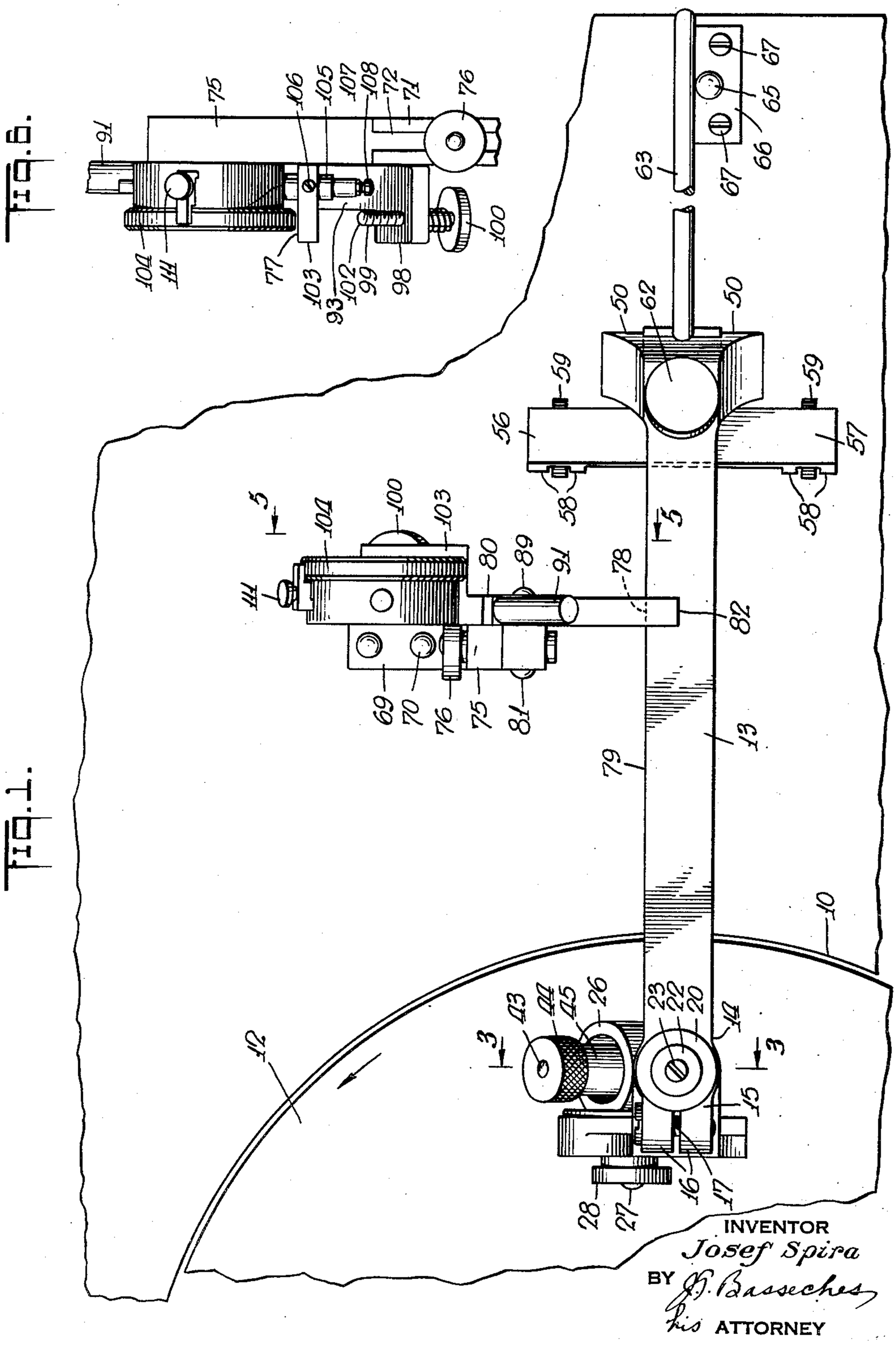
Oct. 31, 1950 J. SPIRA 2,527,592

DIAMOND CUTTER'S TONG AND GUIDE

Filed May 11, 1946 3 Sheets-Sheet 1



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DIAMOND CUTTER'S TONG AND GUIDE

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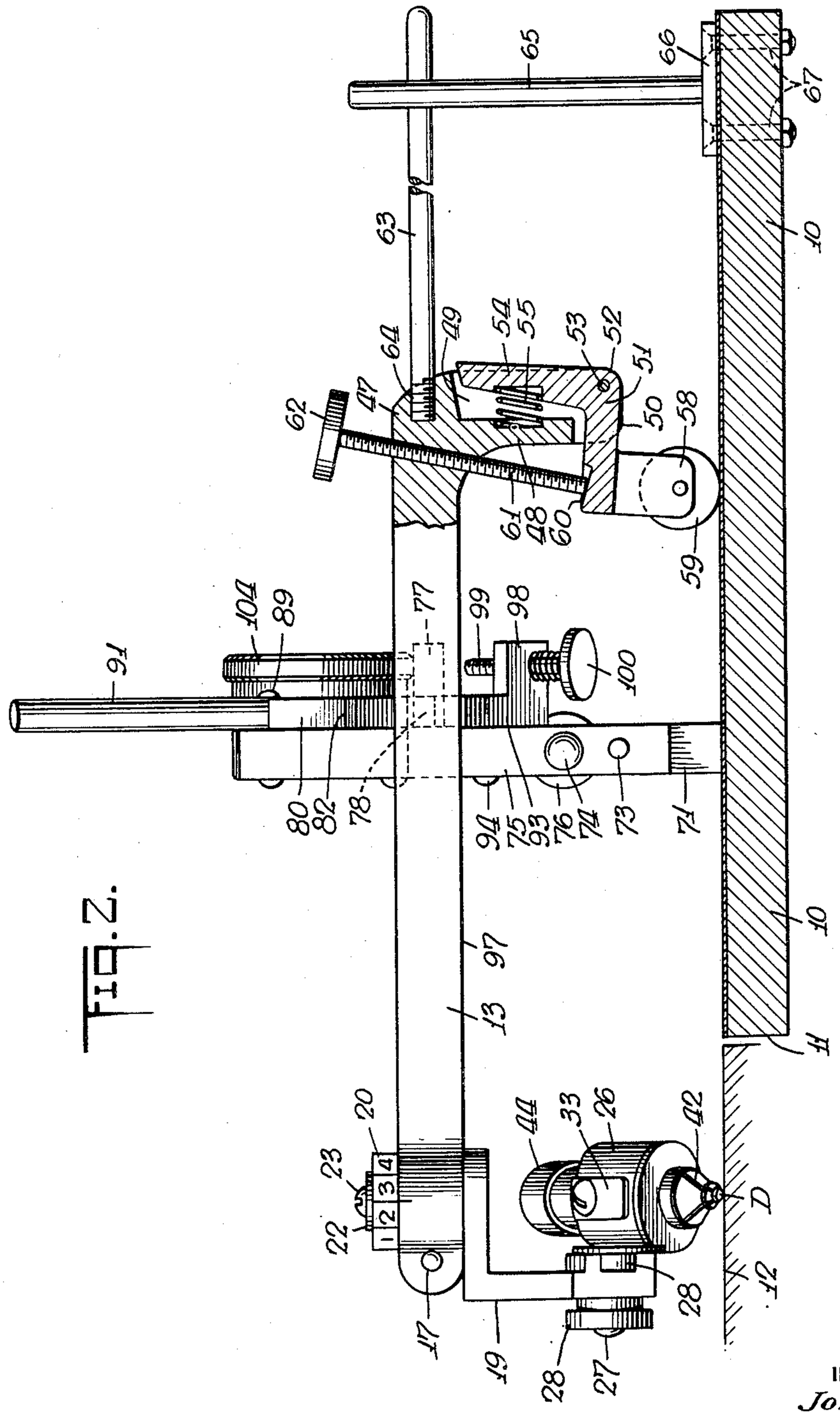

Fig. 2.

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Fig. 5.

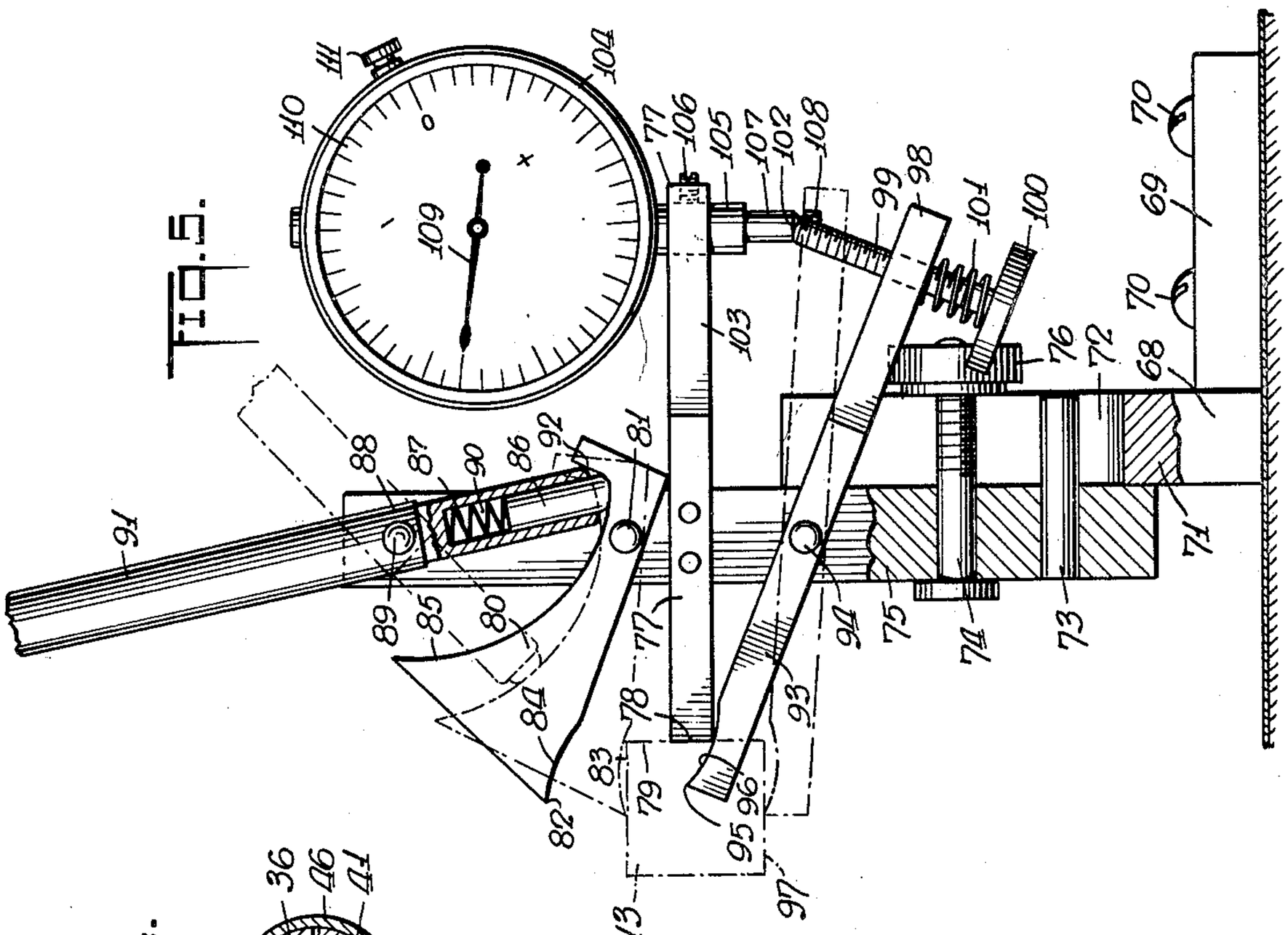


Fig. 4.

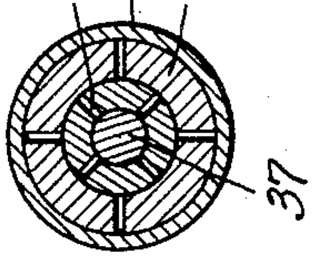
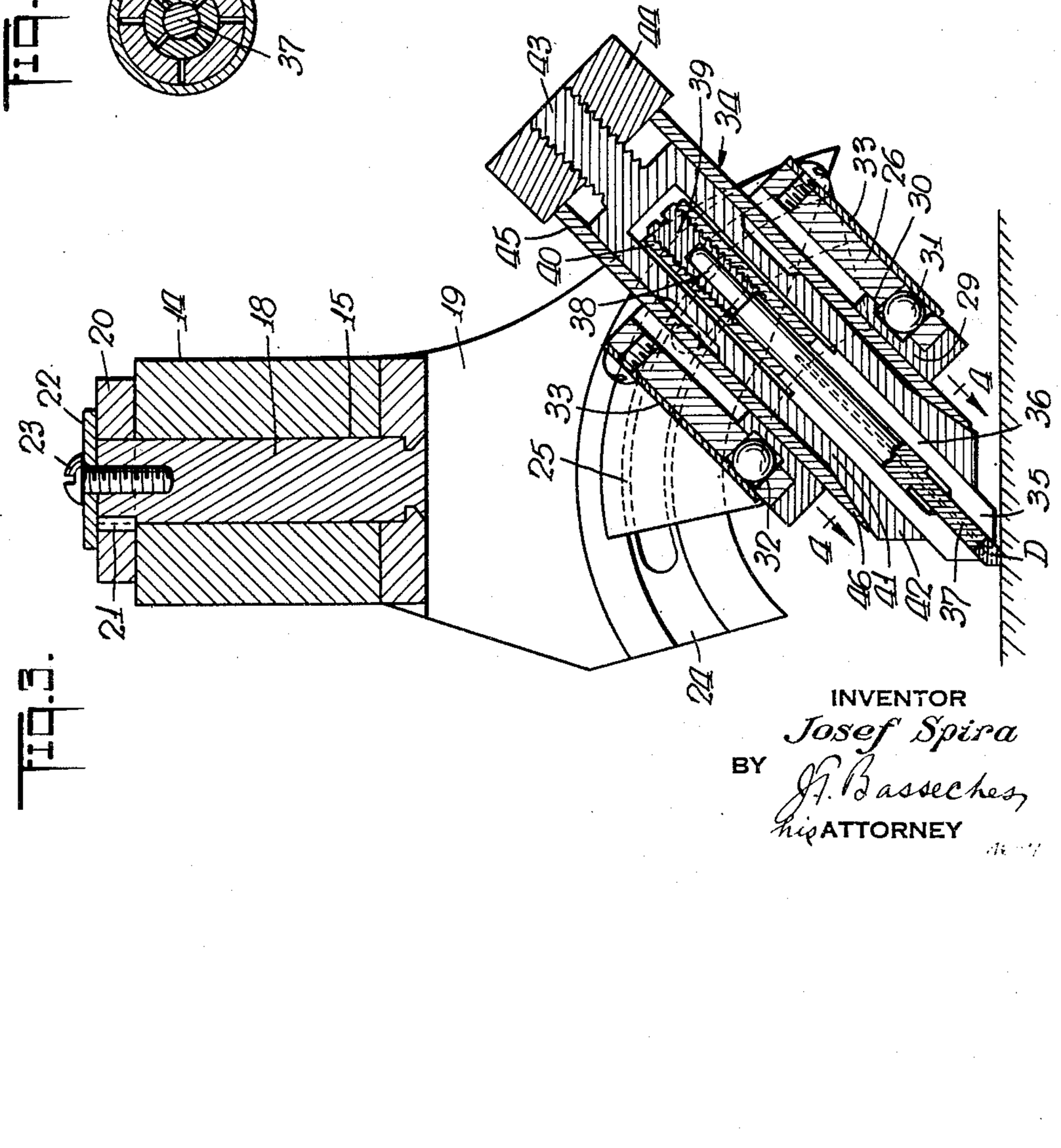


Fig. 3.



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Patented Oct. 31, 1950 2,527,592

UNITED STATES PATENT OFFICE

2,527,592

DIAMOND CUTTER'S TONG AND GUIDE

Josef Spira, New York, N. Y.

Application May 11, 1946, Serial No. 669,033

1 Claim. (Cl. 51—229)

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This invention relates to a diamond polishing device; more particularly, to a diamond polisher's tong and guide.

This application aims to carry out certain phases of my invention Serial No. 643,301, filed January 25, 1946, as a division of my application Serial No. 437,056, now Patent No. 2,393,939, issued January 29, 1946.

In my aforesaid applications, the cutting, grinding and polishing of the facets with the work holder there described, included means for feeding a dop to the skeif or lap under the influence of gravity, and included means whereby the dop carrier may be variously influenced either to augment or partially neutralize the gravitational force in the descent of the dop carrier with its work toward the skeif or lap, and including also means to restrain the dop carrier in its gravitational descent beyond a predetermined depth so that constant attendance need not be involved. This procedure distinguishes from the established practice of constant inspection of the cutting, polishing or facetting operations.

As desirable as this operation may be with the pendulum type of assembly, diamond polishers who are schooled in the tong method of holding the dop oppose the use of the pendulum holder and contend that the tong, with the facility of inspection this device offers, is productive of more perfect facets. It is acknowledged however, that this type of apparatus is not productive quantitatively because of the need for constant supervision, also entirely occupying the operator's hands, whereby he cannot leave the dop in polishing position unattended.

Known to me are the tendencies by diamond workers, using tongs, to weight these elements to eliminate the fatigue occasioned by bearing down on the tongs. Such procedure minimizes the ability for quick inspection of the work either because of the time to take the weights off from the tongs in lifting the tongs for inspection, or in lifting the weighted tong itself.

Accordingly, it is an object of my invention to provide a tong and guide assembly therefor characterized by the features of indicating to the worker when the dop is properly oriented, and including means whereby the guide assembly may be employed to limit the gravitational descent of the dop beyond a predetermined position.

It is contemplated further by my invention to provide a tong and a guide therefor to give indication of whether or not the diamond has been oriented in respect of the skeif or lap, for most efficient cutting.

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It is still further an object of my invention to provide a tong and guide assembly whereby the gravitational influence of the tong with respect to the lap or skeif may be augmented while permitting rapid release of this influence, to facilitate inspection of the work.

Still further objects of my invention reside in the provision of a tong and a guide therefor whereby predetermined depth of movement of the tong may be measured, and to indicate the proper orientation of the dop with its work with respect to the skeif or lap.

My invention accordingly aims to make available the employment of diamond cutter's tongs for polishing diamonds, whereby these dop holding devices may be employed to accelerate the diamond facetting and polishing operations, and to accomplish this work more economically.

To attain these objects and such further objects as may appear herein or be hereinafter pointed out, I make reference to the accompanying drawings, forming a part hereof, in which—

Figure 1 is a fragmentary plan view of a diamond worker's bench, showing a skeif with my tong and guide in position;

Figure 2 is a side elevation thereof, with portions in section; before moving the tong in limiting position;

Figure 3 is a section taken on the line 3—3 of Figure 1;

Figure 4 is a section taken on the line 4—4 of Figure 3;

Figure 5 is a fragmentary section taken on the line 5—5 of Figure 1;

Figure 6 is an end elevation of a tong guide.

Making reference to the drawing, I have illustrated my invention in connection with a diamond worker's bench 10, which has a well 11 adjacent the skeif, lap or turntable 12. It is over this bench that the diamond worker may guide a dop holding tong, resting one end of the tong on the bench while holding the diamond on the revolving polishing surface.

In the illustration, a tong arm 13 is provided. This is preferably of squared machine stock, to provide true rectilinear upper, side and bottom guiding surfaces, for purposes which will appear hereinafter.

The forward end 14 of the tong arm 13 is provided with a bearing portion 15, terminating into spaced extension lugs 16, joined by the tensioning screw 17. In the bearing 15 there is journalled the shaft 18 for the dop carrier 19. The shaft 18 extends into the indexing disk 20, keyed to the shaft 18 by a spline 21, the washer 22 and the screw 23. The dop carrier 19 is

formed with an arcuate guide **24**, cooperating with the quadrant **25**, which carries the collar **26**. The quadrant **25** has an extension screw **27**, cooperating with the knurled nut **28** to hold the quadrant **25** in a predetermined angular position on the guide **24**.

The collar **26** is arranged to axially mount the sleeve **29**, having an annular groove **30**, cooperating with the balls **31** in the orifices **32** and the spring leaves **33**, to act as detents to hold the sleeve **29** frictionally in the collar **26**, while permitting rotatable movement. The sleeve **29** axially mounts the dop assembly **34** for rotational adjustment. This dop assembly very closely follows either the pavilion dop in accordance with my invention, now Patent No. 2,393,939, or may employ a bezel dop in accordance with the divisional application thereof Serial No. 643,301.

In the illustration given, the gem D, which has a cylindrical bezel forming portion in the unfinished state, is held by the jaws **35**, formed on the adapter sleeve **36** by slotting the same. A backing rod **37** has one of its ends positioned adjustably between the jaws **35** to engage the table forming portion of the gem D. The backing rod **37** terminates in a cylindrical shank **38**, housed in the adjusting screw **39** threaded in the sleeve **40** to the rear of the adapter **36**. In this way the gem D may be projected the desired distance beyond the jaws **35**, to form all the pavilion facets without releasing the diamond.

The adapter **36** is housed in the stem **41**. This stem is slitted to outline a plurality of jaws **42**, at least three in number and in position corresponding to the jaws **35** of the adapter sleeve **36** and are formed with conical protuberances merging into tapered sections, to form a tapered nose, as in my patent aforementioned.

The stem **41** terminates in a threaded section **43**, cooperating with the knurled nut **44** to bear upon the sleeve **45** at one end, urging the end **46** against the tapered nose, to effect clamping action of the gem D. The dop assembly just described is keyed to the sleeve **29** by the frictional detent means described. The sleeve **29** and the dop assembly may be indexed in relation to the collar **26** in a manner which will be readily understood.

The arm **13**, at its rear portion **47**, is provided with a downwardly directed branch **48**, recessed at **49**, and terminating into spaced guide shoulders **50**. The spaced shoulders **50** cooperate to hold the frame **51** comprising an elbow **52**, through which a pin **53** passes, and enters the spaced shoulders **50** pivotally to support the frame. The arm **54** of the frame is housed within the recess **49**. A coiled expanding spring **55** is braced against the branch **48** and the arm **54** normally to tilt the frame **51** in a clockwise direction. The frame **51** terminates into side arms **56** and **57**, each of which is formed with downwardly directed fingers **58**, **58**, between which rollers **59** are pivotally mounted.

The frame **51** has a seat **60** engaged by the adjusting screw **61** passing through the end **47** and formed with a knurled head **62**. The adjusting screw **61** may be employed to level the arm **13** by applying a spirit level to the upper surface of the tong arm **13** in a manner which will be readily understood by the skilled diamond worker, in order that the arm may be properly oriented in performing the polishing step, when the diamond is oscillated radially along the lap or skeif surface.

The tong arm is guided radially by providing

its end portion **47** with an extension rod **63**, screw threaded thereinto at **64**. The extension rod is axially positioned with regard to the arm **13** and is designed to engage the forward portion of the standard **65**, extended from the bracket **66** bolted to the table **10** by the bolts **67**.

The secondary guide will now be described and comprises a bracket **68**, the base of which **69** is bolted to the table **10** by the bolts **70**. A standard **71** is formed with a slot **72** to receive the pin **73** and bolt **74**, extending through the bar upon which the guide block and indicator assembly is mounted. The pin **73** and bolt **74** are arranged to be slidably received within the slot **72**, a knurled nut **76** for the bolt **74** being employed to tension the bolt **74** to hold the bar and standard in relative adjusted position in accordance with the height desired, as will more clearly appear hereinafter.

The bar **75** supports a cross arm **77** in a fixed position. The cross arm **77** has an abutting end **78** acting as a stop and cooperates with the arm **13** to engage the rear face **79** thereof to hold the arm **13** with its axial line radial, thus cooperating with the standard **65** to guide the tong assembly radially as the skeif **12** rotates against the gem D held by the dop. The cross arm **77** acts as an abutment and the standard **65** restrains the arm **13** from any pivotal displacement, so that the tong may be oscillated radially to perform the polishing operation as recognized by the skilled diamond worker.

It will be understood that the tong assembly, as the facet is formed, will gravitate while in contact with the abutment **78** under the weight of the assembly about the rollers **59** as a center. To augment the gravitational force, I provide a pressure arm **80** pivoted to the bar **75** by the pin **81**. The pressure arm **80** has a contacting finger **82** arranged to engage the upper surface **83** of the arm **13**. A clearance surface **84** assures substantial linear contact of the pressure point **82** with the surface **83**.

The pressure arm **80** is formed with a camming surface **85**, engaged by the shoe **86**, slidable in the socket **87** of the lever **88** which is pivoted about the pin **89**, mounted on the bar **75**. A coiled spring **90** normally urges the shoe **86** outwardly and acts to provide the desired pressure upon the arm **80**. The end **91** of the lever **88** is oscillated in order to tilt the same and force the shoe **86** along the camming surface **85**. The camming surface **85** is eccentric with relation to the center through the pin **89**, and is extended as well to terminate into an abrupt shoulder **92**.

The off-balance position of the pressure arm **80** on the pin **81** serves to function as follows:

As the arm **88** is pivoted clockwise when viewed in Figure 5, the shoe **86**, in riding along the camming surface **85**, will augment the gravitational force on the arm **13**. The greater the axial displacement of the arm **88**, the greater will be the pressure imposed on the arm **13**. As the lever **88** is pivoted counter-clockwise, the shoe **86**, in being urged toward the abutment **92**, will lift the pressure point **82** from engagement with the arm **13**, including an extreme position completely clearing the contacting finger **82** out of the path of the arm **13**, so that the tong may be bodily elevated for inspection.

I may minimize the gravitational effect on the tong assembly as well as to secure additional features hereinafter described by a supporting member **93**, which is pivoted to the bar **75** by the pivot pin **94**. The supporting arm **93** has its end formed

with a contacting end 95, a clearance surface 96 serving to assure a linear contact of the contacting end 95 with the under surface 97 of the cross arm 13. The supporting member 93 has its rearward end 98 provided with an adjusting screw 99, which is threadedly mounted in the supporting arm 93. A knurled head 100 acts against the friction spring 101, to hold the set screw 99 in any adjusted position. The contacting end 102 of the adjusting screw 99 is faced upwardly toward the offset section 103 on the cross arm 77.

It will be observed that as the tong assembly rests on the supporting arm 93, the limiting position to which the tong assembly may drop is determined by the extensiveness of the adjusting screw 99, so that upon reaching a position where the contacting end 102 engages the offset 103, further descent of the tong arm about the roller 59 will be restrained. Furthermore, the extensiveness of the drop of the arm 13 may be measured and other benefits hereinafter described secured.

For this purpose, the arm 77 adjacent the offset 103 is provided with a depth gauge 104, whose fixed sleeve 105 passes through the cross bar 77 and is maintained in fixed position by the set screw 106. The plunger arm 107 of the pressure gauge has its head 108 arranged to engage the upper surface of the end 98 of the supporting arm 93. The depth gauge reading will be indicated by the needle 109, whose dial 110 may be shifted to a reference position by the adjusting knob 111.

The depth gauge 104 may be employed to read the drop of the tong arm 13 as it rides on the pivoted supporting arm 93. It will be observed, however, that as in my parent application, there is a direct contact between the diamond D through the dop, the cross arm 13, the supporting arm 93 to the head 108 of the depth gauge. The operator, in orienting the dop in accordance with the grain of the diamond can, by this means, determine whether or not he has successfully oriented the grain to effect a cutting and polishing action upon the particular portion to have a facet formed.

I have discovered that by an assembly which permits an undampened transmittal of the vibrations from the lap or skeif through the diamond and the dop to the head of the depth gauge, the activity of the needle 108 will determine whether the operator has found a position of the diamond with relation to the skeif that the cutting or polishing operation will be accomplished. I have discovered that as the operator orients the dop about the shaft 18, he can tell whether he has oriented the grain for cutting action by observing the needle 109. If the needle 109 vibrates vigorously, by my installation embodying the features to an extent disclosed in my parent application, the operator knows that the grain has not been properly adjusted and no cutting or polishing action is secured. The operator may then continue orientation of the dop about the axis through the shaft 18. As the vibration of the needle 109 subsides, the best cutting position is ascertained, as a minimum vibration will be evident and the only reading will be to ascertain the depth of cut as the dop, with its gem, gravitates.

The operator, by inspection, may observe on the depth gauge the best position necessary to secure the proper facetting operation for one facet. He may thereupon set the adjusting screw 99 so that it is fixed thereafter as the limiting depth for the series of facets of that particular diamond. The operator may then index the diamond from one facet to another with regard to one circumferential band of symmetrical facets.

After indexing to a new facet and locating the grain for cutting and polishing, the operator may thereupon rely upon the supporting arm 93 to determine the limiting position to which the dop will drop. The operator may thereupon leave the tong assembly with the diamond in the dop, unattended without danger of over-cutting the diamond and need not remove the dop from its contact with the lap.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is:

In a diamond worker's bench or the like having a lap including uprights thereon serving as guides radially to guide a tong as it is slid on the bench substantially toward and from the center of the lap, one of said guides including a pivoted arm thereon extended to one side of said guide to engage the tong, a camming surface on said arm eccentrically positioned, a manually operable lever on said guide, a resiliently directed shoe carried by said lever engaging said camming surface whereby manual operation of said lever will augment the pressure on said tong in one position and will lift the arm from engagement with the tong in another position.

JOSEF SPIRA.

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