Oct. 12, 1948. A. PASTORE 2,450,984

GEM GRINDING AND POLISHING TOOL

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Fig. 1.

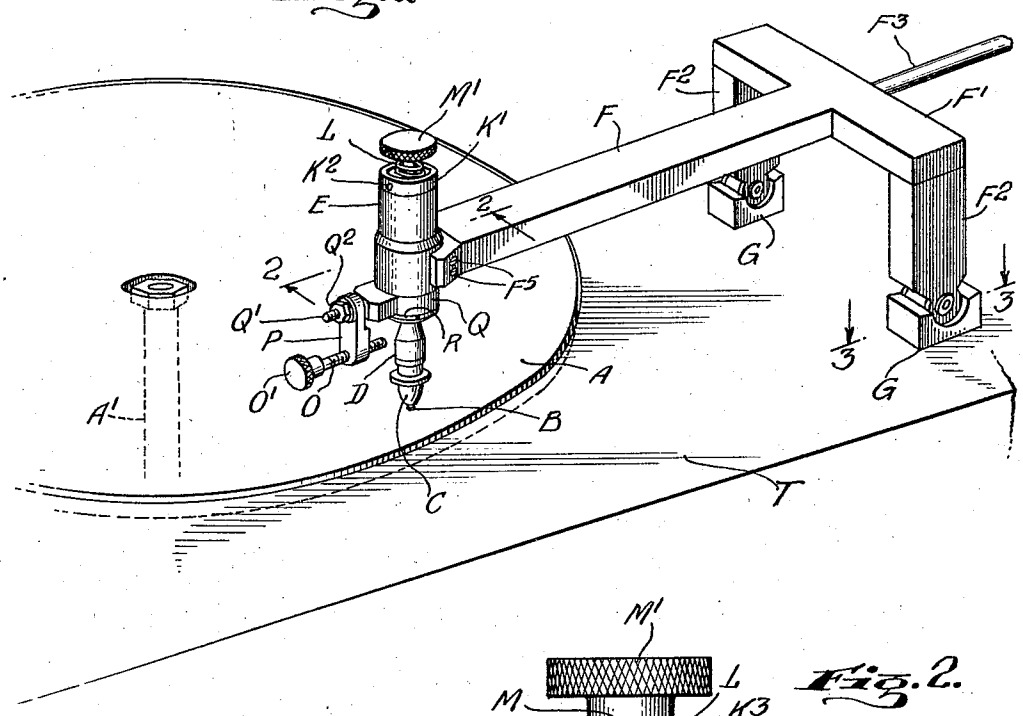


Fig. 2.

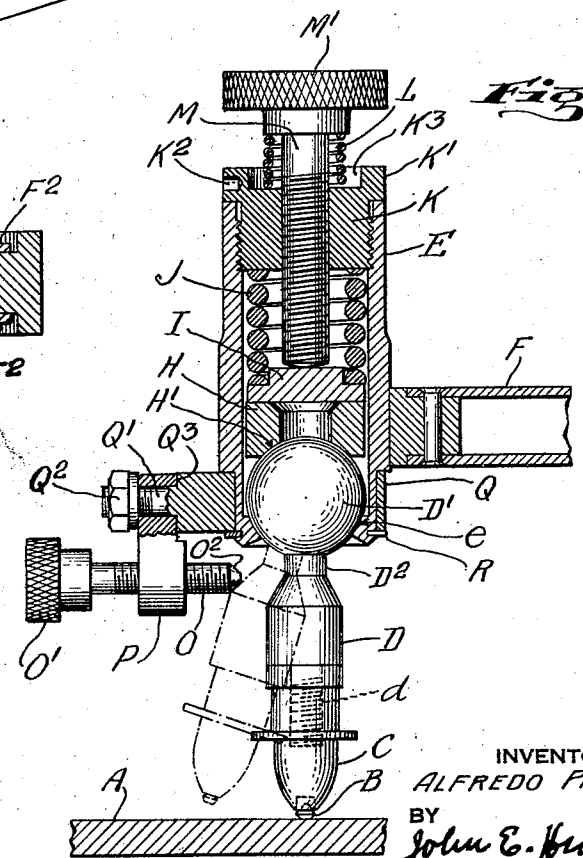
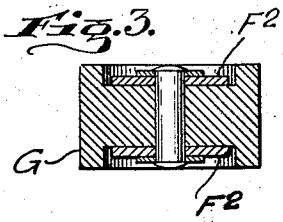


Fig. 3.



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GEM GRINDING AND POLISHING TOOL

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2 Claims. (Cl. 51—229)

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The general object of the present invention is to provide an improved grinding and polishing tool of the general type customarily used in grinding and polishing diamonds and other precious stones, all of which are hereinafter usually referred to generally as gems. In grinding and polishing gems it is, and long has been the usual practice to manually move the gems being ground or polished back and forth over the surface of a horizontal lap or abrading disc revolving about a vertical axis, while supporting the gem in such manner as to maintain parallelism between the upper side of the abrading disc and the plane of the gem surface or facet to be ground or polished.

Customarily, the means for so supporting and moving the gem comprises a horizontally disposed arm provided at one end with a depending bracket and at its other end with a depending foot or pedestal portion. The gem is detachably and adjustably secured to the bracket and the foot or pedestal portion of the arm rests on, and is horizontally movable over a stationary table having its upper surface parallel to the upper surface of the abrading disc. The gem is customarily connected to the supporting arm by means comprising a dop in which the gem is cemented or clamped, and means for detachably securing the dop to said bracket.

In grinding or polishing a gem having a plurality of facets it is essential that the planes of the different facets be accurately inclined to one another at predetermined angles, and the adjustments of the dop and its holder to properly relate the different facet planes are essential to the attainment of the desired grinding and polishing operation. Heretofore, many mechanical arrangements have been proposed for adjusting the position of the dop relative to the dop supporting and moving element, but it is the general practice today, as it has been for generations, to connect the dop to said element by a dop spindle or "stick" in the form of a rod or tube of copper, which is clamped or anchored in the bracket and which the operator manually bends to obtain the final adjustment of the dop required to bring the gem surface to be ground or polished into parallelism with the abrading surface.

The object of the present invention is to provide an adjustable, mechanical connection including a ball and socket joint, between the dop and the dop moving and supporting element. More specifically, the object of the present invention is to provide a mechanical connection between the dop and the dop moving element,

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which includes a ball and socket joint and means frictionally opposing but yielding to permit adjustments of said joint when subjected to an adjusting force of the order required to bend the previously used copper rod or stick, and which also includes means for positively locking said joint in its different adjustments. The user of my novel tool is thus enabled to rapidly effect the necessary adjustments of the dop relative to the abrading table with a high degree of accuracy and much more rapidly and readily than they can be effected by the present practice of bending or deforming the dop holding "stick."

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, its advantages, and specific objects attained with its use, reference should be had to the accompanying drawing and descriptive matter illustrating and describing a preferred embodiment of the invention.

Of the drawings:

Fig. 1 is a perspective view of gem grinding and polishing apparatus embodying the present invention;

Fig. 2 is a sectional elevation on the plane indicated by the line 2—2 of Fig. 1; and

Fig. 3 is a plan section on the line 3—3 of Fig. 1.

The apparatus shown in Fig. 1 comprises an abrading disc or lap having a horizontal upper surface and supported by a rotating vertically disposed shaft A'. The gem B which is to be ground or polished, is cemented or otherwise anchored in a dop C. The latter is detachably connected to a non-bendable dop spindle or shank element D which is connected by a ball and socket joint as hereinafter explained, to a supporting bracket E. The latter is secured to one end of an arm or beam-like member F, sometimes called a stock, through which the gem may be manually moved back and forth over the upper surface of the abrading disc A in a direction generally radial to the axis of disc rotation. In its normal operating position the arm F is substantially horizontal. The end of the member F remote from the dop holder E is formed with two spaced apart depending legs F', each pivotally connected at its lower end to a foot or shoe G having a flat bottom surface resting on and movable over the horizontal top surface of a table T, said surface being parallel to the top surface of the lap A.

The dop C may be of customary form and as

shown is formed with a threaded socket open at its upper end to receive the threaded stem *d* which depends from the body of the dop holder D. The upper end portion of the dop holder D is in the form of a ball or sphere D' connected by an integral neck D^2 of reduced cross-section to lower body portion of the dop holder D. The bracket E is a vertically disposed tubular part shown as secured to the front end of the arm F by screws F^5. The lower end of the tubular bracket E includes an internal flange *e* surrounding a passage having a cross-section which is appreciably smaller than the diameter of the ball portion D' of the dop holder, and only slightly larger than the diameter of the lower body portion of the dop holder part D, but is substantially larger than the diameter of the neck portion D^2.

The upper surface of the flange *e* is preferably in the form of an annular zone portion of a sphere, and forms a seat for a lower annular portion of the surface of the globular upper end portion D^2 of the dop holder D. An upper annular zone portion of the surface of the globular part D^2 is in engagement with a preferably spherical annular bearing surface H' of a bearing member H. The member H is in the form of a thick washer or disc which is formed with a central aperture and has its underside recessed to provide the annular bearing surface H'. The member H is longitudinally movable in the member E, but its external diameter is such that it fits snugly in the cylindrical bore of the bracket E. The upper end of the bearing member H engages and supports a disc-like follower body I which serves as an abutment for the lower end of a helical compression spring J.

The spring J acts between the member I and an upper crosshead or abutment K, subjecting the globular upper end portion D' of the dop holder to a yielding action. The abutment K is circular in cross-section and comprises an externally threaded portion screwed into the internally threaded upper end portion of the bore of the member E. The member K is provided at its upper end with an outwardly extending flange K' which in the assembled condition of the apparatus is in snug engagement with the upper end of the member E. As shown, one or more radial holes K^2 are formed in the flange K' for engagement of the member K by a spanner wrench or other implement for rotating the member. The member K is formed with a central passage having an internally threaded lower end portion and having its upper end portion radially enlarged to form a spring chamber K^3. The latter receives the lower portion of a helical spring L which surrounds an externally threaded thrust rod M which is screwed through the internally threaded lower end of the passage through the member K. The rod M is provided at its upper end with an enlarger knurled head M'. The spring L is compressed between the head M' and the annular shoulder portion at the lower end of the spring chamber K^3 in the member K.

With the dop holder D connected to the dop carrying arm F, as illustrated and described, the dop may be adjusted angularly about any axis passing horizontally through the center of the globular head D' of the dop holder D by manual pressure applied to the dop. In practice, the spring characteristic of the spring J acting to frictionally grip the dop head D' between the flange *e* and the bearing member I, may be proportioned and applied to offer about the same yielding resistance to the angular adjustment of the dop holder D about the center of the globular head D' as is required to bend or deform the flexible copper dop holder shank or stick heretofore in common use in gem grinding and polishing apparatus. Furthermore, said resistance is yielding and approximately constant and there is relatively little tendency to effect unintentional over-adjustments. When the dop is adjusted into the required position, it may be locked in that position by rotating the threaded rod M as required to establish a locking or positive clamping contact pressure between the ball portion D' of the member D and the bearing surface *e* and H'.

To facilitate fine adjustments of the dop holder D relative to the bracket E, the bracket E may advantageously be provided, in some cases, with an adjustable gauge or stop element O. As shown, the gauge or stop device O is in the form of a threaded rod having a knurled head O' at its outer end and extending through a threaded opening formed in a supporting part P. As shown, the supporting part P is in the form of a bar having the threaded passage for the element O formed in a lower portion, and having a parallel passage formed in its upper portion. Said parallel passage receives a pivot Q' carried by a ring shaped member Q which surrounds a reduced lower end portion of the member E and is held against axial displacement by a split clamping ring R. The shaft Q' extends radially away from the outer side of the member Q and has an outer end portion of reduced cross-section which is externally threaded to receive a clamping nut Q^2 by which the bar P may be clamped against a shoulder portion Q^3 of the member Q at the inner end of the pivot.

The bar P may be secured to the ring member Q in any desired angular adjustment about the radial shaft Q', and the ring member Q may be rotated about the axis of the bracket E at the will of the operator. By adjusting the member O in its threaded seat in the member P and by adjusting the bar P about the axis of the pivot Q' and by adjusting the ring member angularly about the axis of the bracket, the end surface O^2 of the member O can be adjusted into the position in which it will be in engagement with the dop holder D in any desired adjustment of the bracket E. In adjusting the dop holder, the operator is thus able to visually observe and appraise extremely small distances between the surface O^2 of the gauge or stop O and the adjacent surface of the dop holder D. The ability to rotate the ring member Q about the axis of the bracket E and thus vary the distance between the end surface O^2 and the dop holder D facilitates a determination of the angular position of the member Q relative to the member E in which the distance between the surface O^2 and the surface of the dop holder is at a minimum.

With the dop holder D properly adjusted and locked in the bracket E, the arm F may be manually grasped by the operator and moved horizontally over the lap A and adjacent table T in the customary manner. The invention is characterized particularly by the ease and accuracy with which the dop holder can be adjusted and readjusted in the bracket E. The flat bottom shoes G, pivotally connected to the arm F as shown and described, contribute to the ease of operation of the device and to the accurate initial engagement position of the gem being polished with the lap A at the beginning of a gem grinding or polishing operation, and follow-

ing each elevation of the gem above the lap A for inspection during the course of a grinding or polishing operation.

While in accordance with the provisions of the statutes, I have illustrated and described the best form of embodiment of my invention now known to me, it will be apparent to those skilled in the art that changes may be made in the form of the apparatus disclosed without departing from the spirit of my invention as set forth in the appended claims, and that in some cases certain features of my invention may be used to advantage without a corresponding use of other features.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A gem grinding and polishing device comprising in combination, a dop holder having a spherical head portion at its upper end and an adjacent neck portion, a supporting member formed with a chamber in which said head portion is loosely received and having an annular portion at the lower end of said chamber with an internal diameter larger than the diameter of said neck and smaller than the diameter of said head portion, and forming a seat for the underside of the latter, a bearing member in said chamber above said head portion and movable toward and away from said seat, resilient means mounted in said holder and acting between the latter and said bearing member to press the latter against said head portion and thereby yieldingly clamp

said head portion between said seat and bearing member, and clamping means mounted in said supporting member and adjustable to increase the pressure with which said head portion is pressed against said lower annular seat so as to positively clamp said head portion against movement relative to said holder.

2. A device as specified in claim 1, in which said resilient means comprises a spring abutment member mounted in the upper end of said chamber and a helical spring acting between said abutment member and said bearing member and in which said abutment member is formed with a central, internally threaded passage, and in which said clamping means comprises a threaded rod extending through said central passage and in threaded engagement with said abutment member and having its lower end in engagement with said bearing member.

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