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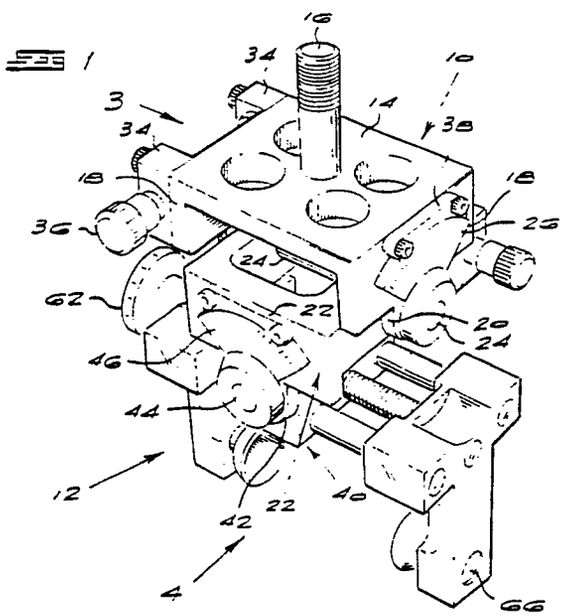
(54) Dop.

(57) The dop has a body (10) and a jaw assembly (12) that has two opposed, adjustably spaced jaws (58). The jaws (58) of the jaw assembly (12) are used to grip a gemstone (69) between them for polishing purposes. The body (10) is attached to a supporting structure and the jaws (58) can be pivoted relative to the body (10), to bring the stone (69) to the desired orientation, about two mutually orthogonal axes. Such pivotal movement is achieved using worm gear mechanisms (28,30; 48,50) which lead to accurate orientation of the stone (69).



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BACKGROUND TO THE INVENTION

This invention relates to a dop which is used to hold a gemstone during polishing thereof.

During polishing of a gemstone, the stone is subjected to fairly large forces so it is desirable to hold it firmly to ensure accuracy of the polished facets. Known dops for holding gemstones have the facility for limited angular adjustment of the stone relative to the skive which is normally used to polish it. Once a desired adjustment has been achieved, the known dops use a lock nut acting against a spring to maintain the chosen orientation of the stone. However, the forces imposed on the stone during polishing are often great enough to overcome the spring force with the result that the stone is able to move relative to the skive and this in turn can lead to inaccurate polishing.

A further disadvantage of the known dops resides in the limited adjustment that they are capable of achieving. Thus it is necessary to release the stone from the dop and to reorientate it quite regularly to polish the various facets.

SUMMARY OF THE INVENTION

A first aspect of the invention provides a dop comprising a body mountable to a supporting structure, a jaw assembly which comprises adjustably spaced, opposed jaws between which a gemstone can be gripped, and worm gear mechanisms operable to cause pivotal movement of the jaws of the jaw assembly relative to the body about at least two mutually orthogonal axes.

The dop may have Vernier-type angular scales enabling the jaws to be pivoted about the at least two mutually orthogonal yes to accurate angular orientations.

In the preferred arrangement, the jaw assembly comprises a pair of opposed jaws, a carrier between the jaws and a threaded shank which passes freely through the carrier and which engages the two jaws in threaded fashion and with threads of opposite hand so that rotation of the shank about its axis causes movement of the jaws towards or apart from one another.

Straight guides can be provided, such guides passing through the carrier and through apertures in the jaws to ensure that the jaws move in a straight line towards or apart from one another when the threaded shank is rotated.

A further feature of the preferred dop is the provision of stone retainers mounted on shafts which can be rotated to chosen rotational positions relative to the jaws and then feed relative to the jaws. The stone retainers comprise elements of dished configuration to hold a suitable material for engaging opposite points on a stone when the jaws are moved together to grip the stone between them.

A second aspect of the invention provides a dop comprising a body, a shank projecting from the body for secural to a supporting structure, a first carrier pivotable relative to the body about a first axis and a jaw assembly, the jaw assembly comprising:

a) a second carrier pivotable relative to the first carrier about a second axis at right angles to the first axis;

b) a pair of opposed jaws for gripping a gemstone between them and located on opposite sides of the second carrier; and

c) means cooperating with the second carrier for moving the jaws in a straight line towards or apart from one another; wherein pivotal movement of the first carrier relative to the body and of the second carrier relative to the first carrier is achieved by operation of worm gear mechanisms.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings in which:

Figures 1 and 2 show perspective views of a dop according to the invention;

Figure 3 shows a view on the arrow 3 in Figure 1; and

Figure 4 shows a view on the arrow 4 in Figure 1.

DESCRIPTION OF AN EMBODIMENT

The illustrated dop has a body 10 and a jaw assembly, designated generally with the numeral 12, mounted to the body. The body 10 comprises a plate 14 from which a partially threaded shank 16 projects at right angles. The shank 16 is used to fasten the dop to a supporting structure or stand, typically on a gemstone polishing table of the kind having an abrasive skive used to polish the diamond and apply the desired facets thereto. Flanges 18 also project from opposite edges of the plate 14, each flange carrying a bracket 20.

The body 10 supports a first carrier 22 forming part of the jaw assembly. The carrier 22 is located between the brackets 20. A shaft 24 passes through aligned holes in the first carrier and in the

brackets 20 and supports at one end a Vernier-type scale 26 which is fixed to the shaft. The other end of the shaft carries a worm wheel 28 meshing with a worm screw 30 forming part of a shaft 32 supported rotatably by brackets 34 fixed to a flange 18 of the body 10. The end of the shaft carries a knurled knob 36 which can be rotated manually to cause rotation of the worm screw 30 about its axis and consequent rotation of the worm wheel 28, shaft 24 and Vernier scale 26. The shaft 24 is fixed relative to the carrier 22 which therefore pivots relative to the body 10 about the axis of the shaft. The degree of pivotal movement can be accurately determined by reference to the position of the Vernier scale 26 relative to the fixed scale 38 carried by the body 10.

The first carrier 22 supports a second carrier 40 which is located between two brackets 42 of the first carrier. A shaft 44 passes through aligned holes in the brackets 42 and in the second carrier and has fixed to its one end a further Vernier-type scale 46. Fixed to the other end of the shaft 44 is a worm wheel 48 meshing with a worm screw 50 supported rotatably by brackets 52 on the first carrier 22. One end of the worm screw is fitted with a knurled knob 54. Rotation of the knob 54 causes rotation of the worm screw 50 and consequent rotation of the worm wheel, shaft 44 and Vernier scale 46. Thus the effect of such rotation of the knob 54 is pivotal movement of the second carrier 40 relative to the first carrier about the axis of the shaft 44. The angular movement is determined by reference to the scale 46 and a fixed scale 47 on the first carrier 22.

It will be noted that the shafts 24 and 44 are mutually orthogonal i.e. at right angles to one another.

Passing through the second carrier 40 is a pair of straight, round cylindrical guide shafts 56. The guide shafts are fixed to the carrier 40 and pass freely through holes formed in two opposing, identical jaws 58. Situated between the guide shafts is a threaded shank 60 which passes freely through a central hole in the carrier 40. The portions of the shank 60 on opposite sides of the carrier 40 are formed with threads of opposite hand, and these portions pass in threaded fashion through tapped holes formed through the jaws 58 between the guide shaft holes. One end of the shank 60 carries an operating knob 62. Clearly, rotation of the knob 62 results in rotation of the shank and movement of the jaws, guided by the guide shafts 56, in a straight line towards or apart from one another, depending on the direction of rotation.

Towards their free ends, the jaws 58 are formed with holes to receive short stub shafts 66 forming part of stone retainers 68. Each stone retainer 68 has a dished element 70 connected to the stub shaft 66. In use, the dished elements accommodate a suitable material 67 for engaging opposite points on a stone which is to be gripped between the jaws 58. In practice, with the material positioned in the dished elements 70, and a stone held loosely between the elements, the jaws 58 are brought together by suitable rotation of the knob 62. The stone is therefore clamped and gripped firmly between the opposing jaws and is immobilised relative to the jaws.

A suitable material 67 to be used in the elements 70 is an amalgam comprising powdered silver bound with approximately 3% to 8% by weight of mercury. The amalgam sets relatively hard after about 3 to 5 minutes, but is nevertheless sufficiently malleable to grip sharp terminal regions of the stone 69 in a firm manner. A major advantage of such an amalgam when compared to conventionally used putties is its hardness and accordingly the accuracy with which the stone is held once initially gripped. A further advantage resides in the fact that the amalgam is a good conductor of heat and will convey heat away from the stone during the abrasive polishing process, thereby reducing the chances of heat degradation of the stone.

The stub shafts 66 are fixed at a chosen rotational position relative to the jaws by means of Allen-type grub screws 72. One of the stub shafts can carry a Vernier scale enabling accurate setting of the orientation of the stone relative to the jaws 58 by comparison of the Vernier scale with a fixed scale on the relevant jaw.

From the preceding description it will be appreciated that the jaw assembly, and accordingly the stone, is capable of angular reorientations about two axes i.e. the axes of the shafts 24 and 44, which are mutually orthogonal. In each case, this angular adjustment is achieved by means of a worm gear mechanism, this is considered to be a marked improvement over conventional dops on which a lock nut acts against spring pressure, since the worm gear provides a positive rotational lock in both directions. Thus there is little chance of a valuable gemstone accidentally reorientating itself during polishing. The two axes of angular movement just described are complemented by the possible reorientation of the stub shafts 66 relative to the jaws and the possibility of angular movement of the shank 16 relative to its supporting structure i.e angular movement of the whole dop about a third axis at right angles to both the axes of the shafts 24 and 44.

With the various degrees of freedom permitted by the described dop structure, it is believed that it will be possible to polish numerous and possibly nearly all facets of a stone before any resetting of the stone in the dop is required. Thus the chances

of resetting inaccuracies are reduced.

The main components of the described dop, namely the body 10, the various brackets, the carriers and the jaws are made of a lightweight titanium alloy for strength and reduced weight. This is particularly important when the dop is of a size to take extremely large stones, since a heavy dop can prove to be most uncomfortable for a stone cutter to use for lengthy periods of time.

The described dop is suitable for holding stones of large size and may be inappropriate for rather small stones.

Claims

1.
A dop comprising a body mountable to a supporting structure, a jaw assembly which comprises adjustably spaced, opposed jaws between which a gemstone can be gripped, characterised by worm gear mechanisms (28,30; 48,50) operable to cause pivotal movement of the jaws (58) of the jaw assembly (12) relative to the body (10) about at least two mutually orthogonal axes.

2.
A dop according to claim 1 characterised by Vernier-type angular scales (26,38; 22,46) enabling the jaws (58) to be pivoted about the at least two mutually orthogonal axes to accurate angular orientations.

3.
A dop according to either one of the preceding claims characterised in that the jaw assembly (12) comprises a pair of opposed jaws (58), a carrier (40) between the jaws (58) and a threaded shank (60) which passes freely through the carrier (40) and which engages the two jaws (58) in threaded fashion and with threads of opposite hand so that rotation of the shank (60) about its axis causes movement of the jaws (58) towards or apart from one another.

4.
A dop according to claim 3 characterised by straight guides (56) passing through the carrier (40) and through apertures in the jaws (58) to ensure that the jaws (58) move in a straight line towards or apart from one another when the threaded shank (60) is rotated.

5.
A dop according to either one of claims 3 or 4 characterised by stone retainers (70) mounted on shafts (66) which can be rotated to chosen rotational positions relative to the jaws (58) and then fixed relative to the jaws (58).

6.
A dop according to claim 5 characterised in that the stone retainers (70) comprise elements of dished configuration to hold a suitable material (67) for engaging opposite points on a stone (69) when the jaws (58) are moved together to grip the stone (69) between them.

7.
A dop comprising a body and a shank projecting from the body for secural to a supporting structure characterised by a first carrier (22) pivotable relative to the body (10) about a first axis and a jaw assembly (12), the jaw assembly comprising:
a) a second carrier (40) pivotable relative to the first carrier (22) about a second axis at right angles to the first axis;
b) a pair of opposed jaws (58) for gripping a gemstone between them and located on opposite sides of the second carrier (40); and
c) means (56, 60) cooperating with the second carrier for moving the jaws (58) in a straight line towards or apart from one another;
wherein pivotal movement of the first carrier (22) relative to the body (10) and of the second carrier (40) relative to the first carrier (22) is achieved by operation of worm gear mechanisms (28,30; 48,50).

Fig 1

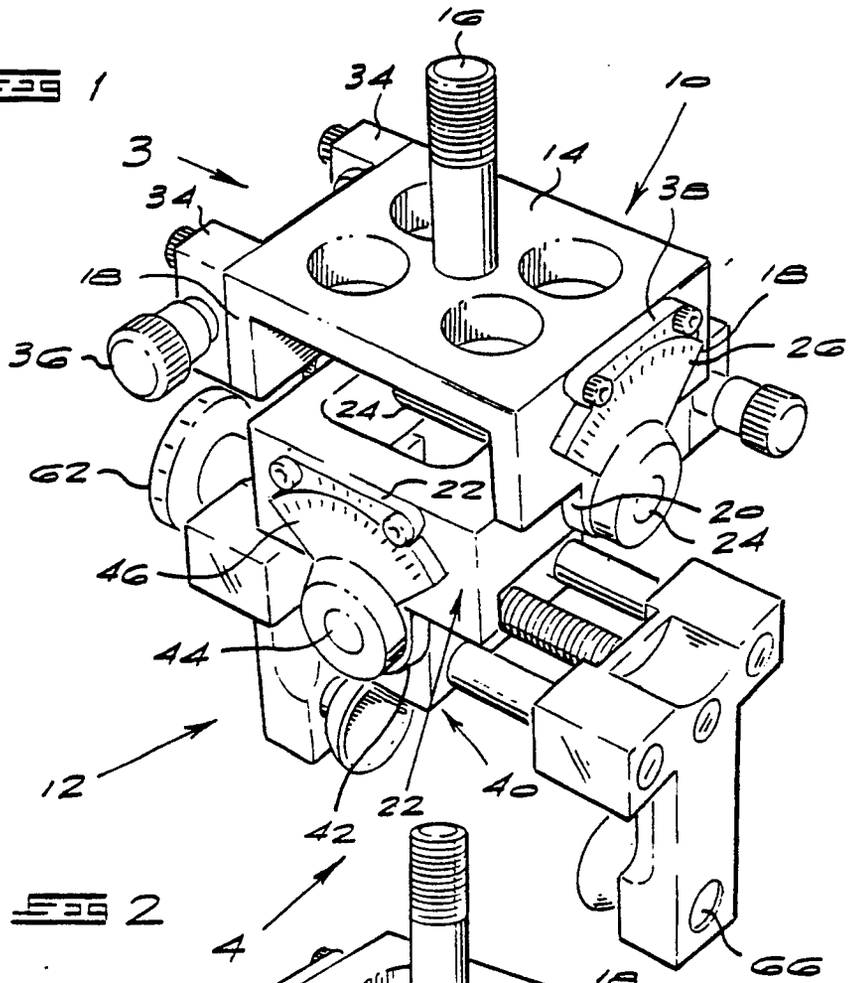
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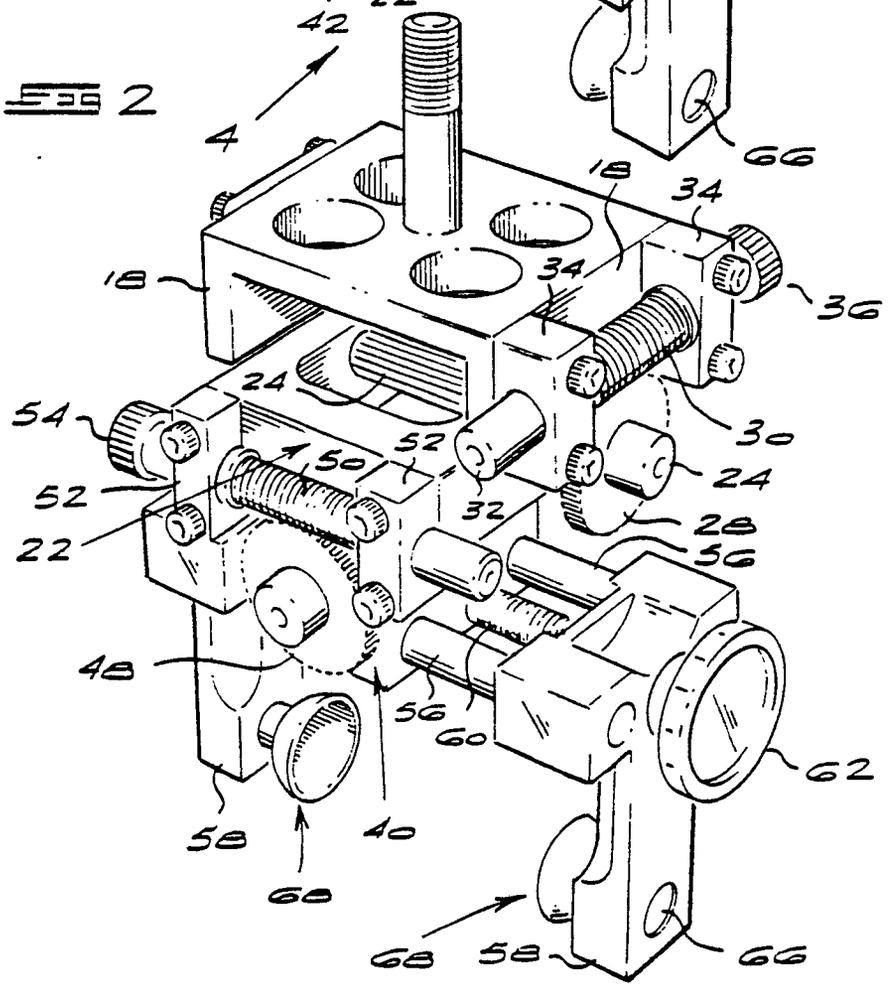
Fig 2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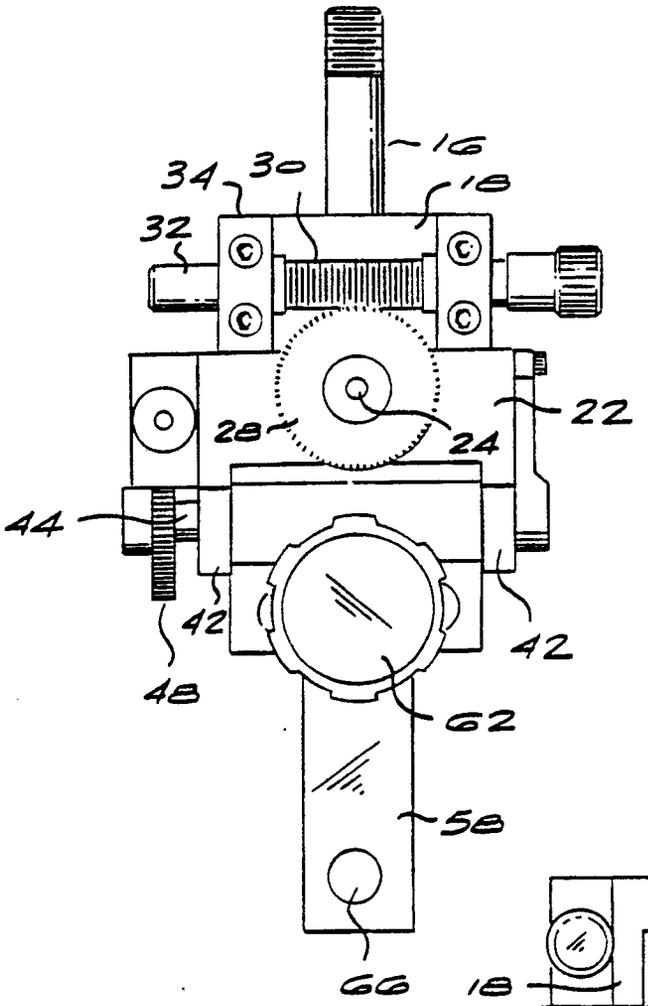
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FIG. 3

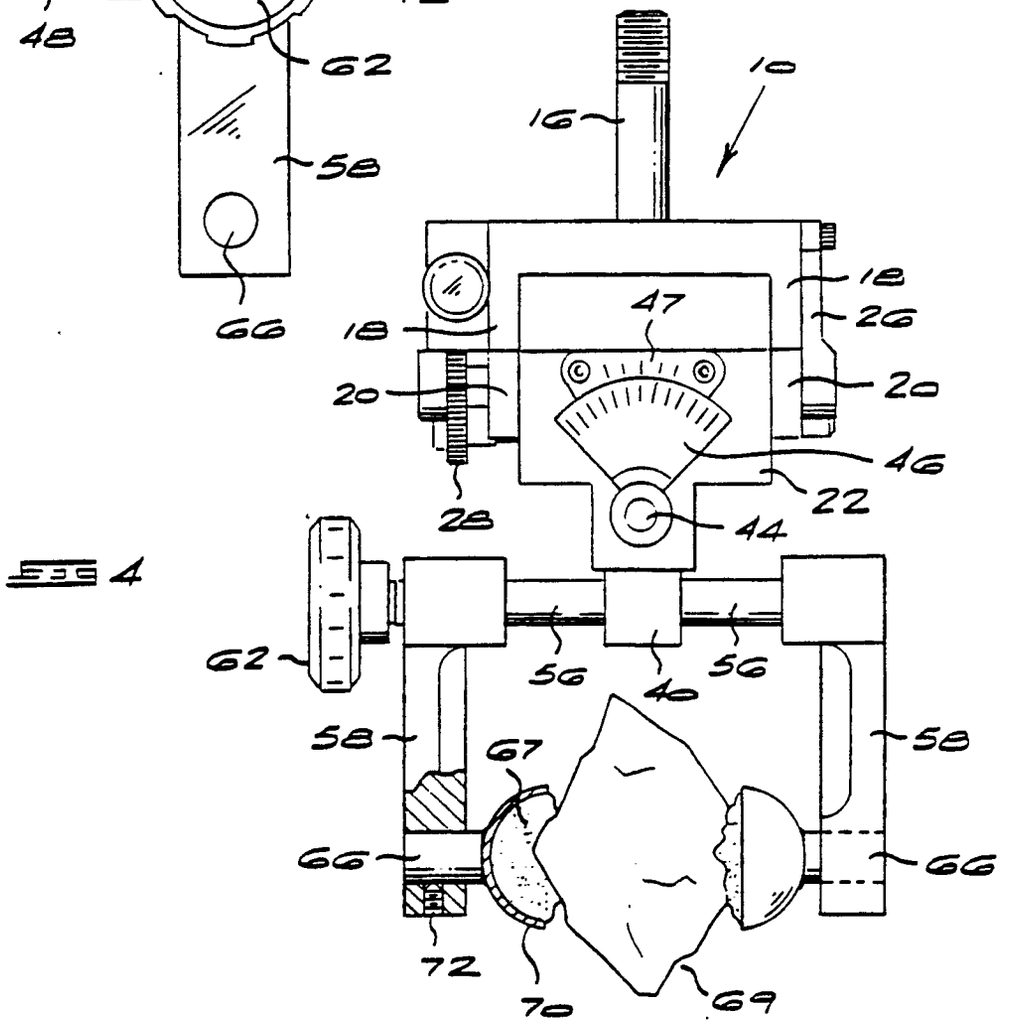
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FIG. 4