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JEWELLERY STONE WITH CHATON CUT

Description

The invention relates to a gemstone with a chaton cut.

To improve the brilliance and further optical properties of a gemstone cut in a faceted manner, a wide range of types of cuts have been developed over time, which differ on the one hand due to the number of facets and on the other hand due to the mutual geometric positional relationships of the facets.

US5970744 discloses a precious stone with a step cut.

For the chaton sector in particular, what is known as the Oktant or Xilion cut (e.g. Swarovski stones A1200 and A1028) has become established on the market in the past, as the cut proved to be aesthetic and could be cut well.

Important parameters for assessing a gemstone are the "fire" and "light return" which relates to countless internal light reflections. These light reflections are caused at the individual facets, which are in specific angular relationships with respect to one another, which characterize the respective cut. The cut and the material of a gemstone are therefore decisive for the "fire" and "light return" created.

The "light return" value indicates how much light, which impinges on the gemstone from a pre-defined solid angle range, falls back to the observer at a relatively narrow (opening angle 3°) directed solid angle range, essentially along the axis of symmetry of the stone.

A further important feature for assessing the brilliance of a gemstone is the "fire". The property of a gemstone to break down the incident white light into the spectral components thereof is termed "fire". The manifestation of this property is dependent both on the material (dispersion) and on the cut.

A gemstone with a chaton cut has a crown, also termed the upper part, with a defined number of lateral facets and a central flat table, as well as a pavilion, also termed the lower part, with a defined number of facets. The end of the gemstone opposite the table can be formed as a point or as a rounded point in the form of what is known as a culet. A "rondist" (circumferential edge) can be arranged between the upper and lower parts. The gemstone can be cut symmetrically or asymmetrically.

It is the object of the invention to further improve the aesthetic impression of a gemstone with a chaton cut by optimizing optical parameters, particularly the "fire" and "light return".

This is achieved by means of a gemstone with the features of Claim 1.

As the gemstone has a shuttle cut, in which the crown angle (α) is between 40.5° and 42.5° and the angle between the rondist plane and those crown facets that adjoin the table via a broad side, is between 33.5° and 35.5°, a particularly high light return has surprisingly resulted simultaneously with a high "fire". The scintillation (sparkle of the moved gemstone) and the brilliance of the gemstone turn out particularly well.

The crown angle is the angle which results in the case of a side view of the gemstone, between the lateral boundary line of the crown and the rondist plane, this boundary line resulting from an orthogonal projection of a crown facet onto a plane which contains the longitudinal axis of the gemstone.

The rondist plane is the plane which is arranged parallel to the table and has the largest cross-sectional extent in the gemstone. The rondist plane is aligned perpendicularly to the longitudinal direction of the gemstone.

The "light return" and the "fire" can be measured, for example as is described below on the basis of Fig. 5 and Fig. 6. Instead of an actual measurement, the measurement can also be simulated computationally on the basis of the geometry and the material of the gemstone.

Further advantageous implementations of the invention of the invention are defined in the dependent claims.

It has been established that particularly preferred crown angle ranges (α) lie between 41.75° and 42.25°. The crown angle (α) is definitely preferably 41.95°.

In a preferred embodiment of the invention, the pavilion angle (β) is between 39.5° and 41.5°, preferably between 40.5° and 41.0° and definitely preferably 40.73°.

The pavilion angle is the angle which results in the case of a side view of the gemstone, between the lateral boundary line of the pavilion and the rondist plane, this boundary line resulting from an orthogonal projection of a pavilion facet onto a plane which contains the longitudinal axis of the gemstone.

Although the gemstone according to the invention can preferably be produced from a glass, a gemstone made from natural or synthetic precious or semi-precious stone or plastic is also possible using the chaton cut according to the invention.

The crown of the gemstone, which is also known as the upper part, has a table, which eight crown facets adjoin via a broad side in each case. In an embodiment of the invention, these crown facets have an angle with respect to the rondist plane of between 34.25° and 34.75° and preferably 34.5°.

Furthermore, the crown has eight further crown facets, which adjoin the rondist via a broad side in each case. In an embodiment of the invention, the angle between these crown facets and the rondist plane is between 40.5° and 42.5° (preferably between 41.75° and 42.25° and definitely preferably 41.95°). The orthogonal projection of the last-mentioned crown facets creates the crown angle. The pavilion, which is also known as the lower part, has at least 16 pavilion facets, which are terminated in the form of a tip or culet at the end opposite the table. In this case, in one embodiment eight pavilion facets have a tip which is arranged in the direction of the rondist, whilst 8 pavilion facets have a broad side, which adjoins the rondist. The end of this pavilion facet opposite the broad side terminates at a point and is directed away from the rondist. These pavilion facets which adjoin the rondist via the broad side have an angle with respect to the rondist plane of between 39.5° and 41.5°, preferably between 40.5° and 41° and definitely preferably 40.73° in one embodiment. The orthogonal projection of the last-mentioned pavilion facets creates the pavilion angle.

In an embodiment of the invention, the angle between the rondist plane and those pavilion facets, which have a point which adjoins the rondist or is arranged in the direction of the rondist, is between 35.0° and 37.0° (preferably between 36.0° and 36.5° and definitely preferably 36.28°).

Further details and advantages of the present invention are explained in the following in more detail on the basis of the description of the figures with reference to the drawings. In the figures:

Fig. 1a to 1c	shows a side view, a plan view, and a view from below onto a gemstone according to the invention,
Fig. 2	shows a schematic illustration for defining the crown angle and the pavilion angle,
Fig. 3a and 3b	shows a comparison of a gemstone of the prior art (Swarovski A1200) with a gemstone according to the invention by means of a schematic illustration of beam paths,

Fig. 4 shows a light return/fire graph

Fig. 5 shows a schematic illustration of the measuring arrangement for measuring the "light return".

Fig. 6 shows a schematic illustration of the measuring arrangement for measuring the "fire".

Fig. 7a to 7c shows a further exemplary embodiment of a gemstone according to the invention in a side view.

Fig. 1a shows a gemstone 1 according to the invention in a side view. The rondist 4 can be seen, which separates the crown 2, also termed the upper part, from the pavilion 3, also termed the lower part. The rondist 4 is the region of the gemstone 1 with the largest cross-sectional extent. The axis of symmetry (longitudinal axis L) of the gemstone is also illustrated schematically.

The pavilion 3 has two types of pavilion facets 8, 9 (double layer cut). In this case, eight pavilion facets 9 have a broad side, via which the pavilion facets adjoin the rondist 4. The remaining pavilion facets 8 have a tip, which in each case adjoins the rondist 4.

The crown 2 also has 16 facets 10 and 11 and a flat table 5, which is aligned parallel to the rondist plane 7 and perpendicularly to the longitudinal axis L.

Eight crown facets 11 adjoin the rondist 4 via a broad side in each case and have a tip, which is aligned in the direction of the table 5. Eight further crown facets 10 adjoin the table 5 via a broad side in each case (double layer cut).

Fig. 1b shows a plan view onto the crown 2 of the gemstone 1. The symmetry of the gemstone 1 can be seen from the schematically illustrated coordinate cross on the table 5. The longitudinal axis L runs through the centre of the coordinate cross.

Fig. 1c shows a view from below onto the crown 3 of the gemstone 1. A further coordinate cross is illustrated symbolically to illustrate the symmetry of the gemstone 1 at the tip 6, which is formed by the pavilion facets 8 which adjoin one another.

Fig. 2 shows a schematic illustration to explain the crown angle α, which is formed between the rondist plane 7 and the lateral boundary line 16 of the crown 2, whilst the pavilion angle β is formed between the lateral boundary line 17 of the pavilion 3 and the rondist plane 7.

Fig. 3a shows a gemstone 1' with a chaton cut of the prior art (Swarovski A1200). The light beams 13 entering into the gemstone are only reflected back partially in the observation direction at the pavilion 3' owing to the angle with which the pavilion facets are cut, particularly because of the crown angle and the pavilion angle. A portion of the beams is refracted or scattered away to the side in the form of the beam 14. The light return value is reduced.

Fig. 3c shows the same illustration for a gemstone 1 according to the invention. Owing to the specific geometric arrangement of the various facets and the crown angle α and the pavilion angle β, the light return is improved considerably as the majority of the beams is totally reflected in the region of the pavilion 3, so that virtually the entire portion of light beams 13 entering into the crown 2 is reflected back to the observer after, if appropriate, multiple reflections in the form of light beams 15 exiting from the crown 2.

The following table shows the differences from the prior art of the known gemstone A1200 of the applicant in relation to an exemplary embodiment of a gemstone "1021" according to the invention.

Figure 4 shows the position of this gemstone 1021 according to the invention in what is known as the light return/fire graph. It is possible to see that the gemstone according to the invention simultaneously has high light return values and high fire values compared to the prior art A1200 and A1028, a different stone of the applicant, and is therefore superior to the prior art with regards to the optical properties and the aesthetic impression.

Fig. 5 shows a measuring arrangement for measuring the light return of a gemstone in a schematic view. Using a hemispherical lighting arrangement 16, a gemstone 1 arranged in the centre of the base circle 17 of the hemisphere 16 is illuminated by light beams 18, so that the crown 2 of the gemstone 1 is irradiated with white, diffuse light, wherein the light beams impinge hemispherically onto the gemstone 1 as far as a darkened region 19 and are reflected by the gemstone. The base circle 17 is darkened up to the recess for the gemstone 1, so that no light impinges onto the gemstone 1 from below the base circle 17. Likewise darkened is a region 19 of the hemisphere 16, which is directly opposite the gemstone 1 and has an opening angle α of 46°. Also, no light comes from this region to the gemstone 1. The region 19 has a recess 20 with an opening angle β of 3°. This recess 20 is used as a narrow measuring field for a detector. Thus, a detector which measures a luminous flux may be arranged above the recess 20.

Instead, the respective light-specific values, such as for example the brightness in the region of this recess 20, can be calculated in a computer simulation.

The light quantity reflected upwards by the gemstone 1 constitutes an average over virtually all possible lighting arrangements and therefore results in a quantitative measure for the light return of the gemstone 1. The reflections take place at various facets, so that light is reflected back to the recess directly when first impinging on the gemstone, but also after a plurality of internal reflections.

Figure 6 shows a measuring arrangement for the "fire" value. The gemstone 1 held by a holder 20 is illuminated through the opening 22 in the direction of the main axis thereof using a directed list from the light source 21. The light backscattered by the gemstone 1 is recorded in colour on a measuring field 24. The product values of saturation and illuminance of the light points detected in the measuring field (25) are added and thus give the measured value for the "fire".

Figures 7a to 7c show a further exemplary embodiment of a gemstone according to the invention in a schematic side view, similar to Figure 1a, but in this stone, by contrast with the stone of Figure 1a, a pronounced circumferential edge 4a (roodist) is provided, which in the plan view runs on the gemstone in a circular manner around the same.

Of course, the invention is not limited to the illustrated exemplary embodiments, in particular the number of facets may vary, by contrast with the illustrated gemstone, which has 8+ facets in each case both on the table and in the case of the pavilion, other combinations of facets may also be used, for example 6+6, 10+10 or 12+12 facets. Odd numbers of facets are also possible. Also, the number of facets between crown on the one hand and pavilion on the other hand do not have to match.

In the illustrated exemplary embodiment, both the crown and the pavilion have received two different cut angles (double layer cutting method). In principle, single-layer and multiple layer gemstones are also possible.

Glass is used as preferred material, preferably with a refractive index between 1.50 and 1.60 and

ideally 1.55. However, other materials, particularly natural stones, are also conceivable and possible.

ÉKSZERKŐ

Szabadalmi igénypontok

1. Ékszerkő pavilon csiszolattal, amelynél korona sík táblájához körben a táblához képest rézsútosan ferde koronafazetták csatlakoznak, melyek egy az ékszerkő legnagyobb keresztmetszeti méretével rendelkező rundisztig terjednek, ahol a rundiszthoz alulról előnyösen hegyesen összefutó fazetták képezte pavilon csatlakozik, ahol az ékszerkő legalább nagyobbrészt, előnyösen egészében üvegből van, ahol a korona szöge (α) 40,5° és 42,5° között van, **azzal jellemezve**, hogy a rundiszt síkja (7) és valamennyi, a táblához (5) széles oldallal csatlakozó koronafazetta (10) közötti szög 33,5° és 35,5° között van.

2. Az 1. igénypont szerinti ékszerkő, **azzal jellemezve**, hogy a korona szöge (α) 41,75° és 42,25° közé esik.

3. A 2. igénypont szerinti ékszerkő, **azzal jellemezve**, hogy a korona szöge (α) 41,95°.

4. Az 1-3. igénypontok bármelyike szerinti ékszerkő, **azzal jellemezve**, hogy a pavilon szöge (β) 39,5° és 41,5° között van.

5. A 4. igénypont szerinti ékszerkő, **azzal jellemezve**, hogy a pavilon szöge (β) 40,5° és 41° közé esik.

6. Az 5. igénypont szerinti ékszerkő, **azzal jellemezve**, hogy a pavilon szöge (β) 40,73°.

7. Az 1-6. igénypontok bármelyike szerinti ékszerkő, **azzal jellemezve**, hogy a rundiszt síkja (7) és valamennyi, a táblához (5) a széles oldallal csatlakozó koronafazetta (10) közötti szög 34,25° és 34,75° között van, előnyösen 34,52°, és/vagy a rundiszt síkja (7) és valamennyi, a rundiszthoz (4) széles oldallal csatlakozó koronafazetta (11) közötti szög 40,5° és 42,5° között, előnyösen 41,75° és 42,25° között van, különösen előnyösen 41,95°.

8. Az 1-7. igénypontok bármelyike szerinti ékszerkő, **azzal jellemezve**, hogy a rundiszt síkja (7) és valamennyi, a rundiszt (4) irányában elrendezett csúccsal rendelkező pavilonfazetta (8) közötti szög 35,0° és 37,0° között, előnyösen 36,0° és 36,5° között van, különösen előnyösen 36,28°, és/vagy a rundiszt síkja (7) és valamennyi, a rundiszthoz (4) széles oldallal csatlakozó pavilonfazetta (9) közötti szög 39,5° és 41,5° között, előnyösen 40,5° és 41,0° között van, különösen előnyösen 40,73°.

9. Az 1-8. igénypontok bármelyike szerinti ékszerkő, **azzal jellemezve**, hogy az ékszerkő átlátszó anyagának törésmutatója 1,50 és 1,60 között van, előnyösen mintegy 1,55.

Fig. 1a

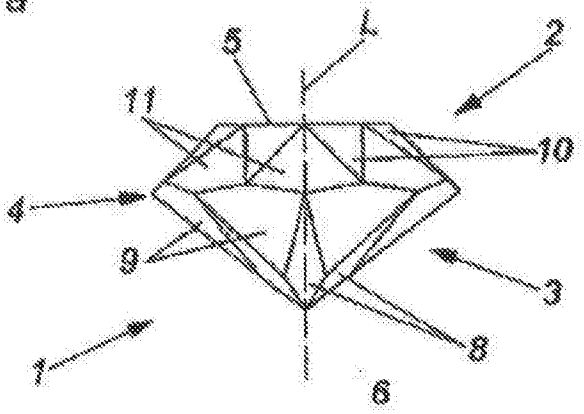


Fig. 1b

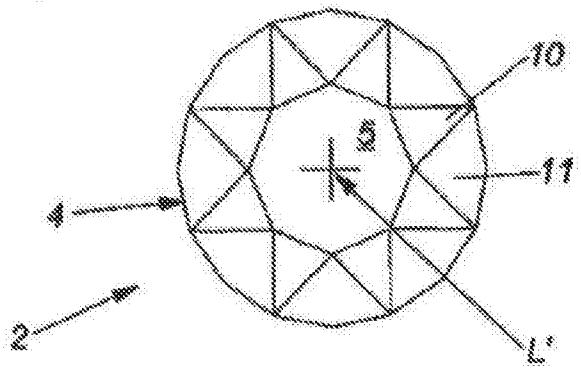


Fig. 1c

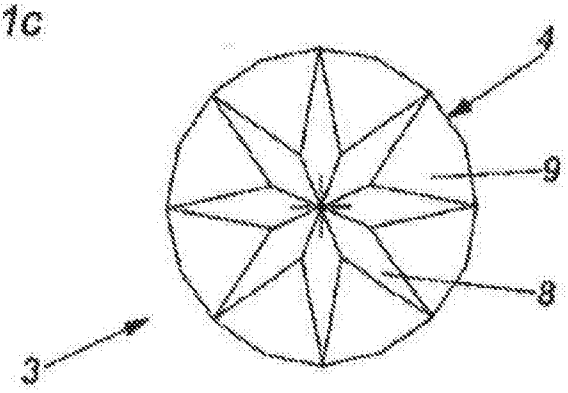


Fig. 2

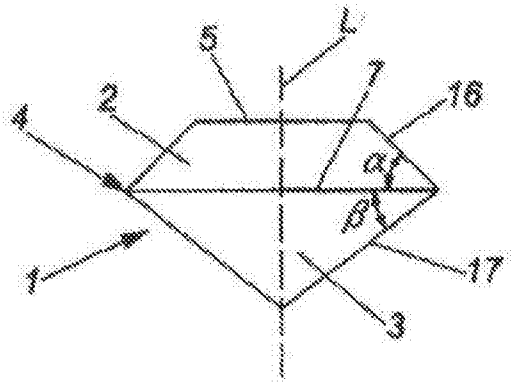


Fig. 3a

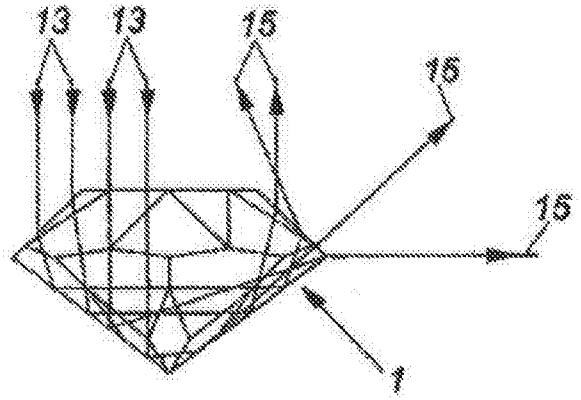
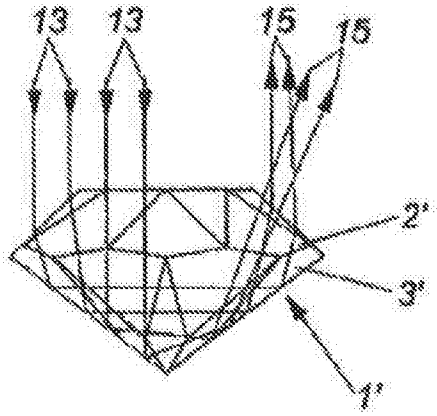


Fig. 3b



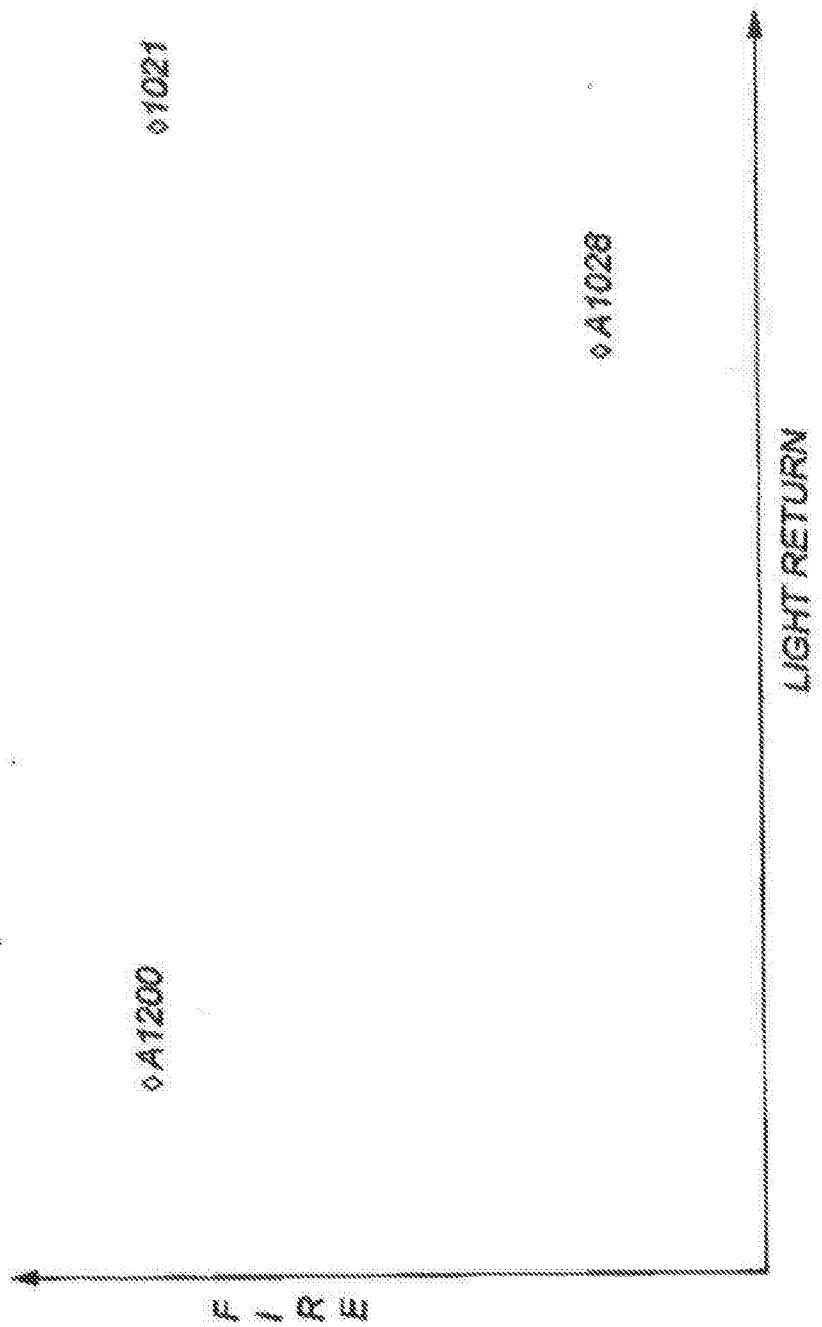


Fig. 4

Fig. 5

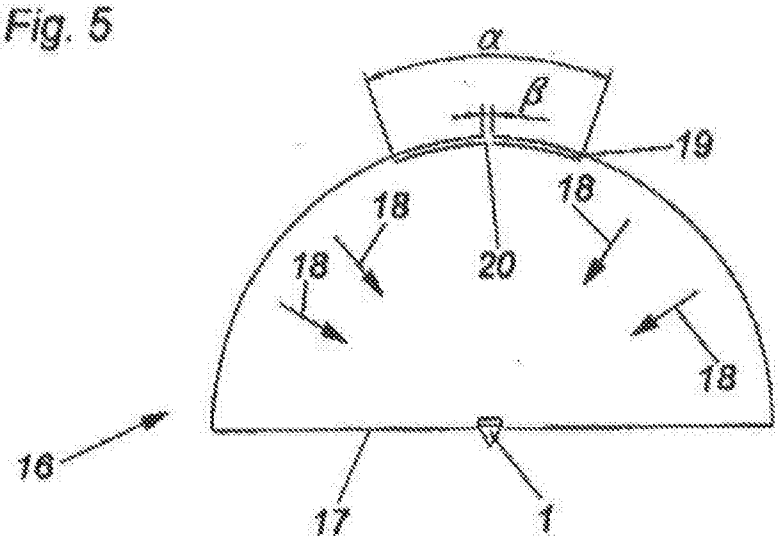


Fig. 6

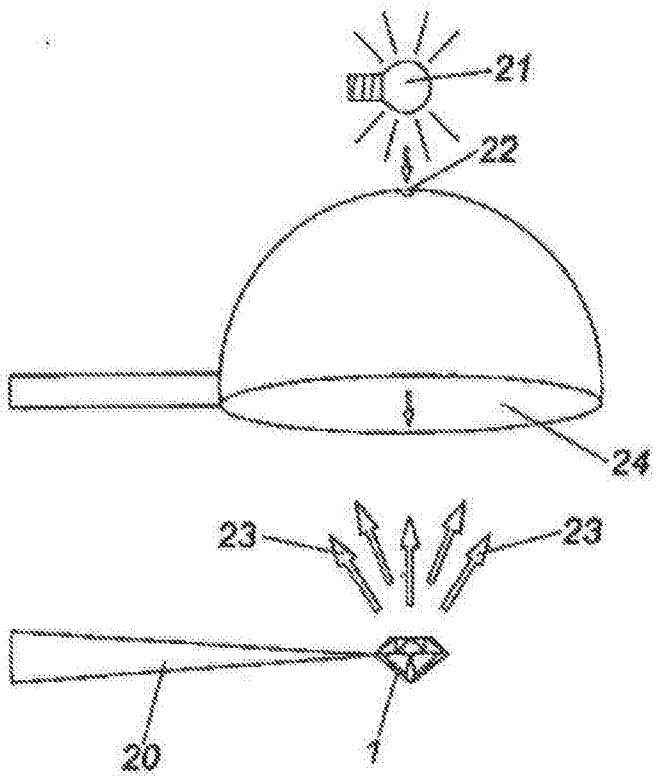


Fig. 7a

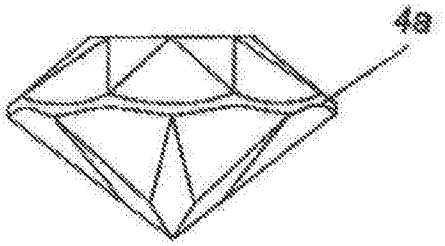


Fig. 7b

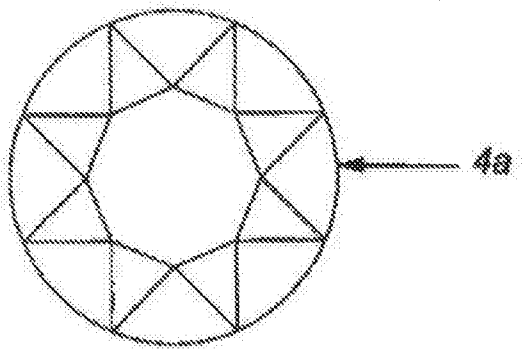


Fig. 7c