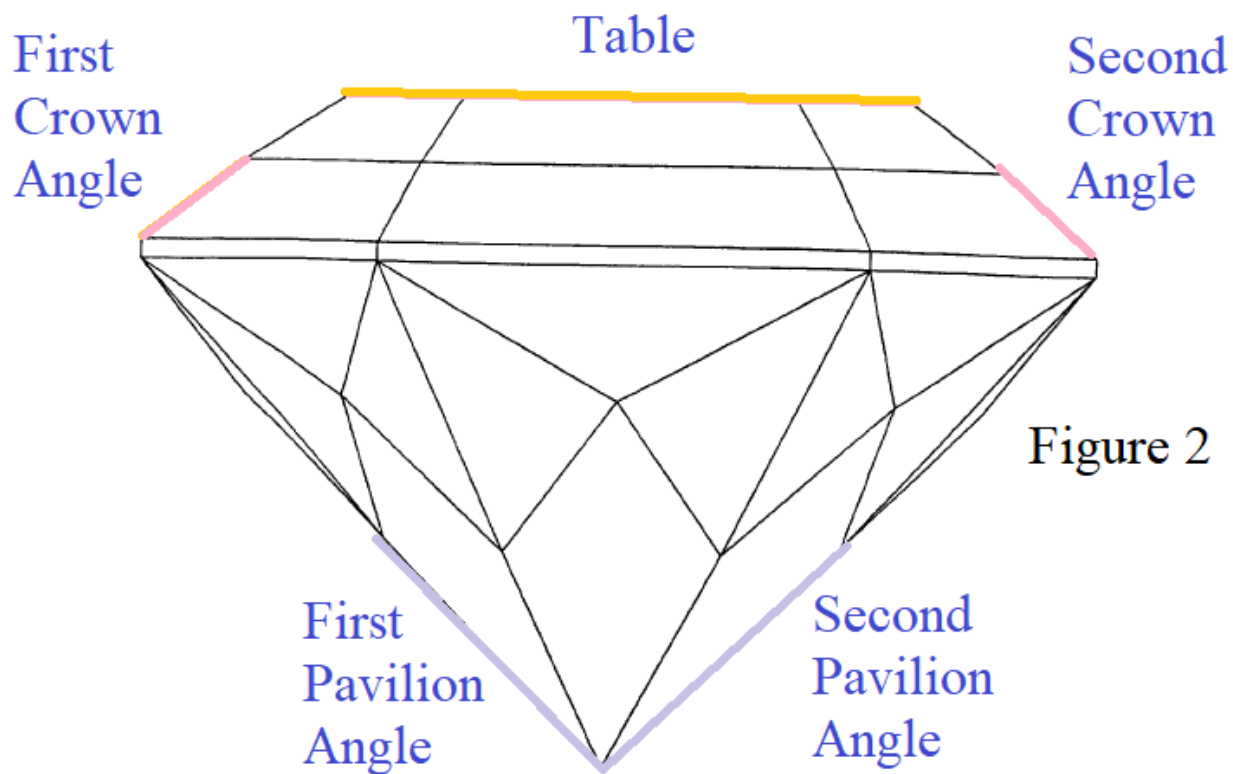
HDL-1006

141. **Claim element [1d]**: Fig. 3 of Greeff shows a second crown surface that is elongated in the one direction and extends at the right side of the gemstone. The second crown surface of Greeff is located between the table and the girdle. As Fig. 2 of Greeff shows, the second crown surface extends at a crown angle relative to the table plane.

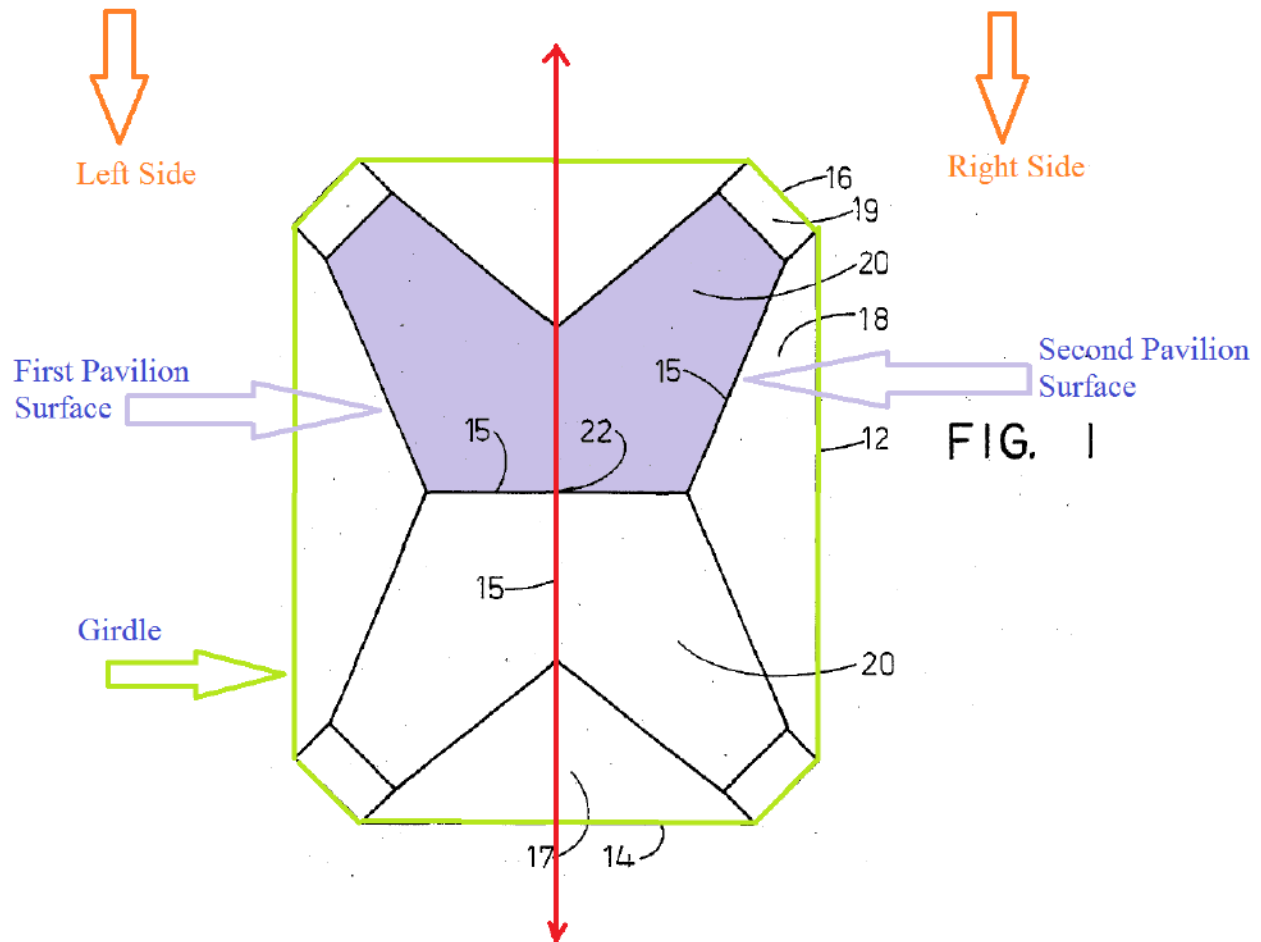


143. ***Claim element [1e]***: Fig. 1 of Greeff shows a first pavilion surface that is elongated in the one direction and extends at the left side of the gemstone. Fig. 3 of Greeff shows that the first pavilion surface extends at a pavilion angle relative to the table plane.





144. Grossbard also discloses this element. *See* Ground 2, claim element [1e].



145. **Claim element [1f]:** Greeff shows the first pavilion angle. Greeff does not show the second pavilion surface, but a POSITA, looking at Fig. 5 of Greeff, understands that there is a second pavilion surface, opposite the first pavilion surface. Similar to the first pavilion surface, the second pavilion surface is elongated in the one direction and extends at the pavilion angle relative to the table plane.

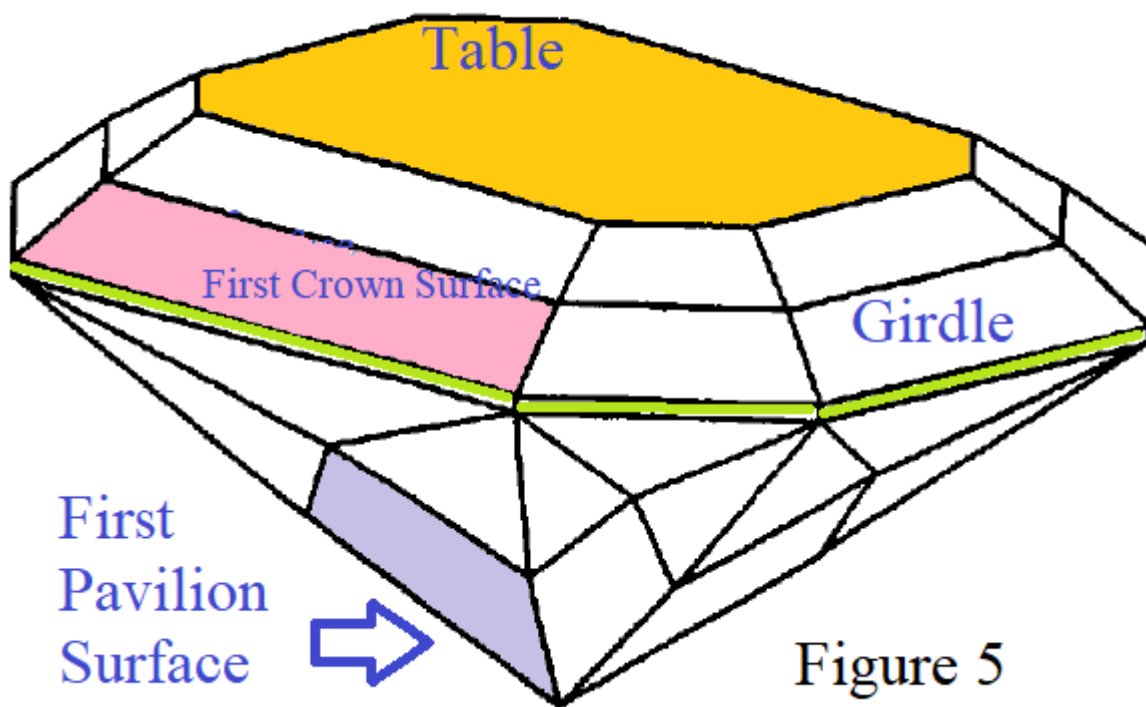


Figure 5

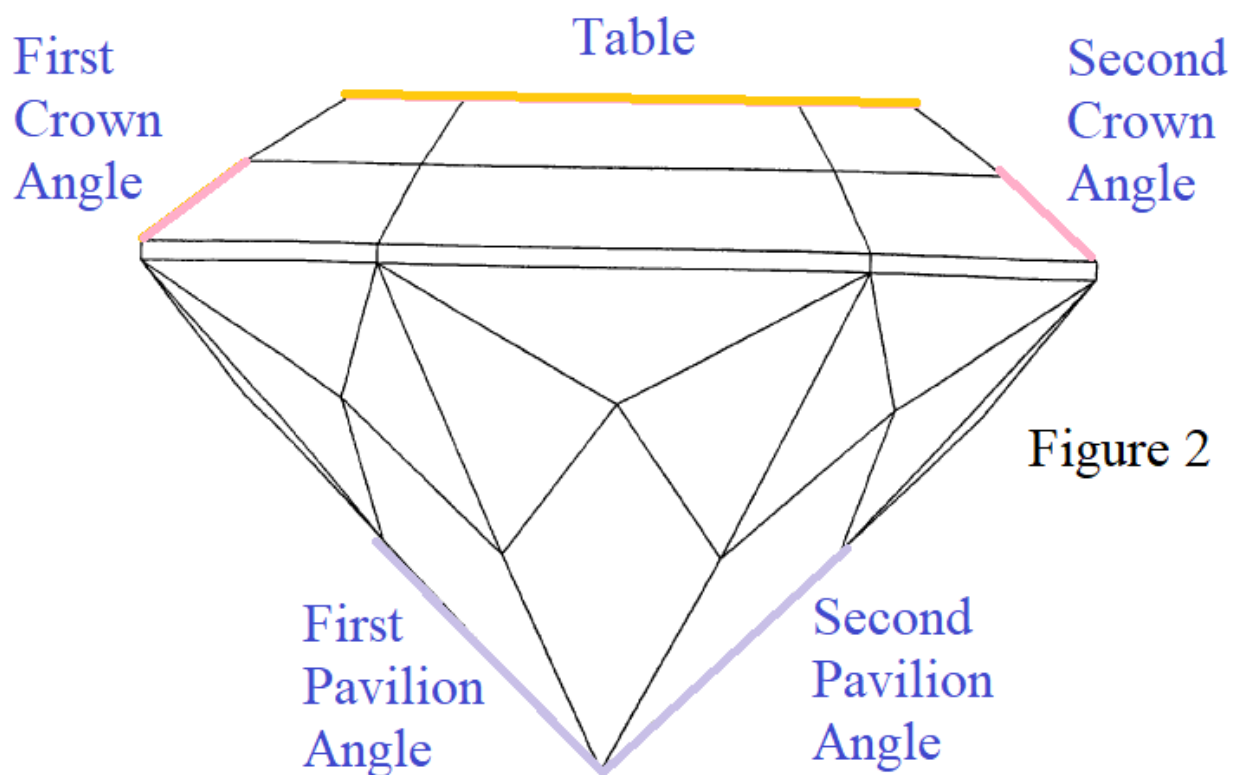
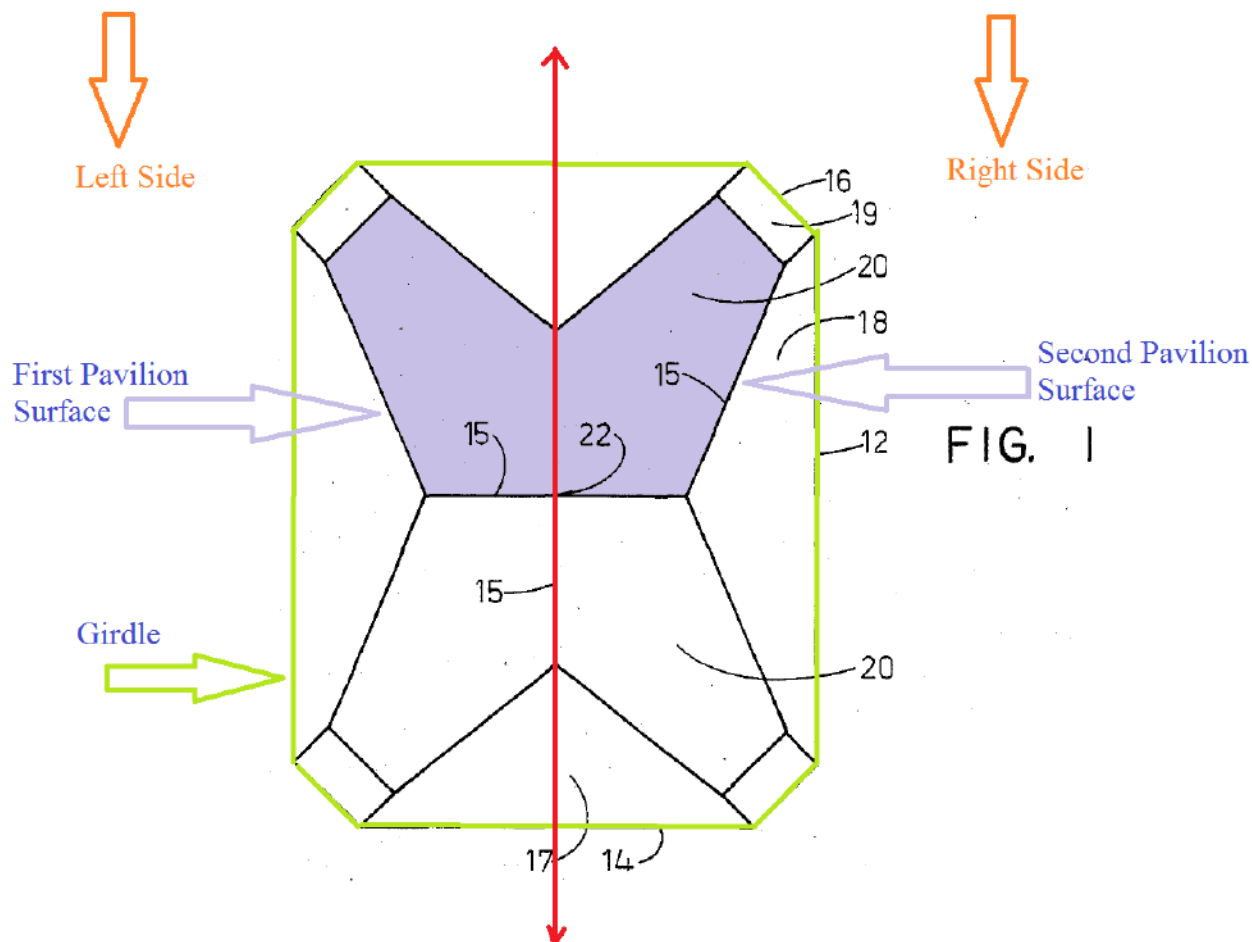


Figure 2

146. Grossbard also discloses this element. *See* Ground 2, claim element [1f].



147. **Claim element [1g]:** Greeff does not disclose this limitation of claim 1. Grossbard, however, discloses that “the angle between the plane of the girdle break of the crown and the table should be in the range from 35° to 45°” and “[t]he angle between the plane of the culet break and the plane of the table is from 33° to 42°.” HDL-1007, 2:23-25, 2:28-29. These angles refer to the crown angle and pavilion angle of claim 1, respectively, and they overlap with the ranges claim 1 provides for the crown angle and the pavilion angle (*i.e.*, the crown angle overlaps in the 35°-36°

range and the pavilion angle overlaps in the 33°-34° range). These angles create a presumption of obviousness and, as I was informed by Counsel, the Patent Owner has failed to show any unexpected result. *See* Ground 1.

148. ***Claim element [1h]***: Grossbard discloses the crown angle in the 35°-36° range and the pavilion angle in the 33°-34° range. HDL-1007, 2:23-25; 2:28-29. In these ranges, the crown angle is larger than the pavilion angle by less than 6 degrees. *See* Ground 1.

Motivation to Combine Greeff and Grossbard

149. As explained above, Greeff discloses a relatively flat emerald cut gemstone with first and second crown surfaces extending in the elongated direction of the gemstone. Greeff also discloses first and second pavilion surfaces extending in the elongated direction of the gemstone. Greeff, however, does not disclose any crown or pavilion angles for the crown surface or the pavilion surfaces. A POSITA would have been motivated to look at Grossbard to cut the gemstone in Greeff in accordance with the angle parameters provided in Grossbard.

150. A POSITA would have had several reasons to make this combination. For example, a POSITA would have utilized Grossbard to enhance the “fire” (dispersion) of the gemstone and enhance the yield of the cut. Grossbard recognizes that traditional brilliant “cut is the most wasteful of diamond raw material.” HDL-1007, 1:9-11. Grossbard also explains that “step cut stones such as square cut

diamonds and emerald cut diamonds while being more conservative of diamond raw material have none of the fire of brilliant cut diamonds.” HDL-1007, 1:12-16. Thus, Grossbard provides “a diamond which is, on the one hand, more brilliant than the heretofore known conventional or hybrid square or emerald cut colored diamonds and, on the other hand, is less wasteful of raw material than conventional brilliant cut or the afore-mentioned hybrid cut diamonds.” HDL-1007, 1:43-47. Therefore, a POSITA would have utilized the teachings in Grossbard to cut a brilliant gemstone using the gemstone disclosed in Greeff. This cut would have preserved as much of the rough gem as possible.

151. Grossbard discloses that “the angle between the plane of the girdle break of the crown and the table should be in the range from 35° to 45°” and “[t]he angle between the plane of the culet break and the plane of the table is from 33° to 42°.” HDL-1007, 2:23-25; 2:28-29. These ranges overlap within the ranges provided in claim 1; the crown angle of 33° and pavilion angle of 35° falls squarely within the claimed limitations of claim 1.

152. It would have been a matter of routine optimization to try these angles. I have been informed by Counsel that doing so is within the bounds of obviousness.

153. A POSITA would have been particularly motivated to try 33° and 35° because these angles are the lower limit for the crown and pavilion angles taught by Grossbard. For a rough gem with a relatively small crown and a relatively small

pavilion, a POSITA would have tried the lower limit of the crown angle to maximize the yield of the rough gem. A POSITA would also have tried the lower limit for the pavilion angle to ensure that the contemplated design fits within the rough gem. Therefore, cutting the rough gem at 33° and 35° would have been a routine optimization by a POSITA.

Grossbard Teaches Claim 5: “The precious stone of claim 1, wherein said pavilion angle is in the range of 31 to 33 degrees.”

154. *See* Ground 2 for Grossbard’s disclosure.

Grossbard Teaches Claim 6: “The precious stone of claim 1, wherein said precious stone is a diamond.”

155. *See* Ground 2 for Grossbard’s disclosure.

Greeff in view of Grossbard and Admitted Prior Art Teach Claims 7-12: “The precious stone of claim 1, wherein said precious stone has a . . . [cushion-cut shape, emerald-cut shape, radiant shape, oval shape, marquis shape, or princess shape].”

156. *See* Ground 1 (discussing admitted prior art for these claims). Grossbard also discloses an emerald cut diamond. *See* Ground 2.

GROUND 4: Claims 1 and 5-12 Are Obvious Over Sung (HDL-1009) in View of Grossbard (HDL-1007)

157. It is my opinion that the combination of Sung and Grossbard renders claims 1 and 5-12 obvious either explicitly or combined with the knowledge of a POSITA. The motivation for combining the references is provided below in the discussion of the rejection.

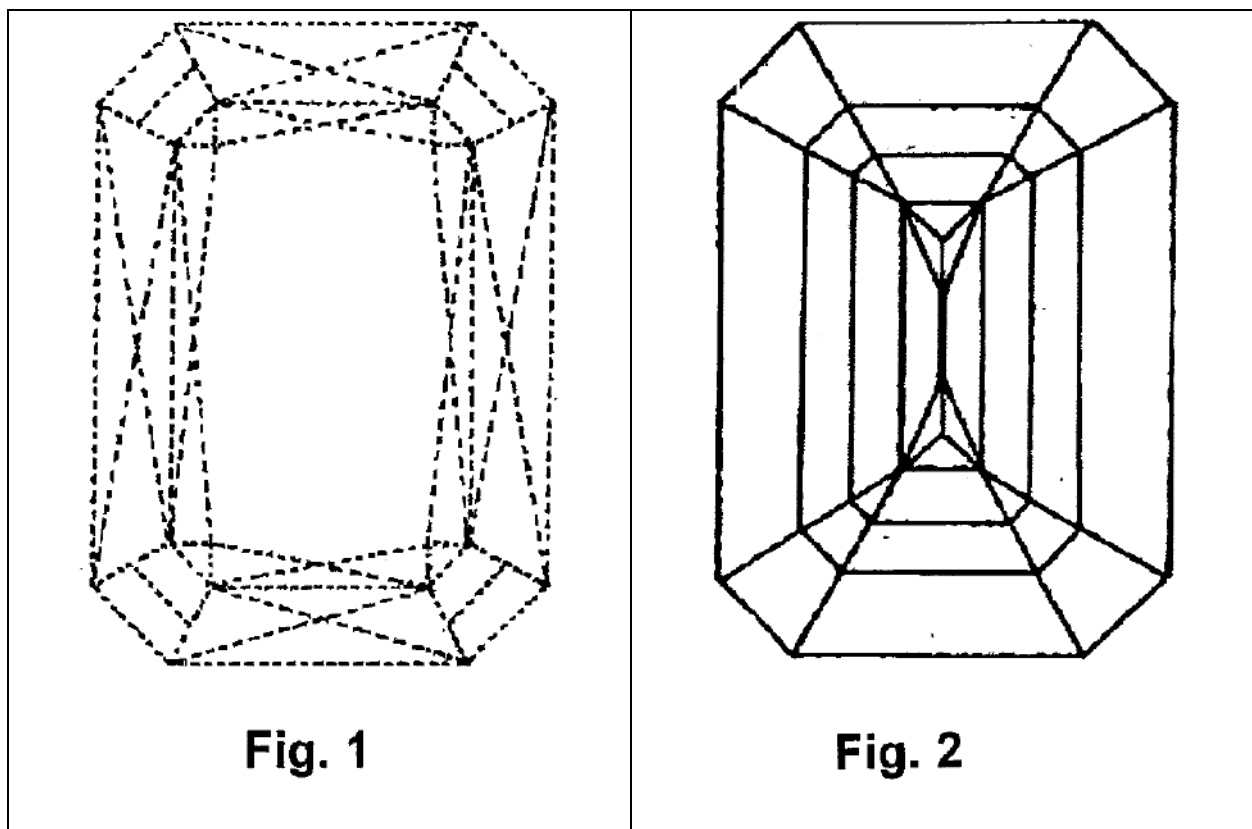
158. *See* Ground 2 for a description of Grossbard.

HDL-1006

Sung

159. The first prior art reference applied in this Ground is U.S. Design Patent No. 524,682 to Sung (“Sung”). (HDL-1009). It has a patent grant date of July 11, 2006 and was filed on February 7, 2005. I have been informed that it therefore qualifies as prior art to the ’791 Patent under 35 U.S.C. § 102(a)(1).

160. Similar to the ’791 Patent, Sung offers an emerald cut for a diamond HDL-1009; *see* HDL-1001 (claim 8). Figs. 1-5 of Sung show various views of the diamond. Figs. 1, 2 and 4 of the reference are included below.



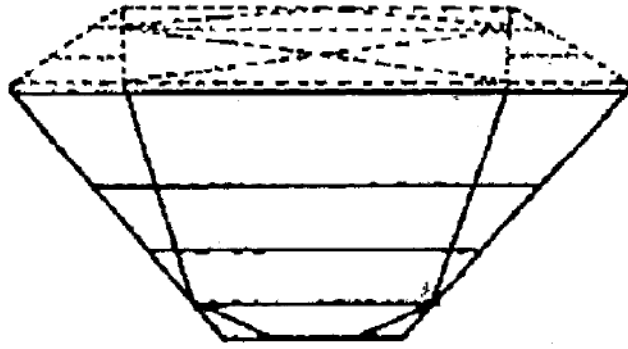


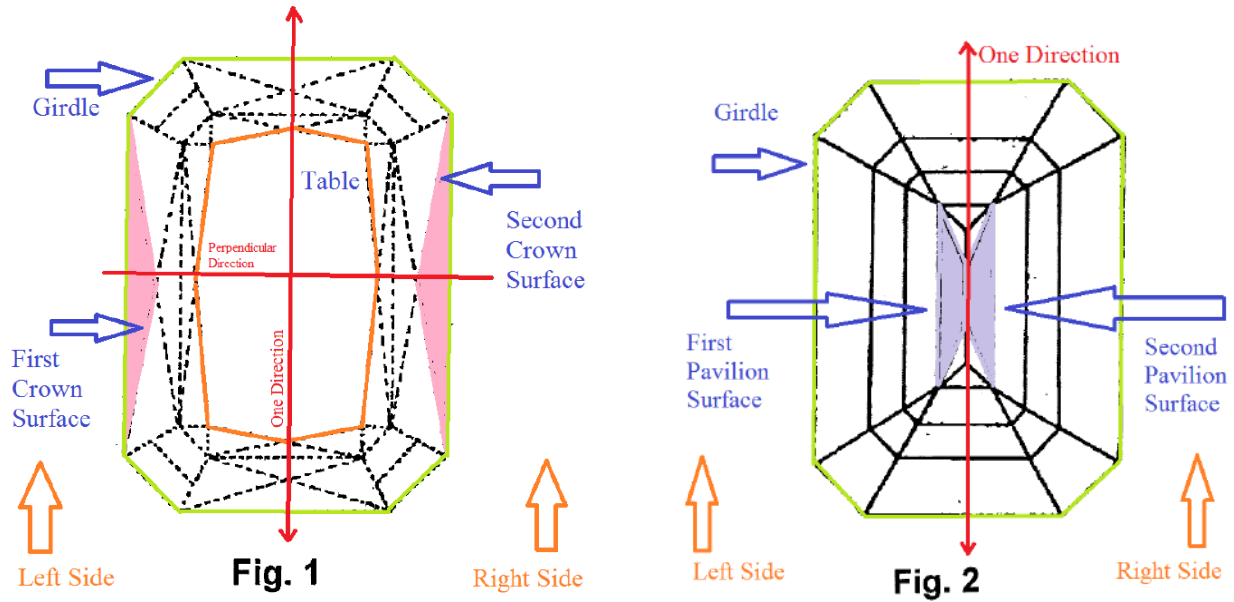
Fig. 4

Sung and Grossbard Render the Claims Obvious

161. Sung and Grossbard render claims 1 and 6-12 obvious either explicitly or combined with the knowledge of a POSITA.

Sung and Grossbard Teach Each Element of Independent Claim 1

162. *Claim element [1a]*: Figs. 1 and 2 of Sung show an emerald cut diamond, which is elongated in one direction and defining a length. HDL-1009, Figs.1; 2. The diamond has a width in a perpendicular direction. The diamond has a left side and a right side, both of which extend along the length of the stone.



163. Grossbard also discloses this element. *See* Ground 2, claim element [1a].

164. ***Claim element [1b]:*** Figure 1 of Sung shows a diamond with a table having a table plane, that is elongated in the one direction, and a girdle.

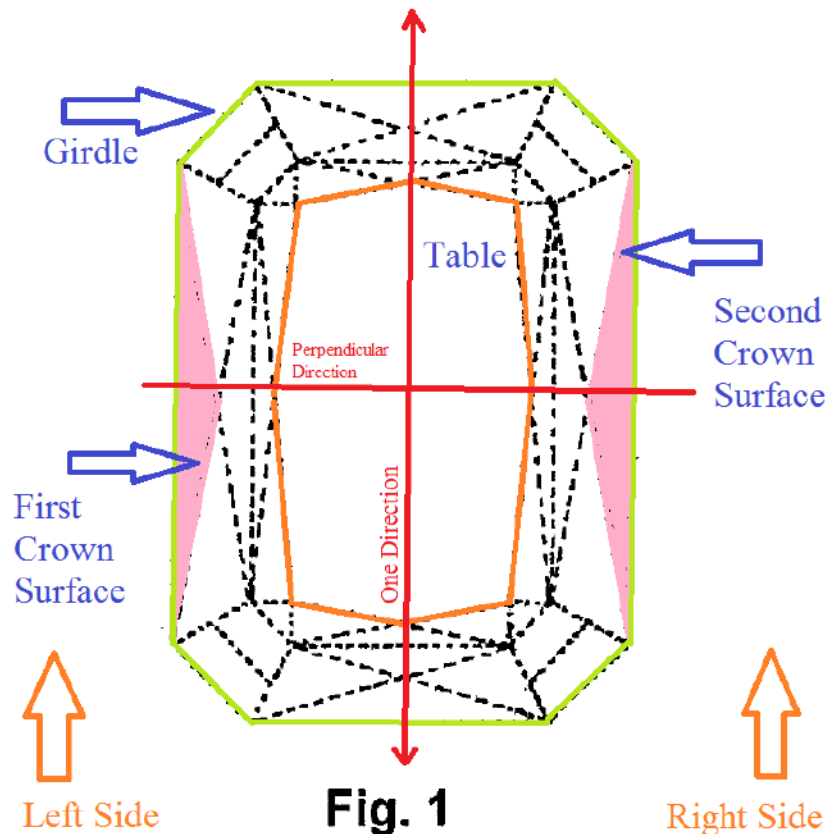


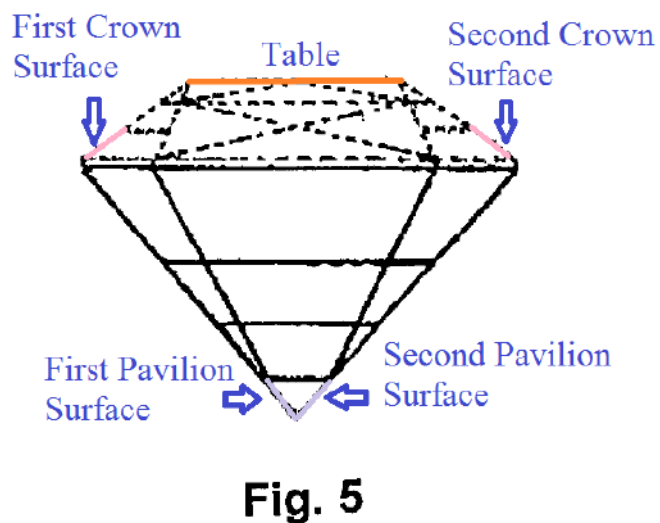
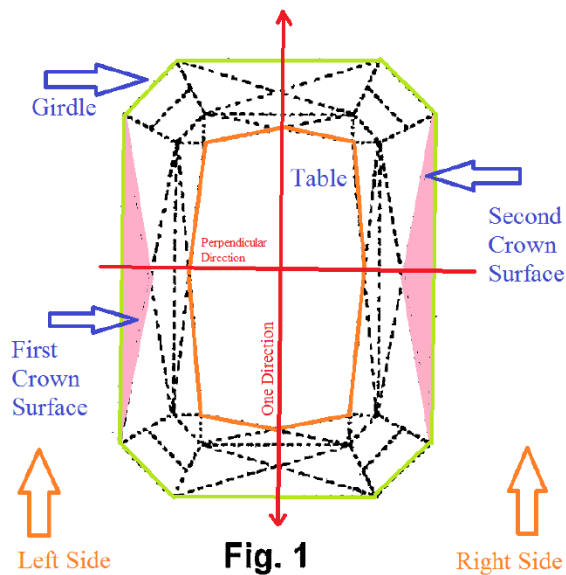
Fig. 1

165. Grossbard also discloses this element. *See* Ground 2, claim element [1b].

166. Claim 1 further requires a specific total depth percentage, a specific crown height percentage, a specific girdle height percentage and a specific table percentage, but does not define any value for these parameters. These parameters are merely characteristics that a POSITA would understand all stones to have and are well known and conventional, as admitted by the '791 Patent.

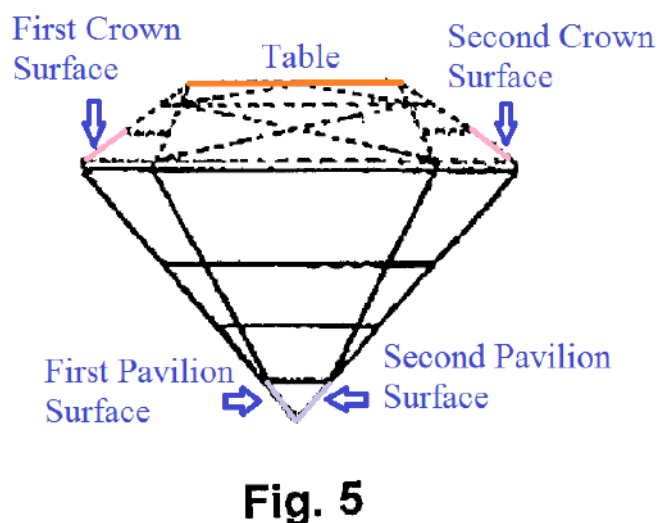
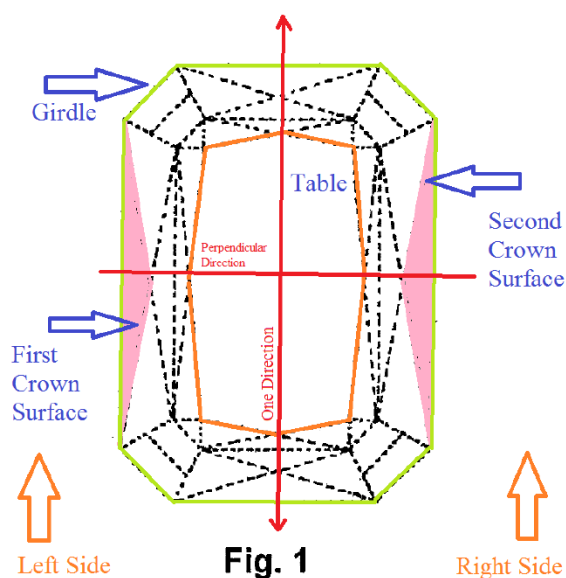
167. **Claim element [1c]:** Fig. 1 of Sung shows a first crown surface that is elongated in the one direction and extends at the left side of the gemstone. The first crown surface of Sung is located between the table and the girdle. As Fig. 5 of Sung shows, the first crown surface extends at a crown angle relative to the table plane.

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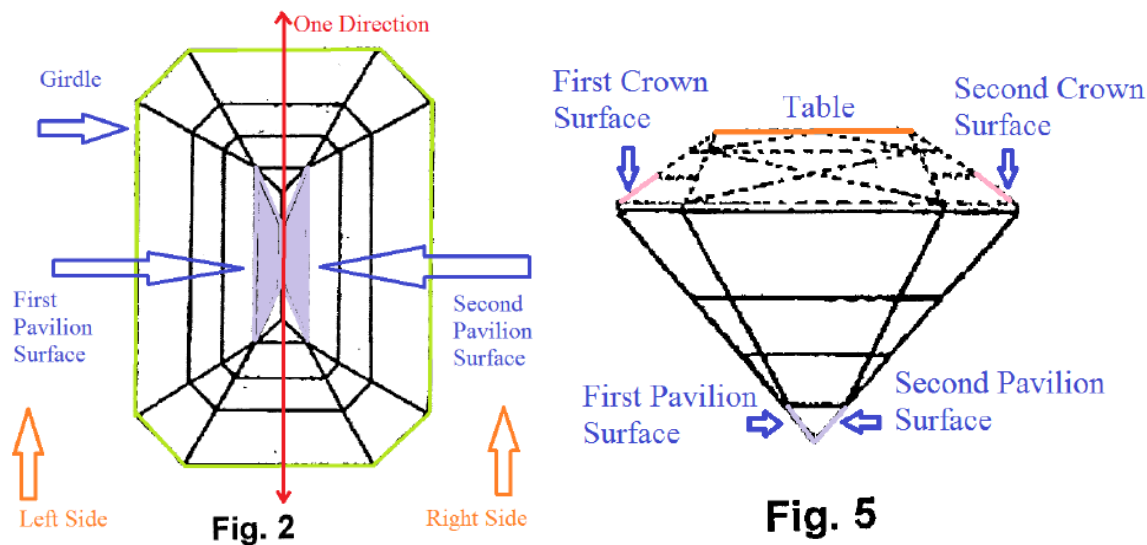
168. Grossbard also discloses this element. *See* Ground 2, claim element [1c].

169. **Claim element [1d]:** Fig. 1 of Sung shows a second crown surface that is elongated in the one direction and extends at the right side of the gemstone. The second crown surface of Sung is located between the table and the girdle. As Fig. 5 of Sung shows, the second crown surface extends at a crown angle relative to the table plane.



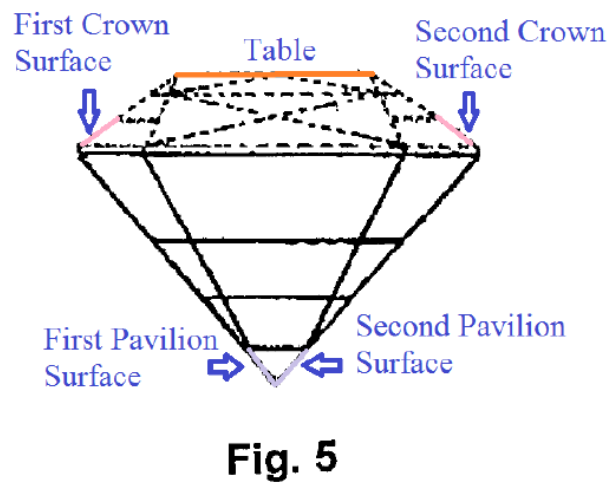
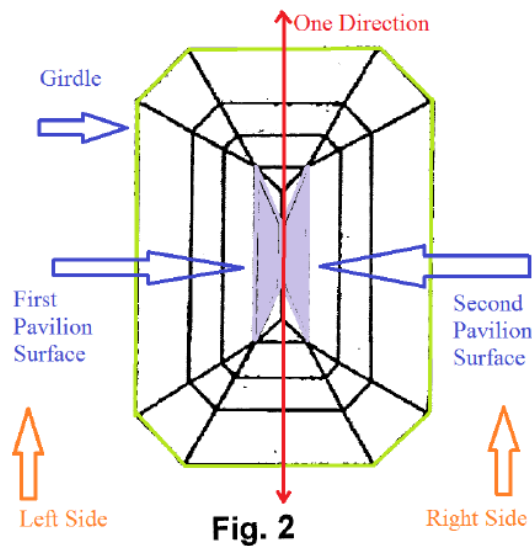
170. Grossbard also discloses this element. *See* Ground 2, claim element [1d].

171. **Claim element [1e]:** Fig. 2 of Sung shows a first pavilion surface that is elongated in the one direction and extends at the left side of the diamond. Fig. 5 of Sung shows that the first pavilion surface extends at a pavilion angle relative to the table plane.



172. Grossbard also discloses this element. *See* Ground 2, claim element [1e].

173. **Claim element [1f]:** Sung also shows a second pavilion surface, opposite the first pavilion surface. Similar to the first pavilion surface, the second pavilion surface is elongated in the one direction and extends at the pavilion angle relative to the table plane.



174. Grossbard also discloses this element. *See* Ground 2, claim element [1f].

175. ***Claim element [1g]:*** Grossbard discloses this element. *See* Ground 2, claim element [1g] (discussing the crown angle overlaps in the 35°-36° range and the pavilion angle overlaps in the 33°-34° range).

176. ***Claim element [1h]:*** Grossbard discloses this element. *See* Ground 2, claim element [1h] (discussing the crown angle being larger than the pavilion angle).

Motivation to Combine Sung and Grossbard

177. The motivation to combine Sung and Grossbard mirrors that of the motivation to combine Greeff and Grossbard as discussed above. *See* Ground 3 (discussing the motivation to combine Greeff and Grossbard).

Grossbard Teaches Claim 5: “The precious stone of claim 1, wherein said pavilion angle is in the range of 31 to 33 degrees.”

178. *See* Ground 2 for Grossbard’s disclosure.

Grossbard Teaches Claim 6: “The precious stone of claim 1, wherein said precious stone is a diamond.”

179. *See* Ground 2 for Grossbard’s disclosure.

Sung in view of Grossbard and Admitted Prior Art Teach Claims 7-12: “The precious stone of claim 1, wherein said precious stone has a . . . [cushion-cut shape, emerald-cut shape, radiant shape, oval shape, marquis shape, or princess shape].”

180. Grossbard discloses an emerald cut diamond. *See* Ground 2; *see also* Ground 1 (discussing admitted prior art for these claims).

GROUND 5: Claims 2-4, 13 and 14 Are Obvious In View of Grossbard and Schmidt

181. As explained above in Ground 2, claims 1, 5 and 6 are anticipated by Grossbard. Also, as explained above in Ground 1, Schmidt discloses certain elements of the claims. It is my opinion that the combination of Grossbard and Schmidt renders claims 2-4, 13 and 14 obvious either explicitly or combined with the knowledge of a POSITA.

182. *See* Ground 1 for a description of Schmidt and Ground 2 for a description of Grossbard.

Schmidt Teaches Claim 2: “The precious stone of claim 1, wherein said total depth percentage is in the range of 36.00 to 57.00.”

183. Grossbard does not teach the total depth percentage for its diamond. Schmidt however, a total depth percentage of approximately 41.18%, which falls within the claimed range of 36 to 57. A POSITA would have combined these references to enhance the diamond provided by Grossbard with the brilliance and large

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appearance of Schmidt while at the same time preserving the rough gem. Both references are in the same field of endeavor and seek to provide brilliance to shallow cut diamonds.

Schmidt Teaches Claim 3: “The precious stone of claim 1 wherein the total depth percentage is in the range of 40 to 50.”

184. Grossbard does not teach the total depth percentage for its diamond. As explained above in Ground 1, Schmidt discloses the total depth percentage of 41.18%, which falls within the claimed range of 40 to 50. The same motivation described above, applies equally here for the combination of Schmidt and Grossbard.

Schmidt Teaches Claim 4: “The precious stone of claim 1, wherein said crown angle is in the range of 31-34 degrees.”

185. Grossbard does not teach the crown angle for its diamond. As explained above in Ground 1, Schmidt disclose a crown angle in the range of 31-32° which overlaps with the claimed range of 31-34 degrees. A POSITA would have been motivated to cut the diamond of Grossbard to the lower crown angle of 32° to provide it with enhanced brilliance and enlarged appearance while preserving the weight of the rough stone. The same motivation described above, applies equally here for the combination of Schmidt and Grossbard.

Schmidt Teaches Claim 13: “The precious stone of claim 1, wherein said crown height percentage in the range of 6-15, said girdle height percentage in the

range of 3-5, said table percentage in the range of 70-79, and said total depth percentage in the range of 36-57.”

186. Grossbard does not teach the listed characteristics for its diamond. As explained above in Ground 1, Schmidt discloses a table percentage of at least 70%, and a total depth percentage of 41.18%, which overlap and fall within the claimed ranges, respectively. Schmidt also discloses a combined crown height percentage and a girdle height percentage: $K/D = 0.11/1.7 \approx 6.4\%$. HDL-1005, 4:30-45. It would have been obvious to a POSITA before the filing date of the '791 Patent to shape the gemstone, as claimed, to optimize the light properties of the precious stone. Discovering an optimum value of a result effective variable involves only routine skill in the art. It is further noted that Patent Owner has not disclosed that the crown height percentage and a girdle height percentage create any unexpected result.

Schmidt Teaches Claim 14: “The precious stone of claim 13, wherein said crown height percentage is in the range of 8-13, said girdle height percentage is in the range of 3.5-4.5, said table percentage is in the range of 72-77, and said total depth percentage is in the range of 40-50.”

187. As explained above for claim 13, and in Ground 1, Schmidt discloses a table percentage of at least 70%, and a total depth percentage of 41.18%, which overlap and fall within the claimed ranges, respectively. Schmidt also discloses a combined crown height percentage and a girdle height percentage: $K/D = 0.11/1.7 \approx 6.4\%$. HDL-1005, 4:30-45. It would have been obvious to a POSITA before the filing date of the '791 Patent to shape the gemstone, as claimed, to optimize the light properties

of the precious stone. Discovering an optimum value of a result effective variable involves only routine skill in the art. It is further noted that Patent Owner has not disclosed that the crown height percentage and a girdle height percentage create any unexpected result.

GROUND 6: Claims 2-4, 13 and 14 Are Obvious In View of Greeff, Grossbard, and Schmidt

188. As explained above in Ground 3, claims 1, 5-12 are obvious in view of the combination of Greeff and Grossbard. It is my opinion that the combination of Greeff, Grossbard, and Schmidt renders claims 2-4, 13 and 14 obvious for at least the same reasons as discussed above in Ground 5.

189. *See* Ground 1 for a description of Schmidt, Ground 2 for a description of Grossbard, and Ground 3 for a description of Greeff.

GROUND 7: Claims 2-4, 13 and 14 Are Obvious In View of Sung, Grossbard and Schmidt

190. As explained above in Ground 4, claims 1, 5-12 are obvious in view of the combination of Sung and Grossbard. It is my opinion that the combination of Sung, Grossbard, and Schmidt renders claims 2-4, 13 and 14 obvious either explicitly or combined with the knowledge of a POSITA for at least the same reasons as discussed above in Ground 5.

191. *See* Ground 1 for a description of Schmidt, Ground 2 for a description of Grossbard, and Ground 5 for a description of Sung.

GROUND 8: Claims 2-4, 13 and 14 Are Obvious In View of Grossbard and Alburger

192. As explained above in Ground 2, claims 1, 5 and 6 are anticipated by Grossbard. It is my opinion that the combination of Grossbard and Alburger renders claims 2-4, 13 and 14 obvious either explicitly or combined with the knowledge of a POSITA. The motivation for combining the references is provided below in the discussion of the rejection.

193. *See* Ground 2 for a description of Grossbard.

Alburger

194. The prior art applied in this Ground is US Patent No. 4,708,001 to Alburger (“Alburger”). (HDL-1010). It has an issue date of November 24, 1987 and was filed on September 4, 1985. I have been informed that it therefore qualifies as prior art to the ’791 Patent under 35 U.S.C. § 102(a)(1).

195. Similar to the ’791 Patent, Schmidt and Grossbard, Alburger also deals with the problem of faceting shallow diamonds. Alburger explains that:

a gemstone which is too shallow in the rough, and which is cut to excessively low main angles, will fail to reflect light properly, and will lack brilliance. In the past, there has been only one solution to the problem presented by a shallow stone, this being to reduce the size of the girdle diameter so as to permit cutting correct angles on crown and

pavillion, that is if correct main angles are to be maintained. This may often result in a loss in stone size of as much as 75%, or more.

HDL-1010, 2:5-14.

196. Alburger discloses “a method and design for modifying the shape of the pavillion [sic] of a faceted gemstone, whereby stones having a depth of less than one half the gridle diameter can be cut to yield full brilliance in the finished gem.” HDL-1010, 2:15-19. Alburger explains that a benefit of his cut is “that very large stones which are intended to be used as pendants may be cut from shallow material”

HDL-1010, 2:20-22.

197. Central to Alburger’s disclosure are the Tables located in column 6, providing the various dimensions and specification for the embodiments. Regarding these tables, Alburger states the tables contain “[d]imensional ranges and preferred values given as percentages of girdle diameter, are set forth in Table I. Angles, ranges and preferred values, are set forth in Table II.” HDL-1010, 5:47-6:3. An image of those tables follows:

TABLE I		
DIMENSIONAL RANGES		
Feature	Range - %	Preferred Value - %
Total stone depth	37-75	38
Crown height	10-25	20
Table diameter	40-60	50
Girdle thickness	0-4	2
Pavillion depth	20-40	25
Cone depth	5-50	25
Cone base diameter	10-75	50
Initial drill hole	Cone depth plus .020"	

TABLE II		
ANGLE RANGES		
Feature	Range - °	Preferred Value - °
Crown mains	15-45	30
Pavillion mains	31-60	42
Cone included angle	60-118	90

HDL-1010,6:4-23. Alburger explains that its disclosure can be applied to “any selected gemstone shape” including oval shapes. HDL-1010, 1:56-57.

Alburger Teaches Claim 2: “The precious stone of claim 1, wherein said total depth percentage is in the range of 36.00 to 57.00.”

198. Grossbard does not teach the total depth percentage for its diamond. Alburger discloses, in Table I, a “Total stone depth” range of 37-75%. HDL-1010, 6:8. This meets the claim limitation as the range contains the claimed range of 36.00 to 57.00. A POSITA would have been motivated to cut the diamond of Grossbard with the total depth percentage provided by Alburger to further enhance the brilliance of the diamond cut according to Grossbard, and at the same time maximize the yield of the rough gemstone. It is my opinion that doing so would yield predictable results.

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Alburger Teaches Claim 3: “The precious stone of claim 1 wherein the total depth percentage is in the range of 40 to 50.”

199. Grossbard does not teach the total depth percentage for its diamond. Alburger discloses, in Table I, a “Total stone depth” range of 37-75%. HDL-1007, 6:8. This meets the claim limitation as the range contains the claimed range of 40 to 50. A POSITA would have been motivated to cut the diamond of Grossbard with the total depth percentage provided by Alburger to further enhance the brilliance of the diamond cut according to Grossbard, and at the same time maximize the yield of the rough gemstone. It is my opinion that doing so would yield predictable results.

Alburger Discloses Claim 4: “The precious stone of claim 1, wherein said crown angle is in the range of 31-34 degrees.”

200. Grossbard does not teach the recited crown angle for its diamond. Alburger discloses, in Table II, a “Crown mains” angle range of 15-45°. HDL-1007, 6:20. This meets the claim limitation as the range contains the claimed range of 31 to 34 degrees. A POSITA would have been motivated to cut the diamond of Grossbard with the crown angle provided by Alburger to further enhance the brilliance of the diamond cut according to Grossbard, and at the same time maximize the yield in stone size. It is my opinion that doing so would yield predictable results.

Alburger Discloses Claim 13: “The precious stone of claim 1, wherein said crown height percentage in the range of 6-15, said girdle height percentage in

the range of 3-5, said table percentage in the range of 70-79, and said total depth percentage in the range of 36-57.”

201. Grossbard does not teach the listed characteristics for its diamond. Alburger discloses, in Table I, a “Total stone depth” range of 37-75%, a “Crown height” of 10-25%, a “Table diameter” of 40-60%, and a “Girdle thickness” of 0-4%. HDL-1007, 6:8-11. Thus, Alburger’s Crown height contains the claimed range of 6-15, the Girdle thickness overlaps with the claimed range of 3-5, and the Total stone depth contains the claimed range of 36-57. The Table diameter does not overlap or contain the claimed range of 70-79, but it would have been obvious to a POSITA before the filing date of the ‘791 Patent to shape the table, as claimed, to change the light properties of the diamond. Discovering an optimum value of a result effective variable involves only routine skill in the art. A POSITA would have been motivated to cut the diamond of Grossbard with the characteristics provided by Alburger to enhance its brilliance. It is my opinion that doing so would yield predictable results.

Alburger Discloses Claim 14: “The precious stone of claim 13, wherein said crown height percentage is in the range of 8-13, said girdle height percentage is in the range of 3.5-4.5, said table percentage is in the range of 72-77, and said total depth percentage is in the range of 40-50.”

202. Grossbard does not teach the listed characteristics for its diamond. Alburger discloses, in Table I, these elements of claim 14 (*see* discussion of these elements for claim 13). A POSITA would have been motivated to cut the diamond of

Grossbard with the characteristics provided by Alburger to enhance its brilliance. It is my opinion that doing so would yield predictable results.

GROUND 9: Claims 2-4, 13 and 14 Are Obvious In View of Greeff, Grossbard and Alburger

203. As explained above in Ground 3, claims 1, 5-12 are obvious in view of Greeff and Grossbard. It is my opinion that the combination of Greeff, Grossbard, and Alburger renders claims 2-4, 13 and 14 obvious for at least the same reasons as discussed above in Ground 8.

204. *See* Ground 2 for a description of Grossbard, Ground 3 for a description of Greeff, and Ground 8 for a description of Alburger.

GROUND 10: Claims 2-4, 13 and 14 Are Obvious In View of Sung, Grossbard and Alburger

205. As explained above in Ground 4, claims 1, 5-12 are obvious in view of Sung and Grossbard. It is my opinion that the combination of Sung, Grossbard, and Alburger renders claims 2-4, 13 and 14 obvious for at least the same reasons as discussed above in Ground 8.

206. *See* Ground 2 for a description of Grossbard, Ground 4 for a description of Sung, and Ground 8 for a description of Alburger.

CONCLUSION

207. I currently hold the opinions set expressed in this declaration. But my analysis may continue, and I may acquire additional information and/or attain supplemental insights that may result in added observations.

208. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code.

Executed on this 28th day of January 2025



Thomas R. Paradise

Appendix A

THOMAS R. PARADISE

Gemological Curriculum Vita

more extensive CV is available on request

*Fellow (FGA): Gemmological Association of Great Britain (Gem-A), London
Graduate Gemologist (GIA): GG, Certified Gemologist-Appraiser (AGS): CGA, USA
Registered Jeweler (AGS): RJ, Distinguished Professor of Geosciences: PhD*

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Gemstone, mineral, and jewelry identification, cataloging, and valuation (insurance, fair market, distress)) since 1981 with a confidential client portfolio including notable private and university museums (i.e. High, Walters, SF Academy, Asian Art), legal firms (i.e. M. Belli, King & Spalding), auction houses (i.e. Christies, Phillips, Butterfields-Bonhams) banks (e.g. Bank of America, Crocker), court testimony and research (>500 hours), corporations (i.e. Cartier, Tiffany), agencies (i.e. IRS), and numerous individuals.

ADVANCED EDUCATION:

- PhD (1993):** Geology, Cultural Heritage: Arizona State University, Tempe, Arizona, US
Dissertation: 'Weathering-constrained deterioration of the sandstone Roman Theater in Petra, Jordan'
Advisors: Ron Dorn, Tony Brazel, Pat Fall, Will Graf, Ran Gerson (IGS: Israel)
- MS (1990):** Geomorphology, Petrology: Georgia State University, Atlanta, US
Thesis: 'Development and distribution of granite gnamma on Stone Mountain, Georgia'
Advisors: Frank Magilligan, Borden Dent, John Yin
- CGA (1984):** Certified Gemologist-Appraiser certification (CGA) American Gem Society,
- FGA (1983):** Gemology-Jewels, Fellow, Gemmological Institute of Great Britain, London
- RJ (1983):** Registered Jeweler (RJ) certification, American Gem Society
- GG (1980):** Gemological Sciences, Gemological Institute of America (GIA), LA California
- BS (1979):** Geosciences & Mining, University of Nevada, Mackay School of Mines, Reno
(specialization: mineralogy and petrology, minors: art history, Italian language)

RELATED ACADEMIC HONORS and ACTIVITIES:

- Fellow, International Explorers Club (National Fellow since 2017) inducted for
'Paradise is regarded as a renowned cartographer, but especially as an international authority on the ancient city of Petra in southern Jordan and having received research awards and international accolades for his research'.
- Fulbright Senior Scholar in Jordan (Petra, Amman): JACEE-CIES 1997-1999 for
'the examination and analysis of the deterioration of Petra's Nabataean Architecture'
- Director, King Fahd Center for Middle East Studies (2005-2010, 2015-2017)
- ▶ Councilor, U.S. State Department Fulbright Commission, Washington DC (2017-2021)
- ▶ Regent's Award in Teaching Excellence, University of Hawai'i, 1997
- ▶ Teacher of the Year Award 2010: University of Arkansas Alumni Association
- ▶ Teacher of the Year Award 2009: University of Arkansas Associated Students
- ▶ Teacher of the Year Award, Arizona State University, (1993)
- ▶ Cultural heritage consultant to UNESCO, 2008-present (Jordan: Wadi Rum, Petra)
- ▶ Stone/mineral conservation consultant: Vatican (Rome, 2009-2010, Dr.ssa S. Turriziani)
- ▶ Stone/mineral conservation consultant to C.N.R. (Florence, 2010, Dr. L. Piccardi)

- ▶ Cultural heritage consultant to UNESCO (Mali 2007: Timbuktu, Djenne, Segou)
- ▶ Society of Jewelry Historians, speaker & coordinator, Orono, Maine USA, 1985-1990
- ▶ American Society of Appraisers (ASA) Vice President, Atlanta Chapter, 1989-1991
- ▶ American Society of Appraisers (ASA), Personal Property Certificate coursework, 1988
- ▶ International Society of Appraisers, (ISA) Personal Property Certificate coursework, 1987

Gem-related PUBLICATIONS only (refereed):

Paradise, T.R. 2023. 'The Rare Occurrence of Fine, Gemmy Turquoise at the Mona Lisa Mine, Arkansas' in Encyclopedia of Arkansas (editor G. Lancaster), Butler Center, Little Rock, AR, USA)

Paradise, T. R. 2020 '*The Quartz of Arkansas*', chapter in Crystals in Art: Ancient to Modern (editor L. Haynes), Crystal Bridges Museum of Art, University of Arkansas Press: Fayetteville, AR

Paradise, T.R. 1998. 'Calcite and Limestone Deterioration, Great Temple of Amman' in *Physical Geography* v. 19:134-147

Paradise, T.R. 1994. 'Limestone Weathering Rate Analysis' in Roman Architecture: The Great Temple of Amman. (editor C. Kanellopoulos), National Press of Jordan and ACOR.

Paradise, T.R. 1990. 'The Archaeological Style in Jewelry -- Influences of Major European and Asian Excavations on the 19th Century'. *HERITAGE: Journal of Antique Jewelry & Metals* (November).

Paradise, T.R. 1989. 'Historical Usage of Metal and Enameling Techniques', *HERITAGE: Journal of Antique Jewelry and Metals*

Paradise, T.R. 1985. 'California Nephrite Jade Occurrence and Distribution', *Journal of Gemmological Sciences*, British Gemmological Institute.

Paradise, T.R. 1982. 'The Natural Formation and Distribution of Greened Quartz', *Gems and Gemology*, Gemological Institute of America (G.I.A.).

Research projects in progress:

- *Emerging Turquoise Occurrences in Arkansas: a geologic and economic analyses*
- *Arkansas' Diamondiferous Lamproite analysis: deterioration rates (Crater of Diamonds)*

REPORTS (gem & mineral-related only):

Paradise, T.R. 2008. 'Mining Techniques' (chapter), Encyclopedia of the Environment & Society, Facts on File Publishing

Paradise, T.R. 2008. 'U.S Geological Survey' (chapter), Encyclopedia of the Environment & Society, Facts on File Publishing

Paradise, T.R. 2008. 'U.S. Mining Act of 1872, 'U.S. Antiquities Act of 1906" (chapters), Encyclopedia of the Environment & Society, Facts on File Publishing

Paradise, T.R. 2008. 'U.S. Department of Interior' (chapter), Encyclopedia of the Environment & Society, Facts on File Publishing

PUBLICATIONS (books):

Paradise, T.R. 2011. Arkansas: an Illustrated Atlas, Institute of Arkansas Studies, Butler Center, Little Rock: hardbound and softcover.

Juvik, J, **Paradise, T.R.**, Juvik, S. 1998. Student's Atlas of Hawai'i, Bess Press, Honolulu

Juvik, S, Juvik, J, **Paradise, T.R.** 1997. Atlas of Hawai'i, University of Hawaii Press, Honolulu, Hawaii (330pp).

PUBLICATION, PROPOSAL and GRANT REVIEW:

Agencies: National Science Foundation, US State Department, US Department of Defense, American Center for Oriental Research (ACOR), National Geographic Society, Getty Foundation, Gemological Institute of America (GIA), Gems & Gemology Magazine (USA), Italian Conservation Institute, UNESCO, Journal of Gemmological Sciences (UK), British Archaeological Institute, ICOMOS (UN International Council on Monuments & Sites), Geological Society of America (GSA), ICAHM (UN International Commission on Heritage Management), Ford Foundation, US Agency for International Development (USAID), Bernard & Barbro Osher Foundation

Publications: American Journal of Archaeology, Geografiska Annaler, Gems & Gemology, Journal of Gemmology, Professional Geographer, Journal of Conservation Studies, Conservation, Hazards & Risk, Earth Surface Processes & Landforms (ESPL), Journal of Arid Environments, Bulletin of the Schools of Oriental Research (BASOR), Geologic Society of America (GSA) Monographs

CONFERENCE PRESENTATIONS (gem-related only):

'*Quartz in History, Legend, and Science*', University of Arkansas, Fayetteville, AR (November 11, 2022) - public lecture and zoom: 250+ attendees

'*Arkansas Gemstone Resources: Quartz, Diamond, Turquoise*', University of Arkansas with the Arkansas Gem & Mineral Societies (November 2022): 120 attendees

'*The Quartz of Arkansas*', Crystal Bridges Museum of Art, Bentonville, AR (October 2019) - plenary lecture for exhibit premiere '*Crystals in Art: Ancient to Modern*': 100+ attendees

'*Mineralogy in Architectural Conservation: theory & application*', Department of Geology and Applied Earth Sciences, University of Jordan, Amman (May 2019): 90+ attendees

'Gemstones Use in Byzantine Mosaics. American Center of Oriental Research (ACOR), Amman, Jordan, July 2013: 100+attendees

'Deterioration of Tiburtine Travertine of Bernini's Grand Colonnade at St. Peter's Square, Vatican City,' Vatican Council of Art & Architecture (December 2010): 200+ attendees

'Preservation issues facing Rome's Limestone and Travertine Architecture', in IL GIL (Luigi Moretti), Trastevere, Rome, Italy (22 October, 2010): 50+ attendees

'Classical & Islamic Architecture: problems in stone and mineral conservation', University of Pavia, Italy (October 1999): 150+ attendees

'Mineralogy and Architectural Conservation: theory & application', Department of Geology and Applied Earth Sciences, University of Jordan, Amman (July 1998): 125+ attendees

'Great Temple of Amman: Implications for the Study of Limestone Deterioration', American Center for Oriental Research (ACOR), Amman, Jordan, June 1993: 100 attendees

'Gemstones used in Jewelry's Archaeological Styles. Society of Jewelry Historians' Symposium, University of Maine, Orono, July 1992: 200+attendees

'19th Century's Archaeological Discoveries' Influence on Western Decorative Arts' Society of Jewelry Historians' Symposium, University of Maine Orono, July 1990: 200+ attendees

'Environmental Degradation of Gemstone-Mining Practices', Conference of Gemologists, Washington D.C./Annapolis, Director Dr. J. Jolliff, September 1988: 150+ attendees

TEACHING EXPERIENCE:

- ▶ **2000 to present, University Distinguished Professor:** Gem Sciences, Geology, Cartography, Middle East Studies, Jewelry Art History - University of Arkansas
- ▶ **2002-2003, 2009-2010, Professor,** University of Arkansas Rome Center, Rome Italy: Geosciences and Gemology
- ▶ **1998-1999, Professor,** University of Jordan, Amman, Jordan: Geology, Materials Conservation, Cultural Heritage Management, Classical Architecture
- ▶ **1993-2000, Assistant and Associate Professor,** University of Hawaii, Manoa & Hilo: Geology, Gemology, Environmental Sciences, Geography-Cartography

GEM-RELATED LEGAL and JOB EXPERIENCE

- ▶ 1983-2000: Expert Witness, Testimony, Interrogatories, Deposition, Reporting: *Melvin Belli (San Francisco), Troutman-Sanders (Atlanta), King & Spalding (Atlanta), IRS (San Francisco, Atlanta: Rick Nixon), Stanford University, Christie's Auction House (Los Angeles: R. Fogarty), Christies Auction House (NYC: F. Curiel), U.S Customs Agency (San Francisco, Los Angeles), Metro Police*

Agencies (San Francisco, Atlanta, Los Angeles), Bank of America (San Francisco), Wells Fargo (San Francisco), Crocker Bank (San Francisco), Bank of California (San Francisco), Union Bank (Atlanta)

*** numerous client references remain confidential*

- ▶ 1981-Present: Gemologist-Appraiser/Co-Owner, Paradise Associates and Guilds LLC, San Francisco (1981-present), Los Angeles (1985-present), Atlanta (1990-1993), Central US/Arkansas (2000-present): www.paradiseassociates.com
- ▶ 1990-2000: Pacific Rim Representative, Butterfield's (and Bonham's) Auction House, San Francisco, California and Honolulu, Hawaii
- ▶ 1983-1988: Director, Gems, Jewelry, and Objet d'Arts Department, Butterfield's (and Bonham's) Auction House, San Francisco (main office), CA
- ▶ 1981-1984: Chief Gemologist and Appraiser, Gleim Jewelers, Palo Alto, CA
- ▶ 1981-1986: Field mineralogist/gemologist, GME Inc. San Francisco, CA (G. Mendenhall)
- ▶ 1978: Intern Geologist, Union Oil Coalinga Nose Field, Coalinga, California

TELEVISION COMMENTARY and CONSULTING

- ▶ 2024: PBS Australia Special on Petra, Jordan. WildBear Productions: Dan Robson
- ▶ 2020: NatGEO Special on Petra, Jordan. NGS/France Productions: Lea Sansonetti
- ▶ 2019: National Geographic Society (NatGEO) special on Petra: L. Giangrande
- ▶ 2017: Smithsonian Documentaries with Blink Pictures: N. Hardie and A. Collinge
- ▶ 2015: PBS 'Nova' Documentaries with Providence Films: G. Glassman and S. Tiffany
- ▶ 2009-2018: Bernard & Barbro Osher Foundation, Board Member, Mid-US Region
- ▶ 2009-2017: Lecturer: The Mediterranean, Gemology - Disney Cruises, Royal Caribbean

RELATED SERVICE and EXPERIENCE

Television-Radio Host/Guest Commentator on Gemological, Environmental Issues:

2019: National Geographic Society (NatGEO) '*The Wonders and Mysteries of Petra, Jordan*' (December 2019) on-air interviews, narration (8+ million premiere)

2017: Smithsonian Channel: '*Secrets: Riddle of Petra*' (May 2017), script-work, graphics, on-air interviews, narration. (10+ million premiere).

2015: NOVA-PBS: '*The Lost City of Petra*' (February 2015), script-work, on-air interviews, narration (80+ million viewers) (*PBS: highest Nielsen ratings*).

2011-2015: Discovery-Fremantle, K. Meade, Director '*Mega-Disaster Series: (1) Earthquake, (2) Hurricane, (3) Tsunami, (4) Volcano, (5) Leshan Buddha*

2007-2009: Good Morning America (ABC) '*Petra, New Wonder of the World.*'

2003-2006: NPR-Italy/US (May), *Domenica di Corriere*: 'Problems facing Petra's

Future', *Feinberg Show*: 'Cultural Resources Issues in Iraq: robbing the museums'

2001-2003: PBS-Las Vegas, '*Great Valleys of the World: Petra*' (script, narration)

1995: On-Air Commentator Ancient Mysteries (TV Series): '*Gemstones*' and '*Petra*'

1989-1991: Radio Host of the '*Rock Doc with Tom Paradise*' jewelry and gems call-in talk show: WSB-New Radio (95.5FM), and WRAS (88.5FM) Atlanta, Georgia

RELATED SOFTWARE and EQUIPMENT CAPABILITIES:

Software: Adobe CS6+ (Illustrator, PhotoShop, InDesign), Macromedia (Adobe-FreeHand, Flash, Fireworks), Surfer, ESRI ArcView, ArcInfo, ArcGIS, autoCAD, AtlasGIS, Maptitude, Microsoft Office (Word, Excel, Powerpoint), Systat-PC, SPSS-PC, Microcam Cartography. Morpheus Cartographic Morph-Animator,

Equipment: Scanning Electron Microscope (visual and backscatter SEM), Microprobe (material and aerosol), X-ray Diffraction (EXDA), Petrological and Mineralogical Analyses tools (spectroscope, polariscope, refractometer), Brunton, Alidade, Transit/Theodolite, Photographic Enlarger and Darkroom Apparatus, Plane Table Surveying, Scanners

REFERENCES

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Fulbright-Jordan, Jordanian Council for International Exchange of Scholars
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(962-6) 568-4760, fulbright@nets.com.jo

Simona Turriziani, Archives Director & Curator, Vatican City (Rome, Italy)
La Fabbrica di San Pietro (The Archives of Saint Peter's), Vatican City
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A more extensive curriculum vita is available on request.



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