A Processed Porous Stone

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A processed porous stone

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2006100020 10 Jan 2006

ABSTRACT

The present invention relates to a porous stone for inclusion in jewelry products. The stone includes visual material in the pores of the stone. The visual material includes any one of the following group: carbon material, hydrocarbon material, manganese oxide, cobalt oxide, phosphoric acid, and other like material which affects the visual appearance of the stone. The present invention also relates to a method for processing a porous stone.

2006100020 10 Jan 2006

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PATENTS ACT 1990

COMPLETE SPECIFICATION
INNOVATION PATENT

A PROCESSED POROUS STONE

The following statement is a full description of this invention including the best method of performing it known to me:

2006100020 10 Jan 2006

A PROCESSED POROUS STONE

TECHNICAL FIELD

The present invention relates to a method for processing porous gemstones including opals. The present invention also relates to processed porous gemstones, and porous stones for inclusion in jewelry and other decorative products such as tiles, for example.

BACKGROUND

Porous gemstones such as opals are commonly used in jewelry, carvings, and mosaics. Precious opal is composed of small spheres of silica packed in a regular array (i.e. matrix). White light is diffracted by the array and is broken up into the colors of the spectrum to thereby cause a characteristic display of colors which is visual appealing. Common opal (or potch) is composed of small spheres of silica which are either of assorted sizes which do not produce the regular array required for color diffraction or are too small to produce a significant display of color. Accordingly, precious opal is more highly valuable and sought after than common opal.

It is an object of the present invention to provide a method to facilitate altering the visual appeal of porous jewelry stones including opals.

SUMMARY OF THE INVENTION

According to a further aspect of the present invention, there is provided a processed porous stone for inclusion in jewelry or other decorative products, the stone including visual material provided in the pores of the stone, the visual material including any one of the following group: carbon material, hydrocarbon material, manganese oxide, cobalt oxide, phosphoric acid, and other like material which affects the visual appearance of the stone.

2006100020 10 Jan 2006

The stone may further include stabilising material in the pores of the stone, the stabilising material including any one of the following group: epoxy resin, silica, crylate, and other like material for stabilising the structure of the stone.

The porous stone may be any one of the group: opal, malachite, azurite, zeolite, and other like semi-precious or precious gemstones.

According to a further aspect of the present invention, there is provided a method for processing a porous stone for inclusion in jewelry or other decorative products, the method including the steps of:

providing visual material into pores of the porous stone; and

providing stabilising material into pores of the porous stone.

Either step of providing may involve compressing the material and the porous stone in a pressure chamber.

According to a further aspect of the present invention, there is provided a method for processing a porous gemstone, the method including the step of providing material into pores of the gemstone.

Preferably, the step of providing involves compressing the material and the gemstone in a pressure chamber.

Preferably, prior to the step of providing, the method further involves the step of removing air and/or moisture from the gemstone. Even more preferably, the step of removing involves subjecting the gemstone to a vacuum.

In one embodiment, the gemstone includes opal. Preferably, the opal includes matrix opal having a regular array.

The material may include any one or more of the following group: hydrocarbon, epoxy resin, crylate, silica, phosphoric acid, manganese oxide and cobalt oxide.

2006100020 10 Jan 2006

According to a further aspect of the present invention, there is provided a method for processing a porous gemstone, the method including the steps of:

providing first material into pores of the gemstone; and

providing second material into pores of the gemstone.

Preferably, between the steps of providing the first and second material, the method further involves the step of heating the gemstone.

Preferably, prior to each providing step, the method further involves the step of:

removing air and/or moisture from the gemstone.

The first material may include any one or more of the group: hydrocarbon material, manganese oxide, cobalt oxide and phosphoric acid or other like visual material. The second material may include any one or more of the group epoxy resin, crylate and silica or other like stabilising material.

According to a further aspect of the present invention, there is provided a porous gemstone processed in accordance with the foregoing method.

According to a further aspect of the present invention, there is provided a processed porous gemstone including material provided into the pores of the gemstone.

Preferably, the gemstone includes opal. Alternatively, the gemstone may include any one of the group: malachite, azurite, zeolite and other like semi-precious or precious gemstones.

The provided material may include carbon. The provided material may include epoxy resin, silica or crylate.

2006100020 10 Jan 2006

According to a further aspect of the present invention, there is provided a processed porous opal, the opal including stabilising material in the pores of the opal.

Preferably, the stabilising material includes any one of the following group: epoxy resin, silica, crylate, and other like material for stabilising the structure of the stone.

According to a further aspect of the present invention, there is provided a method for processing a porous opal, the method including the step of:

providing stabilising material into pores of the porous opal.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred features, embodiments and variations of the invention may be discerned from the following Detailed Description which provides sufficient information for those skilled in the art to perform the invention. The Detailed Description is not to be regarded as limiting the scope of the preceding Summary of the Invention in any way. The Detailed Description will make reference to a number of drawings as follows:

Figure 1 is a flowchart showing the processing of opal material.

Figure 2 is a flowchart showing carbonisation of opal material in accordance with an embodiment of the present invention.

Figure 3 is a flowchart showing stabilisation of carbonised opal material in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Opals are generally processed in accordance with the processing method 10 shown in Figure 1.

2006100020 10 Jan 2006

Unprocessed opal which is mined from the ground is generally known as "rough" opal. At step 12, rough opal is rubbed down to remove sand and waste material to reveal the potential of the stone. At this stage, the opal may be generally shaped on a cutting machine.

At step 14, the opal is cut by a skilled jeweler to form its final shape.

Subsequently at step 16, the opal is polished to finish the stone prior to sale.

According to a first embodiment of the present invention, there is provided a method for processing opal so as to alter its naturally occurring visual appearance. The method is typically performed between the steps of rubbing down 12 and cutting 14 the opal. The method involves carbonising the opal 20 and stabilising the carbonised opal 40 as described below.

Carbonisation

Figure 2 is a flowchart showing the basic steps involved with the carbonisation procedure 20.

At step 22, rubbed down porous sandstone matrix opal material is placed in a pressure chamber. The pressure chamber is able to create a relative vacuum (i.e. decrease pressure with respect to atmospheric pressure) or to compress the opal material (i.e. increase pressure with respect to atmospheric pressure) within the chamber.

At step 24, a relative vacuum is created in the pressure chamber using a two stage vacuum pump to remove moisture and air from the opal material.

At step 26, 1,000 ml of liquid hydrocarbon per kilogram of opal material is introduced into the pressure chamber containing the opal material whilst maintaining the relative vacuum.

At step 28, the chamber pressure is increased so that compression is created in the pressure chamber to force the liquid hydrocarbon into the pores of the opal material. Typically, the chamber pressure is held at 120 psi for 60 minutes when impregnating the opal material with the hydrocarbon (i.e. providing the visually black hydrocarbon into the opal pores).

At step 30, the opal material is then removed from the pressure chamber and placed in a reduction kiln. The reduction kiln heats the opal material to a maximum temperature of about 600°C. Oxygen and hydrogen is removed from the opal material and leaves the material with a black appearance due to the carbon residue remaining in the pores of the opal material. Typically, the opal is heated in the reduction fire for 120 minutes when forming the carbonised opal material.

Stabilisation

Figure 3 is a flowchart showing the basic steps involved with stabilising the carbonised opal material 40.

At step 42, the carbonised opal material is placed in the pressure chamber.

At step 44, a relative vacuum is created in the pressure chamber to remove moisture and air from the opal material.

At step 46, 1,000 ml of epoxy resin (such as HX megapoxy) per kilogram of opal material or a form of crylate (i.e. stabilising liquid) is introduced into the pressure chamber containing the opal material whilst maintaining the relative vacuum.

At step 48, the chamber pressure is increased so that compression is created in the pressure chamber to force the stabilising liquid into the pores of the opal material. Typically, the chamber pressure is held at 120 psi for 60 minutes when impregnating the opal material with the stabilising liquid.

2006100020 10 Jan 2006

At step 50, the opal material is then removed from the pressure chamber and the stabilising liquid is allowed to set. In one embodiment, the opal material may be heated to faciliate setting of the stabilising liquid. The set stabilising material stabilises the opal material structure by filling the pores and facilitates polishing of the opal material. The stabiling material also has the effect of retaining the carbon within the opal material.

Once the stabilizing liquid is set, the stone is then ready for cutting and polishing. During polishing, any carbon and stabilising material surrounding the periphery of the opal material is removed whilst material within the pores of the opal remains. The finished processed opal has an enhanced appearance with black carbon being present between the opal matrix. Accordingly, the finished opal has an enhanced speckled appearance of refractive (colored) opal material interspersed throughout a contrasting black carbon background.

The finished opal can be embedded into jewelry products and other decorative products such as tiles, for example.

A person skilled in the art will appreciate that many embodiments and variations can be made without departing from the ambit of the present invention.

The general processing method of the first embodiment can be used to enhance the appearance of different types of porous gemstones, however, the parameters for each step may need to be varied to suit the particular porous gemstone material.

For example, a sandstone matrix with solid opal inclusion may be enhanced in a similar manner, however, this type of opal material cannot withstand the carbonization heat of up to 600°C as previously described in relation to step 30 of the first embodiment. A lower temperature carbonization must be performed for this type of material and therefore phosphoric acid is added with the liquid hydrocarbon at step 26. The resulting opal material can then be

heated in the reduction kiln up to 150°C during step 30, thereby preventing any damage to the opal material. This carbonised opal material can then be stabilized in accordance with the method of the first embodiment shown in Figure 3.

In an alternative embodiment, colloidal silica stabilisation is performed on the porous carbonized opal material at step 42. Colloidal sillica is introduced into the chamber in place of stabilising liquid at step 46. At step 50, the opal material is placed in a reduction kiln and heated to approximately 800°C so that the colloidal silica fuses within the opal pores. After cooling, the opal material is ready for cutting.

The preferred embodiment described the processing of opal material. In alternative embodiments, other gemstones including any one or more of the group: malachite, azurite, zeolite and other like semi-precious or precious gemstones may instead be used.

In the preferred embodiment, the opal was carbonised prior to being stabilised. In an alternative embodiment, the opal need not be carbonised prior to stabilisation.

In the preferred embodiment, the gemstone was impregnated with black carbon material. In alternative embodiments, manganese oxide or cobalt oxide may instead be provided into the pores of the gemstone.

In compliance with the statute, the invention has been described in language more or less specific to structural or methodical features. It is to be understood that the invention is not limited to specific features shown or described since the means herein described comprises preferred forms of putting the invention into effect. The invention is, therefore, claimed in any of its forms or modifications within the proper scope of the appended claims appropriately interpreted by those skilled in the art.

2006100020 10 Jan 2006

The claims defining the invention are as follows:

1. A processed porous stone for inclusion in jewelry or other decorative products, the stone including visual material provided in the pores of the stone, the visual material including any one of the following group: carbon material, hydrocarbon material, manganese oxide, cobalt oxide, phosphoric acid, and other like material which affects the visual appearance of the stone.

2. A processed porous stone as claimed in claim 1, the stone further including stabilising material in the pores of the stone, the stabilising material including any one of the following group: epoxy resin, silica, crylate, and other like material for stabilising the structure of the stone.

3. A processed porous stone as claimed in claim 1, wherein porous stone is any one of the group: opal, malachite, azurite, zeolite, and other like semi-precious or precious gemstones.

4. A method for processing a porous stone for inclusion in jewelry or other decorative products, the method including the steps of:

providing visual material into pores of the porous stone; and

providing stabilising material into pores of the porous stone.

5. A method as claimed in claim 4, wherein either step of providing involves compressing the material and the porous stone in a pressure chamber.

Dated this 9th day of January 2006

STEVEN CORDELL

by our attorneys

Eagar & Buck Patent and Trade Mark Attorneys

2006100020 10 Jan 2006

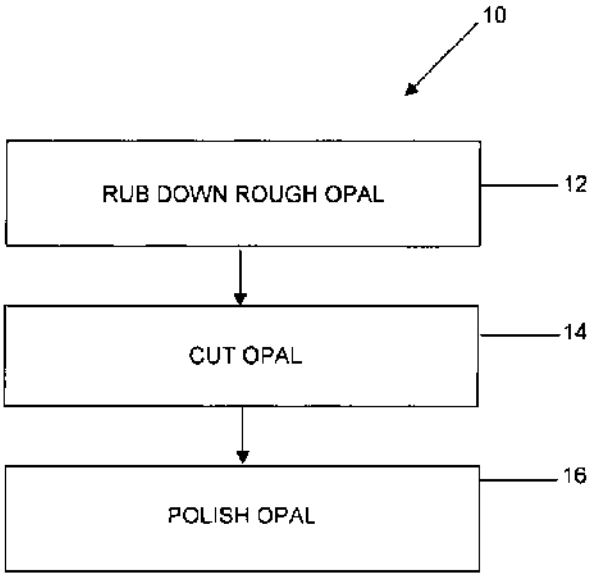

FIG 1

2006100020 10 Jan 2006

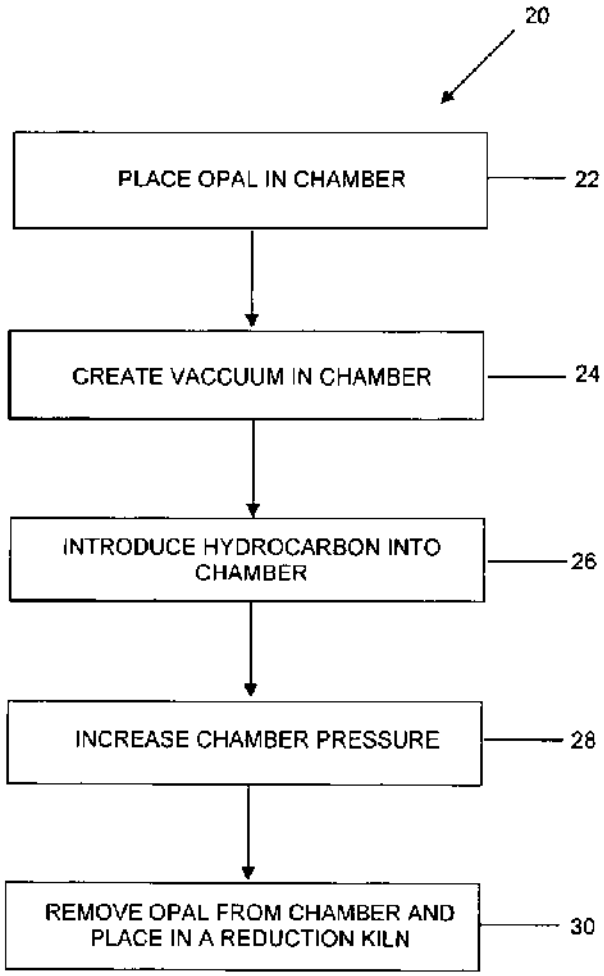

FIG 2

2006100020 10 Jan 2006

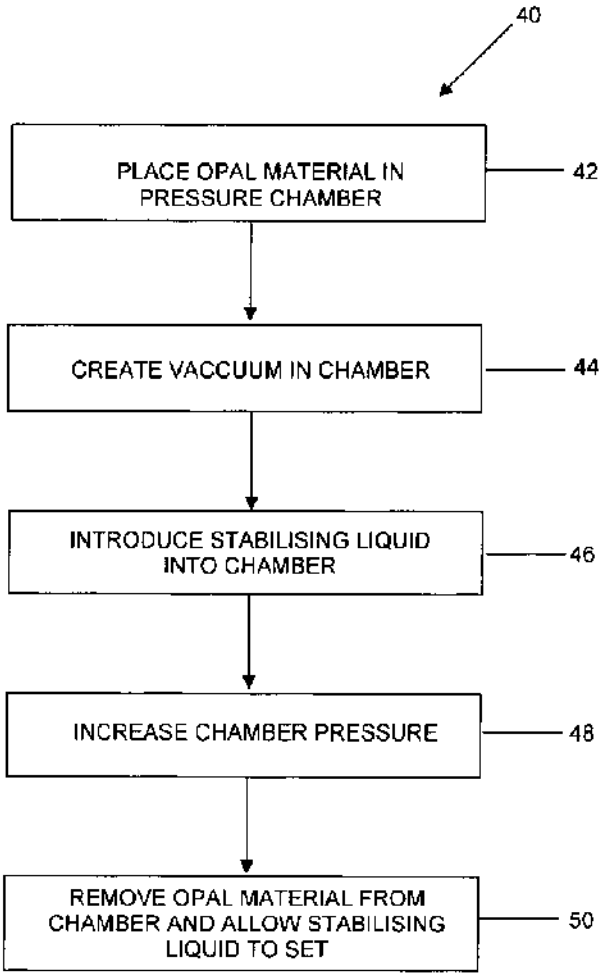

FIG 3