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[54] **METHOD AND APPARATUS FOR HOLDING GEMS**

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[52] **U.S. Cl.** ..... **294/64 R**, 51/229, 51/235

[51] **Int. Cl.** **B66c 1/02**

[58] **Field of Search** ...294/64 R, 64 A; 417/313, 315, 417/410, 423 R, 423 A, 440, 41; 51/229, 235

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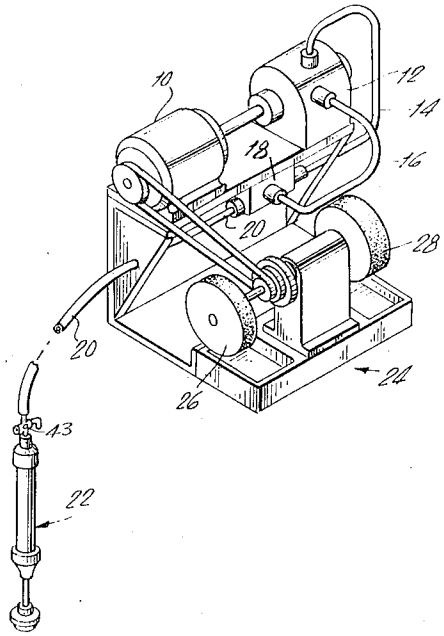
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[57] **ABSTRACT**

A method and apparatus for holding cabochons in which a hollow conduit having an opening at one end for receiving the cabochon is connected to a pump having a vacuum side and a pressure side. The end of the hollow conduit for holding the cabochon is provided with a seal made of flexible material so that when vacuum is applied, the cabochon seals the end of the hollow conduit so that the vacuum force will securely hold the cabochon in place. In this manner, such work as polishing and grinding may be carried out on the cabochon. On release of the vacuum, the cabochon is easily removed.

7 Claims, 2 Drawing Figures



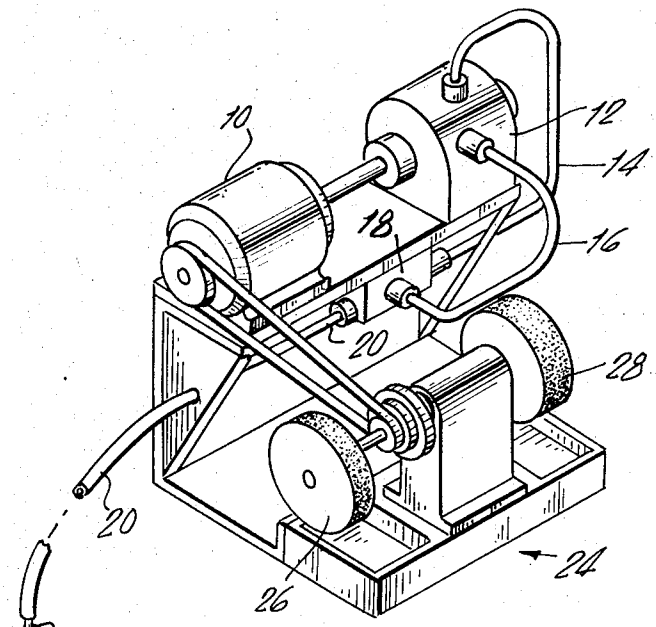


FIG. 1

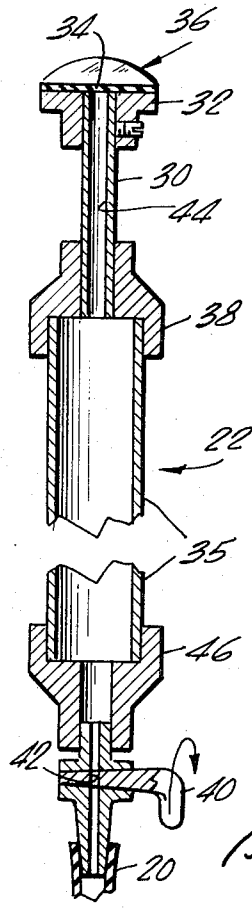


FIG. 2

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METHOD AND APPARATUS FOR HOLDING GEMS

This invention relates to apparatus and method for holding a cabochon while performing polishing and grinding operations.

In the lapidary art (grinding, cutting, abrading, lapping, polishing, etc.), it is customary to utilize a number of different machines in conjunction with a hand-held cabochon holder known as a dop. The dop is used to hold the cabochon securely in place while the operator holds the dop in order to work the cabochon on the various machines utilized to achieve a finished gem.

Generally, dops comprise a thin stem, one end of which is usually designed to coincide with the shape of the cabochon. The cabochon is then mounted generally by means of a special dopping wax or cement to the end of the dop provided for mounting the cabochon. The dopping wax is generally heated to a plastic consistency and applied to both the cabochon and the dop itself, and then permitted to cool. In this manner, an extremely strong bond between the dop and the cabochon is achieved. However, various problems are encountered in the use of a conventional dop which are overcome with the present invention.

More specifically, many cabochons are rather sensitive to heat and can easily crack when too much heat is applied. Therefore, one must be careful in applying the dopping wax not to overheat it; otherwise, the internal stress and strain set up in the cabochon by the heat of the dopping wax may cause the cabochon to crack, thereby destroying a valuable gem stone. However, the dopping wax must be heated sufficiently to strongly bond the cabochon to the dop, otherwise the cabochon will be dislodged from its position on the dop during the finishing operations performed on the cabochon. Should this happen, it is very difficult to reposition the cabochon in proper position on the dop to finish the particular operation which was being carried out when the cabochon separated from the dop. In addition, it is of course difficult to remove the finished gem from the dop since the dopping wax must either be heated to a plastic consistency or placed in refrigeration causing differential contraction to facilitate separation. Of course the same danger of cracking the gem is inherent in its removal from the dop.

In addition to the above, handling the dopping wax is extremely difficult since, when the wax reaches a plastic consistency, its temperature is generally quite high and handling of the dopping wax often causes very painful burns to the hands of the operator applying the wax. Since the cabochon must be removed and replaced on the dop in different positions a number of times to permit the entire cabochon to be ground and cut, etc., it is apparent that the problems inherent in using a dopping wax will significantly multiply in the manufacture of one polished gem stone.

In accordance with the present invention, the process of achieving a polished gem stone from a cabochon is considerably simplified. More specifically, a hollow conduit is provided having sealing means at one end thereof adapted to receive a cabochon. The other end of the hollow conduit is connected to a pump capable of applying both a vacuum force to hold the cabochon securely in place against the sealing means and a pressure force to automatically release the cabochon from the hollow conduit as each particular

operation is finished. For best results, a motor is used to drive both the pump for selectively applying the vacuum and pressure forces and one or more arbors for carrying out the operations necessary to transform the cabochon into a gem stone. The motor is preferably provided with one or more speed-change belts or controls to permit the use of both a single arbor and different cutting speeds while holding the cabochon in place. In most instances, a rotary centrifugal type vacuum pump will be used in the device of the invention. Rotary centrifugal pumps employing displacement mechanisms actuated by centrifugal force generally will not supply sufficient vacuum at low motor speeds or when speeds are changed. To alleviate this problem, a petcock is interposed between the hollow conduit and the pump. The petcock in accordance with the present invention is rotatable between a first position in which the hollow conduit is in communication with the pump and a second position in which communication of the hollow conduit and the pump is severed. In this manner, the cabochon may be retained in place on the dop even though the motor is turned off or the pump speed drops too low, causing a decrease in vacuum. In addition, the motor speeds may be changed without running the risk of significantly reducing the vacuum force utilized to hold the cabochon in place. It can readily be appreciated that a very compact apparatus for the complete polishing and grinding, etc., of the cabochon is provided by the above described "-vacuum dop" assembly. If desired, the petcock can be made to rotate into a third position in which the vacuum in the hollow conduit can be vented to the atmosphere. Of course, the petcock may be used if desired when a variable speed pump is used to achieve retention of the cabochon on the dop when the motor is shut down or pump speed is made too low.

Referring now to the drawings, in which like numerals refer to like parts:

FIG. 1 is an isometric view of a motor pump and arbor arrangement in accordance with the present invention;

FIG. 2 is a detailed view of one embodiment of the hollow conduit made in accordance with the present invention.

Referring now to FIG. 1, numeral **10** denotes a variable speed motor, **12** denotes a combination vacuum and pressure pump capable of supplying a vacuum force at one end thereof and a pressure force at the other end through flexible tubes **14** and **16**, respectively. Tubes **14** and **16** are connected to an adjustable flow reversing valve **18** which both regulates the amount of vacuum or pressure available from the pump **12** and supplies the proper force through tube **20** to a vacuum grip dop **22**. Dop **22** holds a cabochon, as explained hereinafter, so that the cabochon may be polished, ground, lapped, etc., on the arbor **24**. Arbor **24**, as shown, has two gem fabricating wheels **26** and **28**, respectively, which can be used to perform different operations on the cabochon. The motor **10** is a constant or variable speed motor and, as is readily apparent from FIG. **1**, is used to drive both the arbor **24** and the pump **12**. The motor **10** may be a simple conventional motor or it may be a motor to which different pulleys and belts may be attached for changing the speed of the arbor wheels.

Referring now to FIG. 2, a vacuum grip dop 22 is provided with a hollow conduit section 35 which is in communication with tube 20 through a conventional airtight fitting 46. The upper end of the hollow conduit 35 is also capped by a conventional airtight fitting 38, similar to the fitting 46. Mounted in the fitting 38 by conventional means (not shown) such as cooperating screw threads (not shown) is a replaceable hollow tube 30. Mounted by conventional means such as welding or riveting on the end of the hollow tube 30 is a fitting 32. Fitting 32 is lined on its upper surface and also internally with a rubber sealing cup 34 on which a cabochon 36 is mounted, the combination of tube 30 and fitting 32 forming a template. The sealing cup 34 has a central opening 44 therein to allow the cabochon to be held securely against the sealing cup 34 when a vacuum is applied, as explained hereinafter. If desired, the combination of tube 30 and fitting 32 may be made replaceable whereby different size templates may be used to accommodate different size cabochons.

When the motor 10 is operational, pump 12 applies both a vacuum force and a pressure force to valve 18. A conventional switch (not shown) is used to choose whether vacuum or pressure will be applied to tube 20. For holding the cabochon in place on the vacuum dop 22, a vacuum is applied through tube 20 to the hollow conduit 35. The vacuum is of course high enough to hold the cabochon 36 in place against sealing cup 34 so that the cabochon will remain on the vacuum dop 22 throughout all of the operations which are to be performed on the cabochon. In addition, the valve 18 may be provided with a fluid setting in which the vacuum system is vented to the atmosphere to effectuate release of the cabochon from the sealing cup 34.

Only one arbor is shown in the drawings. Where only one arbor is to be used it is preferably to provide a constant speed motor to permit the same arbor to be used for a number of different operations. In changing arbor speeds, the vacuum force generated by pump 12 may decrease to the point where the cabochon will fall off the dop. To prevent this, a petcock 40 is provided in the tube 20. As shown in FIG. 2, the petcock is in a position such that hollow conduit 35 is in communication with tube 20. Petcock 40 is of the conventional type having a single bore 42 therein which when rotated from the position shown in FIG. 2 will interrupt communication between hollow conduit 35 and tube 20. Therefore, rotation of petcock 40 to the position in which communication between hollow conduit 35 and tube 20 is interrupted will maintain the vacuum force contained in the hollow conduit 35 when motor speeds are changed. In this manner, the cabochon 36 will be held in place on the vacuum dop. If desired, the petcock may be provided with a second bore 43 to vent the hollow conduit to the atmosphere, when necessary.

To remove the cabochon from the vacuum dop when venting is insufficient to achieve release, the valve 18 may be operated to permit pressure to be applied through tube 20 to hollow conduit 35. This pressure forces the cabochon away from the sealing cup 34 and breaks any vacuum which may exist to hold the cabochon in place on dop 22.

While only a limited number of embodiments of the foregoing invention have been expressly described, it is nonetheless to be broadly construed and not to be limited except by the character of the claims appended hereto.

What is claimed is:

1. A cabochon dop comprising a hollow handle section a template mounted on said handle section having a hollow tube and a rigid support mounted on one end of said tube, said support having an aperture in communication with said end of said tube and having a shape substantially the generally shape desired in the finished gem;

resilient means for sealing the cabochon on said template, said sealing means having a shape substantially the general shape desired in the finished gem such that a substantially airtight seal is formed;

a conduit, one end of said conduit being in communication with the other end of said tube and;

valve means for selectively retaining a vacuum within said sealing means

means for applying a vacuum to the other end of said conduit.

2. The dop according to claim 1 wherein said valve means is adapted to selectively retain a vacuum within said sealing means after said vacuum applying means is turned off and to vent said conduit to the atmosphere to effect release of said cabochon.

3. The dop according to claim 2 wherein said template is removably mounted on one end of said conduit.

4. The dop according to claim 3 wherein said sealing means comprises a rubber sealing cup, said cup lining the internal and upper surface of said support.

5. The dop according to claim 2 wherein said retaining and venting means comprises a petcock interposed between said conduit and said vacuum applying means, said petcock being selectively movable from a first position in which said conduit is in communication with said vacuum applying means, to a second position in which said conduit is in communication with the atmosphere, and to a third position in which said conduit is closed to order to retain a vacuum within said conduit.

6. The cabochon dop according to claim 2 further comprising means for applying pressure to said conduit to effect release of said cabochon from said sealing means.

7. The dop according to claim 2 further comprising a pump adapted to supply a vacuum force to said conduit, said pump having a pressure side and a vacuum side and means for selectively applying vacuum and pressure to said conduit.

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