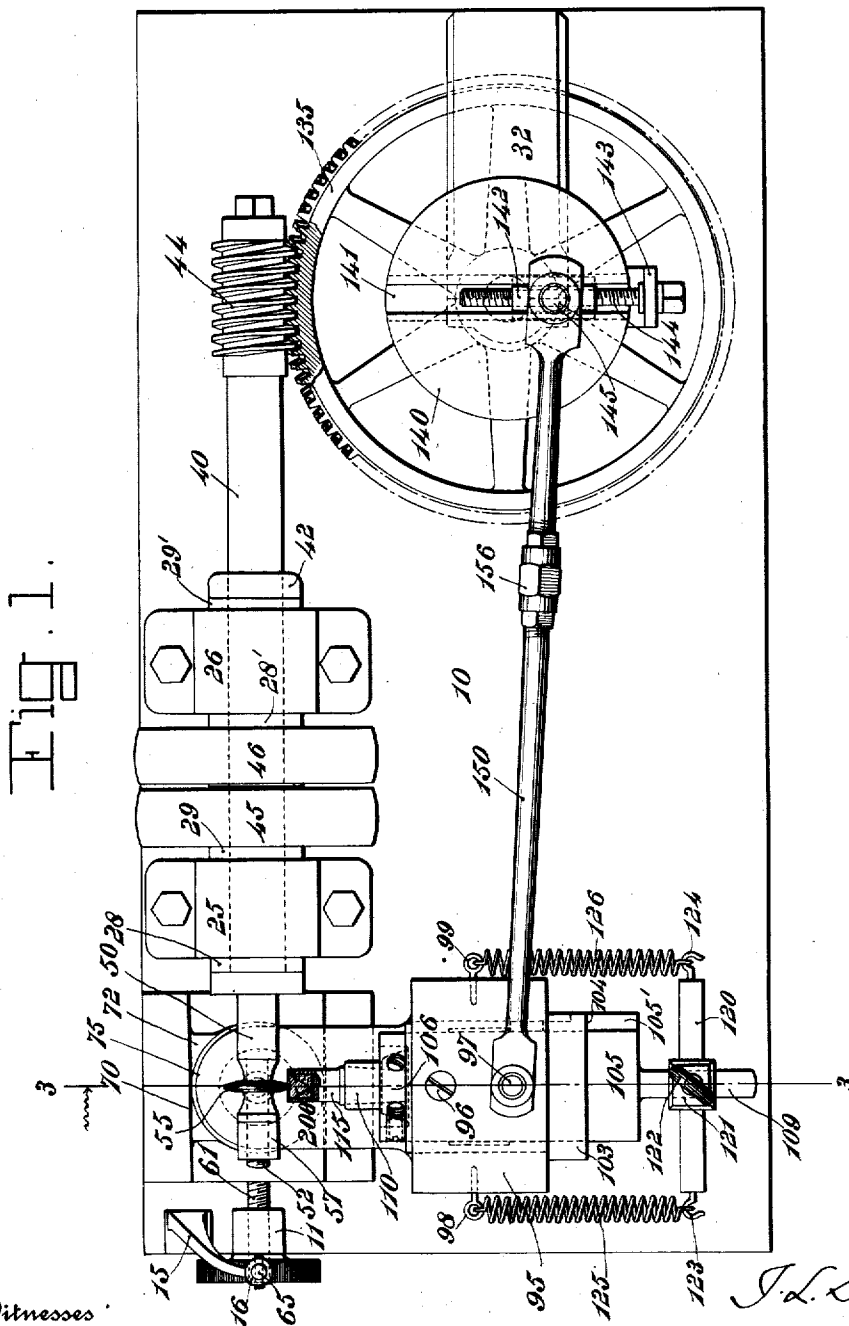


J. L. GONARD.
MACHINE FOR CUTTING CONCAVE FACETS IN CUT DIAMONDS.
APPLICATION FILED JULY 20, 1911.

1,023,513.

Patented Apr. 16, 1912.

4 SHEETS—SHEET 1.



Witnesses
Harry King
Mary L. Brooks

By

J. L. Gonard

Inventor

Attorney

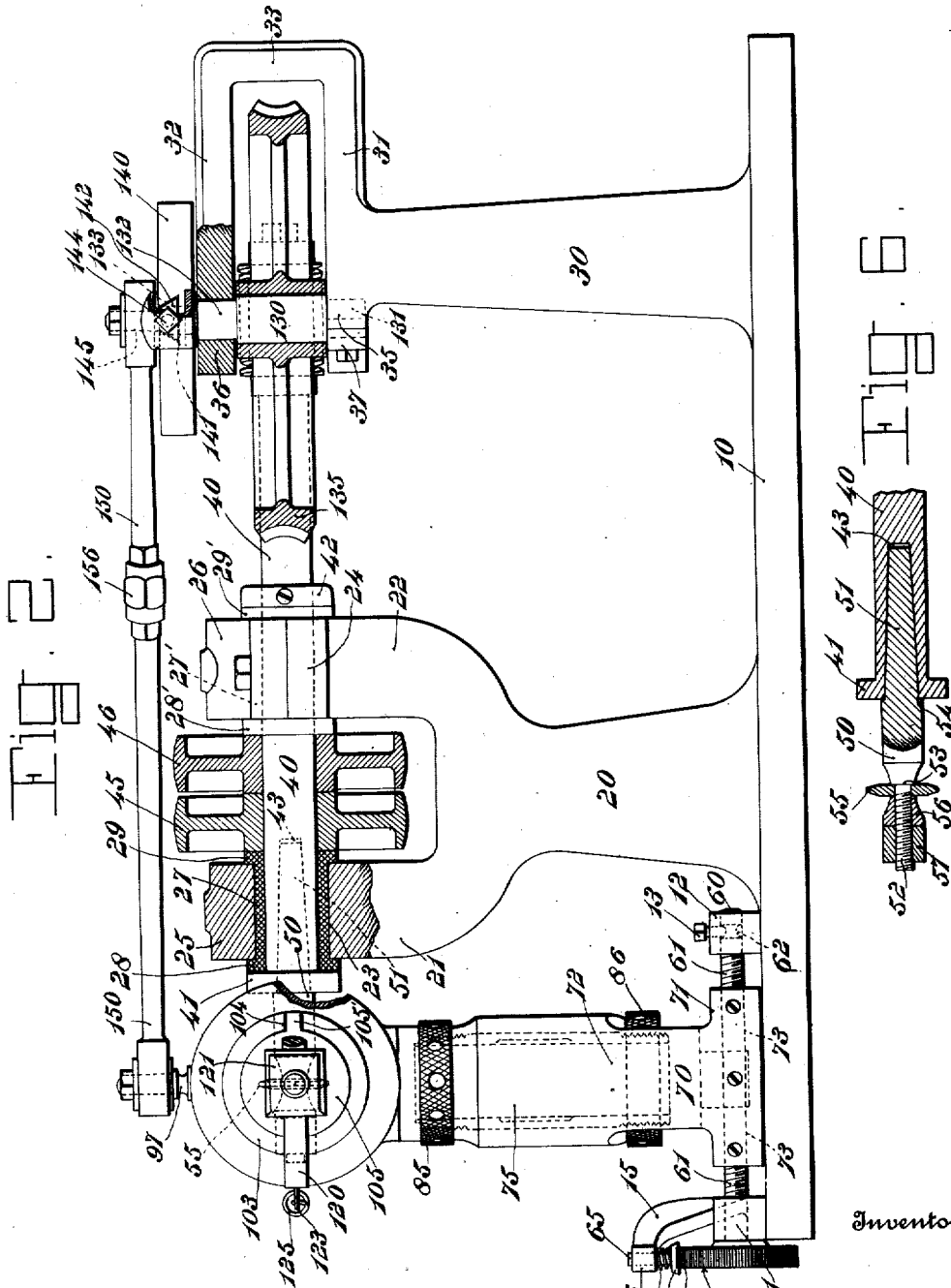
J. L. GONARD.

MACHINE FOR CUTTING CONCAVE FACETS IN CUT DIAMONDS.
APPLICATION FILED JULY 20, 1911.

1,023,513.

Patented Apr. 16, 1912.

4 SHEETS-SHEET 2.



Witnesses

Harry King

Harry Y. Brooks

384

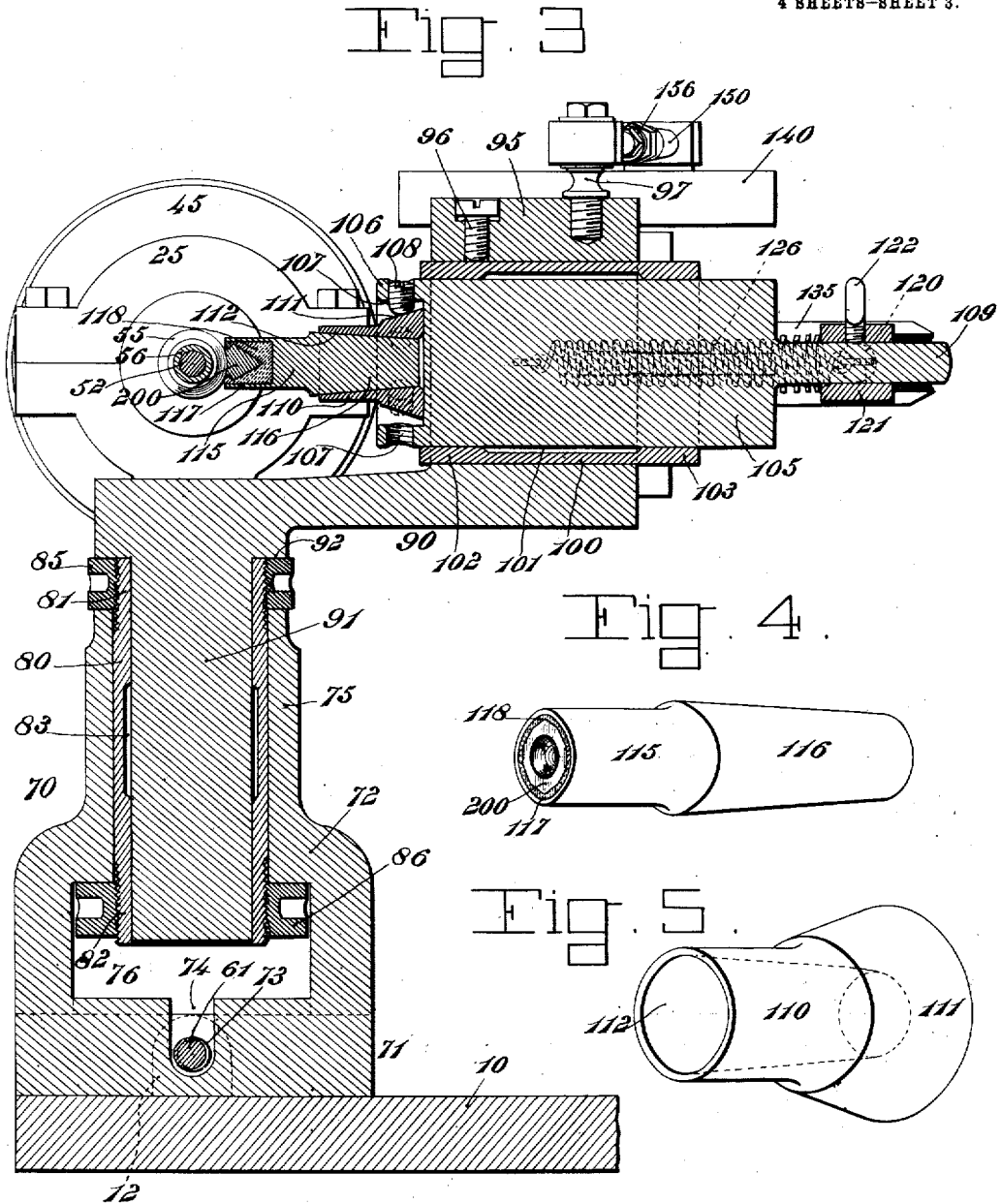
J. L. Gonard
H. E. Lomes, Attorney

J. L. GONARD.
MACHINE FOR CUTTING CONCAVE FACETS IN CUT DIAMONDS.
APPLICATION FILED JULY 20, 1911.

1,023,513.

Patented Apr. 16, 1912.

4 SHEETS—SHEET 3.



Witnesses

Harry King
Mary Y. Brooks

Inventor

J. L. Gonard

By

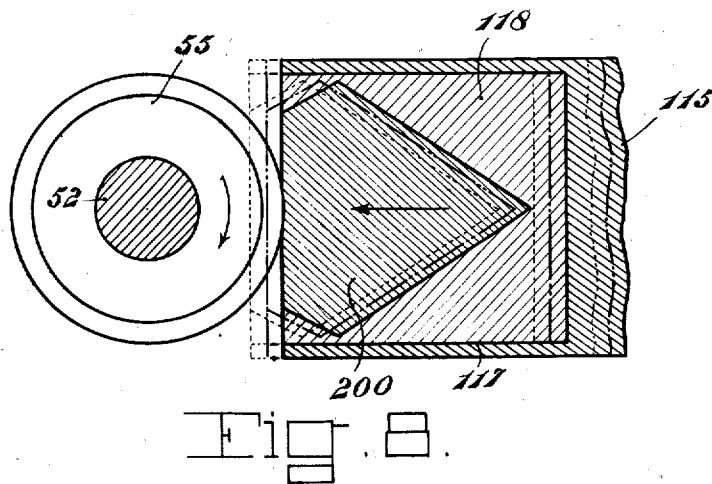
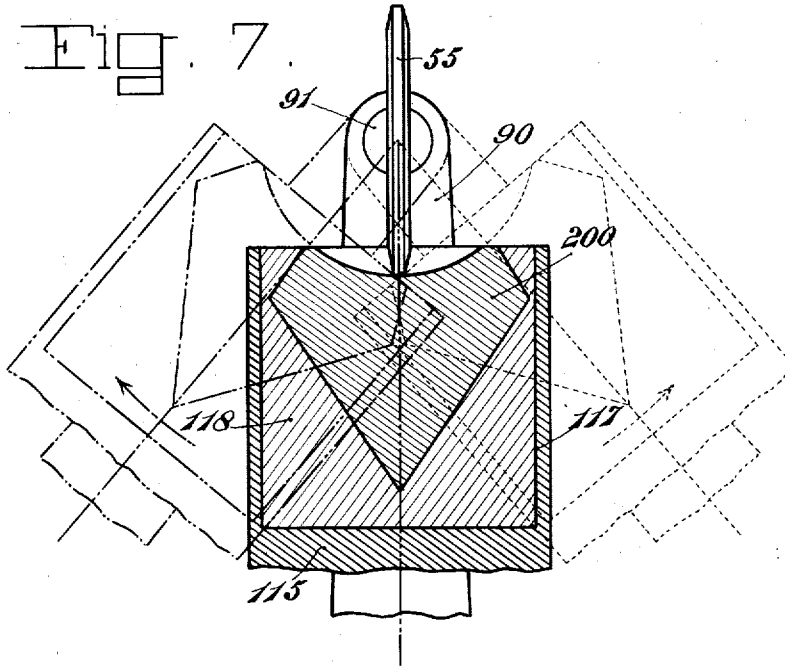
F. C. Jones
Attorney

J. L. GONARD.
MACHINE FOR CUTTING CONCAVE FACETS IN CUT DIAMONDS.
APPLICATION FILED JULY 20, 1911.

1,023,513.

Patented Apr. 16, 1912.

4 SHEETS—SHEET 4.



Witnesses

Harry King
Harry L. Brooks

Inventor

J. L. Gonard

By

F. C. Somes

Attorney

UNITED STATES PATENT OFFICE.

JEAN LOUIS GONARD, OF COYTESVILLE, NEW JERSEY.

MACHINE FOR CUTTING CONCAVE FACETS IN CUT DIAMONDS.

1,023,513.

Specification of Letters Patent.

Patented Apr. 16, 1912.

Application filed July 20, 1911. Serial No. 639,697.

To all whom it may concern:

Be it known that I, JEAN LOUIS GONARD, a citizen of the United States of America, and a resident of Coytesville, in the county of Bergen, in the State of New Jersey, have invented certain new and useful Improvements in Machines for Cutting Concave Facets in Cut Diamonds, whereof the following is a specification.

This invention relates to a machine for cutting in diamonds concave facets such as those described in my patent of United States No. 946,939 dated January 18, 1910.

The principal object of the invention is to provide a machine for the cutting of concave facets in cut diamonds.

Another object is to provide a machine which is adaptable to the cutting of concave facets of different sizes on diamonds of different sizes.

Another object of the invention is to secure great nicety of relative adjustment between the diamond holding mechanism and the mechanism for cutting concave facets thereon.

Another object of the invention is to provide means for the convenient and accurate regulation of the throw of the diamond with reference to the arc of the cut.

Another object of the invention is to so construct certain parts or elements of the machine that they can be removed and replaced with exactly the same longitudinal adjustment and also with the same rotary adjustment.

Other objects accomplished will appear in the following description.

Figure 1 of the accompanying drawings represents a plan of a diamond cutting machine embodying the preferred form of this invention. Fig. 2 represents a front elevation thereof, partly in section. Fig. 3 represents on a larger scale a transverse section on line 3—3 of Fig. 1. Fig. 4 represents on a larger scale a perspective view of the preferred form of dop. Fig. 5 represents on a larger scale a perspective view of a holder for said dop. Fig. 6 represents a transverse section of one end of the cutter shaft, the cutter spindle therein and the cutter on said spindle. Fig. 7 represents an enlarged horizontal section of the dop containing the diamond and a plan of the cutter operating thereon, showing in dotted lines the oscillation of the dop with reference to the cutter for effecting the arc shaped con-

tour of the concave facet. Fig. 8 represents on an enlarged scale a vertical section of a dop containing the diamond and a side elevation of the cutter engaging the diamond, showing in full lines the position of the diamond with reference to the periphery of the cutter at the beginning of the cutting operation and in dotted lines different positions of the dop and diamond with reference to the cutter when the work holder is at right angles to the cutter shaft and the cutter is in the deepest part of the cut.

The same reference numbers indicate corresponding parts in all the figures, round numbers being used for the principal elements and intermediate numbers for the subordinate features thereof.

A base or bed plate 10 supports standards 20 and 30, the standard 20 being disposed at the left of the transverse center of said plate near the rear side thereof and the standard 30 near the right hand end of said plate in front of the longitudinal center thereof. The bed plate 10 is also provided with upright lugs 11 and 12 near the left rear corner of the plate in alinement with each other and with the standards 20 and 30, with an upright angular bracket 15 having a vertical eye 16 at its upper end in a vertical plane above and just outside the lug 11.

The upright standard 20 is forked vertically in its upper part, comprising arms 21 and 22. These arms are provided at their upper ends respectively with shaft bearings 23 and 24, which may be of any suitable form. In the form shown they are covered by cap plates 25 and 26 respectively. The bearing 23 is preferably provided with an antifriction bushing 27 composed of Bab-bitt metal or equivalent soft metal. This bushing 27 is provided at its ends with flanges 28 and 29 which engage the outer faces of the arm 21. The bearing 24 is preferably provided with a similar bushing 27' having flanges 28' and 29' which fit against the outer faces of the arm 22.

The standard 30 is horizontally forked at its upper end, comprising a horizontal arm 31 united with the body of the standard and a horizontal arm 32 disposed above the arm 31 and united therewith at one end by the vertical web 33, forming a U-shaped frame. This frame is provided near its open end with a vertical shaft bearing 35 in the arm 31 and with a vertical shaft bearing 36 in the arm 32, these bearings being in

vertical alinement. Such shaft bearings may be of any suitable construction. In the form shown the bearing 35 in the arm 31 is closed by a cap plate 37 and the bearing in the arm 32 is integral.

A cutter shaft 40 is supported lengthwise of the machine in the bearings 23 and 24 of the standard 20. This shaft is provided at its outer end with a flange 41 which turns against the outer face of the flange 28 of the bushing 27 and with an adjustable collar 42 just outside the bearing 24 of the arm 22. The flange 41 and collar 42 serve to hold the shaft against endwise play and the soft metal flanges 23 and 29 prevent friction. A similar bushing may be inserted in the bearing 24. The cutter shaft is provided at one end with a tapered socket 43 and near its opposite end with a worm 44. Driving and loose pulleys 45 and 46 are disposed on the shaft 40 in the fork of the standard 20, the hub of the driving pulley resting against the soft metal flange 29 of the bushing 27 and a spacing collar 47 being disposed on the shaft 40 between the hub of the loose pulley 46 and the inner face of the arm 22.

A cutter spindle 50, carrying a cutter 55, is secured to the outer end of the cutter shaft 40. This cutter spindle may be of any suitable construction. In the form shown it comprises a cylindrical body or boss provided at one end with a tapered shank 51 and at its opposite end with a screw threaded tang 52 forming shoulders 53 and 54. The tapered shank 51 is adapted to fit tightly in the tapered socket 43 of said shaft 40 and the shoulder 53 rests against the outer end of said shaft when said shank is in position in said socket. Conical clamping collars or nuts 56 and 57 are disposed on the tang 52 with their smaller ends toward each other. The cutter 55 is disposed on said tang between said conical collars or nuts and a set nut 58 at the outer end of said tang operates to clamp the cutter firmly between said collars, the collar 57 abutting against the shoulder 53. The cutter 55 which may be constructed of carborundum or any suitable material, is preferably in the form of a disk composed preferably of cast iron. Cast iron being more or less porous, diamond dust lodges in the pores of the iron and causes the cutter to operate on the principle of diamond cut diamond.

A shaft 60 is journaled at its opposite ends in bearings of the upright lugs 11 and 12 and provided between said bearings with screw threads 61. The journal at one end of this shaft has an annular groove 62 which is engaged by the holding screw 13 of the lug 12 to prevent endwise movement of said shaft. Any suitable means may be employed for this purpose. A hand wheel 63 is disposed on the outer end of the shaft 60 outside the lug 11 for operating said shaft.

This wheel is provided with a notched or toothed periphery 64. A sliding stud 65 disposed in the vertical bearing 16 of the bracket 15 is provided at its lower end with a tooth 66 which engages the toothed periphery of the hand wheel, and constitutes therewith a locking device for the shaft 60. The toothed stud 65 yields automatically to permit the operation of the shaft when the hand wheel is actuated by the attendant. Any suitable means may be employed for this purpose.

A sliding carriage 70 is disposed on the base plate 10 between the upright lugs 11 and 12. This carriage consists of a base 71 preferably rectangular in form, a bridge 72 connected with said base and a tubular standard 75 extending upward from said bridge. Any suitable means may be employed for moving the carriage in a direction parallel with the cutter shaft and holding it in fixed position at any point between said lugs. The means shown for this purpose is the screw shaft 60 which is passed through and engages the threads of a screw hole 73 in the base 71. The bridge 72 forms a chamber 76 which is open at opposite sides of the standard and the base 71 is preferably provided with a central slot 74 opening into said chamber.

A bushing 80 somewhat longer than the tubular portion of the standard 75 is disposed therein and projects at opposite ends thereof. The upper projecting end 81 is screw threaded and provided with a milled nut 85 and the lower projecting end 82 is screw threaded and provided with a milled nut 86, the latter being disposed in the open chamber 76 and projecting at opposite sides of the tubular standard where it can be engaged by the thumb and finger. The milled nut 85 rests on the upper end of the tubular standard 75 and serves as a means for adjusting vertically the bushing 80 and the nut 86 at the lower end thereof serves as a set nut to hold said bushing against endwise play. The bushing is preferably provided with an annular recess 83 in its central portion forming bearings at the opposite ends in lieu of a continuous bearing throughout its length.

A swiveled work support 90 is carried in the carriage 70. When constructed as shown this support comprises a horizontal arm, a vertical spindle 91 dependent from one end thereof and a horizontal open socket or sleeve 95 at the opposite end on the upper side thereof. The spindle 91, which is preferably tapered somewhat, is journaled in the tubular standard 75 or in the bushing 80 thereof and a shoulder 92 formed near the upper end of said spindle rests on the upper end of the bushing 80. The horizontal sleeve 95 is provided with a countersunk lateral set screw 96, with a pitman stud 97 in

its upper side and with eyes 98 and 99 disposed on opposite sides. A bushing 100 somewhat longer than the sleeve 95 is adjustable therein and held in adjusted position by means of the set screw 96 or other suitable means. This bushing has preferably a central recess 101 forming end bearings 102 and 103 in lieu of a continuous bearing, and it also has a longitudinal slot 104.

A sliding mandrel 105 is disposed in the sleeve 95 preferably in the bushing 100 thereof. This mandrel has a recess at its inner end forming a flange 106 which constitutes an extension of the periphery of the mandrel. This flange is provided with three or more lateral screw holes 107 and with clamping screws 108 disposed therein. These clamping screws are preferably rounded at their inner ends. The outer end of the sliding mandrel is provided with an axial projecting spindle 109. The mandrel is provided with a rib or spline 105' which engages the slot 104 of the bushing or bore 100, whereby turning of the mandrel is prevented.

A dop holder 110 is clamped to the sliding mandrel at the inner end thereof. This dop holder has a conical base 111 which is set against the end face of said mandrel and tightly clamped thereto by means of the clamping screws 108 engaging said conical base. This dop holder is provided with a flaring socket 112.

A dop 115 is supported in the dop holder 110. As shown this dop is provided with a tapered shank 116 which fits closely in the flaring socket of said dop holder. The outer end of the dop is provided with the usual recess 117 for receiving a cement filling 118 in which the diamond 200 is embedded.

Means are provided for automatically forcing the sliding mandrel 105 inward to hold the diamond in contact under proper tension or pressure with the cutter 55. Any suitable means may be employed for this purpose. The means shown include a tension bar 120 adjustable on the spindle 109. This bar is provided with a central eye 121 and is clamped to the spindle in adjusted position by means of a set screw 122. The bar is provided at its outer ends with hooks 123 and 124 and contractile spiral springs 125 and 126 are connected at their opposite ends to said hooks and to the eyes 98 and 99 of the socket 95. These springs operate to push the mandrel inward toward the cutter.

Means are provided for oscillating the work holder horizontally during the cutting operation to secure the lateral arc or curvature in the concave facet. Any suitable means may be employed for this purpose. The means shown comprise a short vertical shaft 130 journaled in the bearings 35 and 36 in the horizontal fork of the standard 30.

The journals 131 and 132 of said shaft are smaller in diameter than the diameter of the body of the shaft. The shaft is provided at its upper end with an extension 133 which is of smaller diameter than the journal 132. A horizontal worm wheel 135 is disposed on the shaft 130 in the horizontal fork aforesaid. This worm wheel is engaged by the worm 44 of the cutter shaft 40, and it is preferably provided with arc shaped teeth adapted to closely engage the spirals of said worm so as to avoid play or lost motion.

A crank wheel 140 is fixed on the extension 133 of the shaft 130 above the horizontal arm 32. This crank wheel is provided with a wrist pin 145 of any suitable form. The wrist pin is preferably adjustable in the crank wheel by any suitable means. The means shown comprise a diametrical guideway 141 preferably of dovetail form in cross section, a slide 142 movable in said guideway and carrying said wrist pin, and means for adjusting said slide. The adjusting means may consist of an angular bracket 143 disposed on said crank wheel opposite one end of said guideway and an adjusting screw 144 passed through and turning freely in the flange of said bracket and engaging a screw threaded hole in said slide.

A pitman 150 is connected at one end with the wrist pin 145 of said crank wheel and at its opposite end with the pitman stud 97 in the socket 95 of the swiveled work support 90. This pitman is provided with common adjusting means as 156.

The operation of this machine will now be described.

A diamond 200, which has been cut in plane facets, is inserted in the dop 115 and secured therein in the usual manner. The dop is inserted in the dop holder 110, the work holder 90 being adjusted at a proper height and angle to center the diamond with reference to the cutter 55. The bar 120 is so adjusted that the springs 125 and 126 will have the proper tension to hold the diamond in contact with the cutter under the desired pressure. Motion is then imparted to the cutter shaft 40 through the driving pulley 45 and the cutter 55 is rotated in contact with the facet of the diamond to be cut in concave form. Diamond dust and oil are supplied to the cutter in the usual manner. The rotation of the cutter shaft causes the work holder to oscillate in unison with the rotation of the cutter through the intermediate mechanism hereinbefore described. The forward pressure of the mandrel and the lateral oscillation thereof cause the cutter to grind out a concave concavity in the facet. The length of the cavity may be determined by adjustment of the carriage 70 and the width or lateral curvature thereof by regulating the arc of oscillation of the work holder through the adjustment of the wrist

pin 145 or otherwise: Cutters of various sizes may be employed.

I claim as my invention:

1. The combination of a rotary shaft, a cutter thereon, a swiveled work holder having its center of oscillation radial to said cutter, a diamond dop supported in said work holder, means for pushing said dop toward said cutter to hold the diamond in contact therewith, and intermediate mechanism between said cutter shaft and said work holder for oscillating the latter in unison with the former.
2. The combination of a rotary shaft, a disk shaped cutter thereon, a swiveled work holder, a sliding carriage for supporting said work holder adjustable parallel with said cutter shaft, a diamond dop supported in said work holder, means for pushing said dop toward said cutter to hold the diamond in contact therewith, and intermediate mechanism between said cutter shaft and said work holder for oscillating the latter in unison with the former.
3. The combination of a rotary shaft provided with a cutter and with a worm, a swiveled work holder, a diamond dop supported in said work holder, means for pushing said diamond dop toward said cutter to hold the diamond in contact therewith, a worm wheel meshing with said worm, a crank wheel on the shaft of said worm wheel, and a pitman connecting the wrist pin of the crank wheel with a stud on the work holder.
4. The combination of a rotary cutter shaft provided with a cutter, a carriage adjustable parallel with said shaft and having a tubular bearing radially disposed relative to said cutter, a swiveled work support comprising a spindle journaled in said bearing, an arm at right angles to said spindle and a sleeve on said arm, means for adjusting said spindle, a sliding mandrel in said sleeve, a dop carried by said mandrel, and means for oscillating said work support.
5. The combination of a rotary shaft provided with a cutter, a carriage adjustable parallel with said shaft and having a tubular bearing radially disposed relative to said cutter, a swiveled work support comprising a spindle journaled in said bearing, an arm integral with said spindle at right angles thereto, a sleeve on said arm, a sliding mandrel in said sleeve, a dop carried by said mandrel, means for oscillating said work support and means for pushing said mandrel toward said cutter to hold the work in contact therewith.
6. The combination of a rotary cutter shaft provided with a cutter, a carriage adjustable parallel with said shaft and having a tubular bearing radially disposed relative to said cutter, a bushing disposed in said bearing, means for adjusting said bushing, a swiveled work support comprising a spindle journaled in said bushing and having a shoulder engaging the end thereof, an arm at right angles to said spindle, a sleeve on said arm, a sliding mandrel in said sleeve, a dop carried by said mandrel, and means for oscillating said work support.
7. The combination of a rotary shaft provided with a cutter, a carriage adjustable parallel with said shaft and having a tubular bearing radially disposed relative to said cutter, a swiveled work support comprising a spindle journaled in said bearing, an arm integral with said spindle at right angles thereto, a sleeve on said arm, a bushing disposed in said sleeve, a sliding mandrel in said sleeve, and a dop carried by said mandrel.
8. A work holder comprising an arm provided with a pivot spindle integral with said arm and dependent therefrom at one end thereof and a sleeve in the upper side of said arm at the other end thereof, a sliding mandrel disposed in said sleeve, and a dop carried by said mandrel.
9. In a work holder the combination of a sleeve, a sliding mandrel disposed therein and provided with an axial tang at one end and with a work carrier at the other end, a tension slide bar adjustable on said tang, and springs connecting said bar with said sleeve.
10. In a work holder the combination of a sleeve, a sliding mandrel disposed therein and provided with a projecting peripheral flange having lateral set screws, a dop holder having a conical base engaged by said set screws and provided with a socket, and a work dop supported in said socket.
11. A work holding device comprising a dop holder having an exteriorly tapered base and a socket interiorly flared in the same direction as the exterior taper of the base, a dop having a tapered body adapted to fit said socket and a recess for the work, and clamping means engaging the exteriorly tapered base.
12. A work holding device comprising a mandrel having an end flange forming an end recess, a dop holder having an exteriorly tapered base and a socket interiorly flared in the same direction as the exterior taper of the base, a dop having a tapered body adapted to fit said socket and a recess for the work, and clamping screws in said flange engaging said tapered base.

JEAN LOUIS GONARD.

Witnesses:

GEO. W. PRICE,
EDW. H. RANGES.