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METHOD OF MAKING SYNTHETIC QUARTZ CAT'S-EYE GEM

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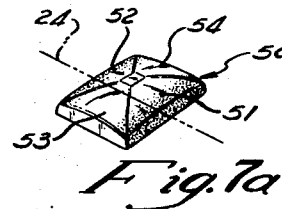
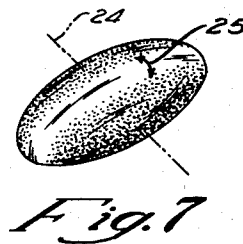
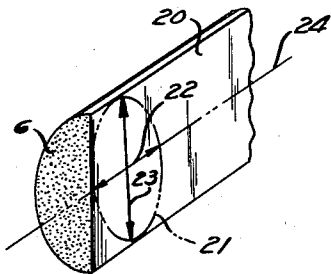
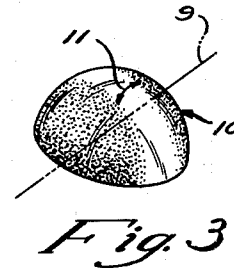
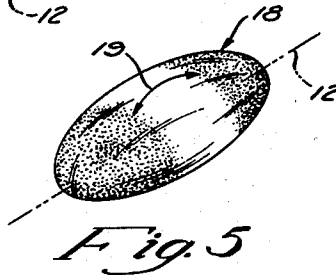
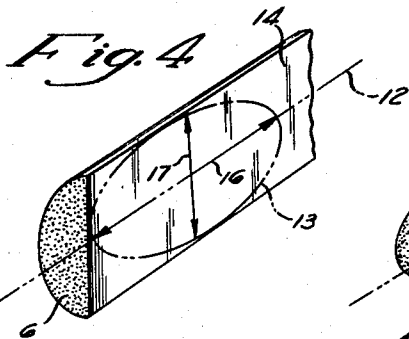
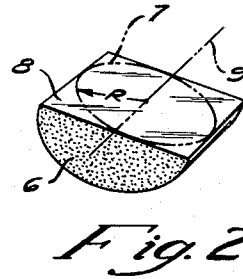
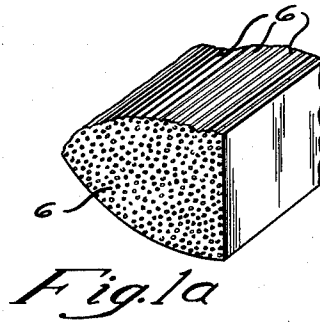
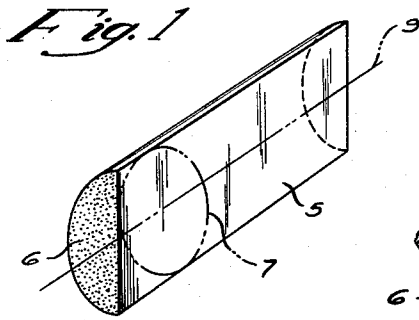


Fig. 6

Fig. 7

Fig. 7a

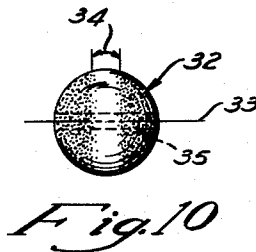
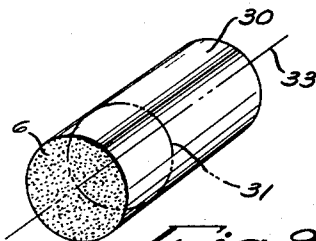


Fig. 10

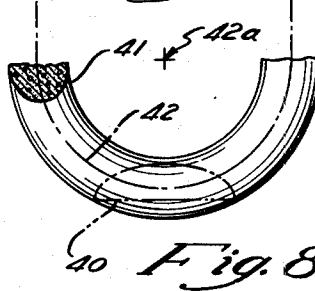


Fig. 8

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METHOD OF MAKING SYNTHETIC QUARTZ CAT'S-EYE GEM

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This invention relates to a gem and the method of making same and more particularly to a synthetic gem having the chatoyant characteristics of natural cat's-eye gems of chrysoberyl or quartz.

My invention relates to a process of treating inexpensive material such as quartz sand and converting such material to a valuable gem and has for its object the production of synthetic gems or stones having the luster and brilliance found in precious natural stones.

It is a further object of my invention to produce a synthetic quartz cat's-eye gem by melting quartz sand, drawing the quartz fusion through a die to produce a quartz rod and thereafter cutting gems from the drawn quartz rod.

It is a further object of my invention to provide a method of drawing a quartz rod having elongated minute tubes or pipes therein parallel to the axis of the rod and thereafter cutting or grinding from sections of the rod a gem in the shape of a flat bottom cabochon with the bottom thereof in a plane parallel to said tubes or pipes.

Further objects and advantages relating to specific gravity, hardness, luster and ease of manufacture will appear from the following description and the appended drawings, wherein

Fig. 1 is an isometric view of a length of drawn quartz rod;

Fig. 1a is an enlarged sectional showing of a portion of the drawn rod showing the pipes or tubes extending axially therethrough;

Fig. 2 is an isometric showing of a section cut from the rod of Fig. 1 with the flat side thereof showing the location of the bottom of the finished gem;

Fig. 3 is a perspective view of the cut and polished gem made from the section shown in Fig. 2;

Fig. 4 is an isometric view of a section of drawn rod showing the bottom of an elliptical gem to be made from a section of rod wherein the major axis of the ellipse is parallel with the longitudinal pipes in the rod;

Fig. 5 is an isometric view of the cut and polished gem made from the section shown in Fig. 4 showing the light band transverse of the major axis of the elliptical gem;

Fig. 6 is an isometric view of a section of drawn rod indicating the bottom of an elliptical gem where the major axis of the gem is transverse of the longitudinal pipes in the rod;

Fig. 7 is a perspective view of the elliptical gem cut as indicated in Fig. 6;

Fig. 7a is a modified form of gem similar to the form of Fig. 7 but ground to provide a "cushion cut" gem;

Fig. 8 is an elevation of a drawn rod bent to follow a helix indicating the relationship between an elliptical gem and the curved central axis of the bent rod;

Fig. 9 is an isometric view of a cylindrical drawn rod indicating the cutting lines for forming a spherical gem or bead; and

Fig. 10 is an elevation of a finished gem in the form of a bead.

There are a number of distinct minerals found in na-

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ture which have a common characteristic that when cut with a convex surface they display a luminous band similar to that seen by reflection in the eye of a cat. Such minerals include the so-called precious oriental or chrysoberyl cat's-eye. A common form of cat's eye is known as the quartz cat's-eye wherein the chatoyant effect is due to the inclusion of parallel fibers of asbestos. The quartz cat's-eye is often called the "occidental cat's-eye" to distinguish it from the chrysoberyl cat's-eye. Many of the natural quartz cat's-eye minerals are colored due to the inclusion of iron oxide.

According to my invention I have provided a synthetic cat's-eye having an appearance characteristic of the most expensive natural cat's-eye minerals. The finished gem, according to my invention, is of quartz but is unlike the natural quartz cat's-eye in that it does not include any filaments of asbestos or the like, and the term synthetic as here used is to describe a quartz cat's-eye as distinguished from quartz in its natural state.

It is well-known that fused silica when heated becomes plastic and can be drawn out similar to glass. It is also known that when quartz sand is melted and drawn out into rods or other elongated objects that bubbles trapped in the material being drawn are greatly elongated and thus the drawn rod is characterized by having elongated capillary ducts or pipes running through the product in parallel relation. The apparatus employed for melting and drawing quartz rods may vary but a common form includes an electric resistance heater with a charge of silica sand and/or quartz crystals around the resistance heater. When the silica fusion is carried out to about 1710° C. to 1730° C. it may be drawn upwardly by adhesion to silica tubes. The molten or fused silica is preferably drawn through a graphite die or tube for shaping the exterior of the rod. The apparatus for melting and drawing the quartz rod is not critical to the present invention as long as the apparatus does not interfere with the formation of the gas bubbles which produce the capillary ducts or pipes in the finished rod.

Referring to the drawings—a drawn quartz body is indicated at 5 in Fig. 1. The body shown is semi-cylindrical in shape and may be formed by cutting a round quartz rod in half or alternatively the body may be formed by drawing the silica fusion through a semi-circular die. As shown in the greatly enlarged section of Fig. 1a, the drawn quartz body is characterized by the hollow capillaries 6 running longitudinally of the rod. Preferably the capillaries 6 are of such a small diameter that they are difficult to see with the naked eye on the cut end faces of the rod. Preferably the capillaries are so small they are not observable with the naked eye on the convex surface of the finished polished gem. The capillary ducts or tubes 6 are indicated by dots on the end face of the body for purposes of disclosure and understanding the invention. The flat bottom face of the gem to be cut from the body 5 is indicated at 7 in Figs. 1 and 2. Preferably a section is cut from the body 5 such as the section 8 corresponding substantially to the diameter across the bottom of the gem to be formed.

The axis of the drawn quartz rod is indicated at 9 and in the case of the round stone to be cut, a circle having the radius R outlines the bottom of the round stone. The section 8 is thereafter cut and ground to provide the hemispherical shape indicated at 10 of Fig. 3. The axis 9 is indicated at Fig. 3 and when the gem shape of the body 10 is polished the chatoyant effect is observed by a band of light indicated at 11 which runs transversely of the axis 9. The chatoyant effect may be produced by the different index of refraction of the light passing through the tubes 6 and the light passing through the solid transparent quartz body surrounding the tube. On the other hand the chatoyant effect may be due to the light re-

flection on the walls of the tubes. I know from experiments I have conducted that if the tubes 6 are filled with a plastic having about the same index of refraction as quartz the chatoyant effect is greatly reduced in the gem. In the example illustrated, the pipes 6 emerge through the curved surface of the revolution and are thus open to air from the atmosphere.

In the form of gem as indicated in Fig. 4, the flat bottom of the gem is indicated by the ellipse 13 on the flat face of the semi-cylindrical body 14. The ellipse has a major axis 16 which is coincident with the axis 12 of the body 14. The minor axis of the ellipse is indicated at 17. The finished gem resulting from the outline shown in Fig. 4 is illustrated in Fig. 5 and is illustrated in its entirety at 18. In this form of gem a wider band of light is obtained than in the preceding examples. The light band is indicated at 19. As in the embodiment of Fig. 3, the open ends of the tubes emerge or open to atmosphere at the curved surface of the body 18.

Another elliptical form of gem is illustrated in Figs. 6 and 7 wherein the semi-cylindrical drawn rod 20 is provided with the gem outline indicated at 21 and in this case the minor axis 22 of the ellipse 21 is coincident with the axis 24 of the body 20. The major axis 23 of the ellipse extends transversely of the axis 24 of the rod 20. In the gem cut as indicated in Fig. 6, the chatoyant effect is found in the finished article as at 25 of Fig. 7. In this instance the light band 25 is transverse of the axis 24 but extends along the major axis of the ellipse.

Attractive beads of the gem material according to my invention may be made as indicated in Figs. 9 and 10 wherein a round drawn silica rod 30 is cut and ground as indicated at 31 to provide a spherical gem shown in its finished form at 32 in Fig. 10. The central axis of the rod 30 is indicated at 33 and the light band in the finished article indicated at 34 extends transversely of the axis 33. A hole 35 is drilled through the spherical on any selected axis of the gem for stringing as in a string of beads. Beads may also be formed by drawing a thick-walled tube of quartz.

In Fig. 8 I have illustrated a gem indicated at 40 as being cut from a drawn silica rod 41 bent in the form of a helix. The central axis of the helical body is indicated at 42. It will be understood that in this form of gem the pipes such as 6 of Fig. 1a are curved and follow the curvature of the central axis 42. The chatoyant effect observed in the finished gem made from the curved rod is characterized by a narrower band of light than in the forms heretofore described. The central axis of the helix is indicated at 42a.

A cushion cut gem is shown in Fig. 7a wherein the gem is cut with reference to the axis 24 and thus will have the highlight transverse to the axis as in Fig. 7. In the cushion cut gem the faces 53 and 54 are cylindrical surfaces concentric of the axis 24. The faces 51 and 52 are cylindrical surfaces having an axis normal to the axis 24. In this form of the invention the highlight band appears to be somewhat wider than in the form of Fig. 7.

It will be understood by those skilled in the art that the basic shapes I have shown and described may be modified to achieve different light transmitting effects without adversely affecting the cat's-eye appearance of the finished gem. For example, the bottom or back of the gems shown in Figs. 3, 5 and 7 has been described as flat. Such a flat surface may be ribbed or made concave or convex and still retain the cat's-eye appearance of the gem.

Although I have shown and described five forms of my invention in considerable detail, it will be understood that numerous modifications may be made therein by those skilled in the art without departing from the scope of my invention as defined in the following claims:

What is claimed is:

1. That method of making a cat's-eye gem which comprises drawing a rod from molten quartz having gas bubbles therein to produce a rod having capillaries therein parallel to each other and parallel to the axis of the rod, cutting a transverse section from the rod and grinding a convex surface from such section and thereafter polishing the convex surface.

2. That method of making a synthetic quartz cat's-eye gem which comprises drawing from molten quartz containing bubbles, a semi-cylindrical rod having hollow capillary tubes therein extending parallel to the longitudinal axis of the rod, cutting a transverse section from the rod and grinding a flat bottom cabochon from said section with the flat bottom of the cabochon formed from the flat side of the rod and thereafter polishing the convex surface of the cabochon.

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