Nov. 12, 1963 J. SPIRA 3,110,136

AUTOMATIC PRECISION CONTROL FOR CUTTING AND GRINDING OF DIAMONDS

Filed March 27, 1962 3 Sheets-Sheet 1

FIG. 1

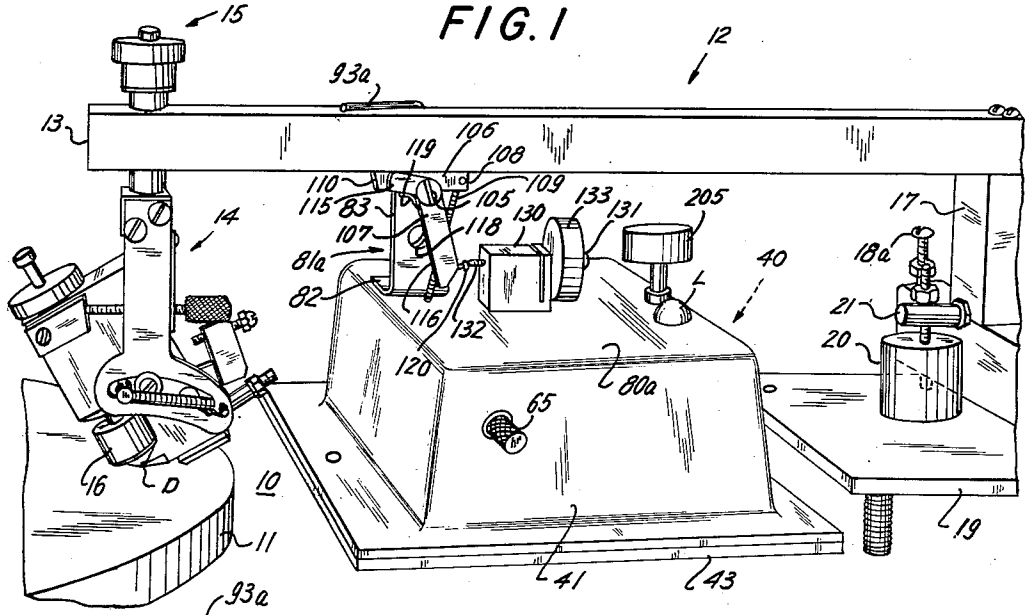
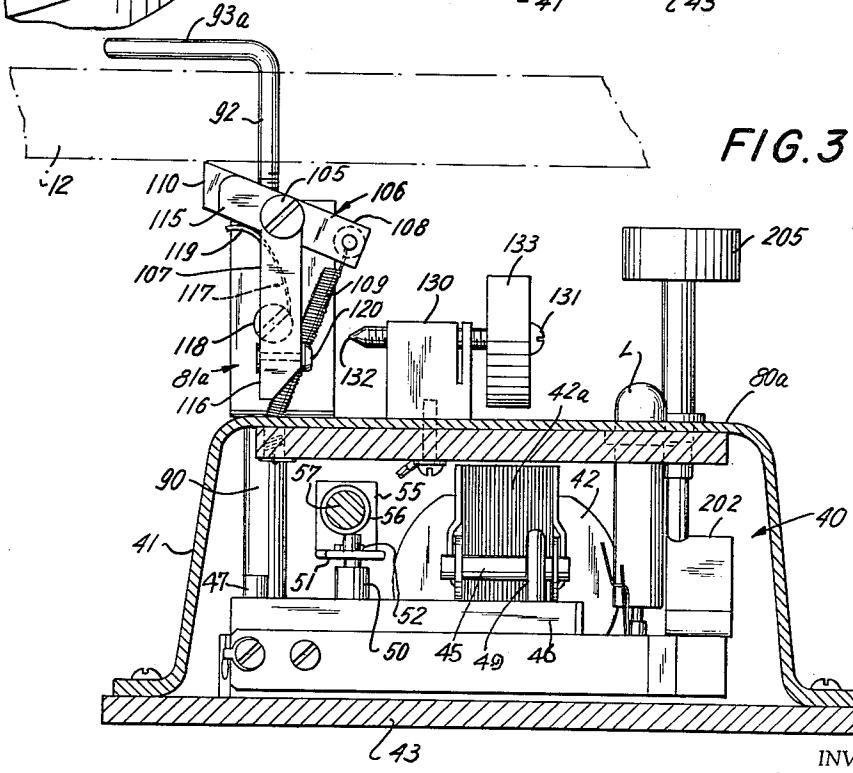


FIG. 3



INVENTOR.
JOSEF SPIRA

BY

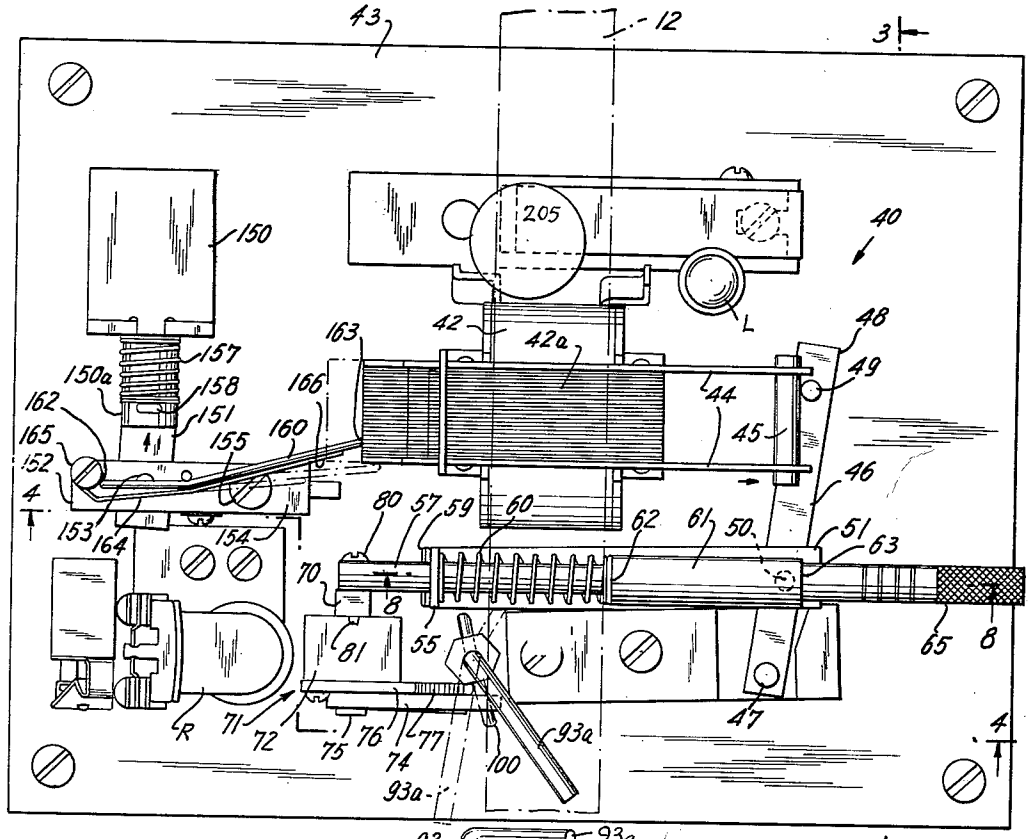
J. J. Bassoches
his ATTORNEY

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AUTOMATIC PRECISION CONTROL FOR CUTTING AND GRINDING OF DIAMONDS

Filed March 27, 1962 3 Sheets-Sheet 2

FIG. 2



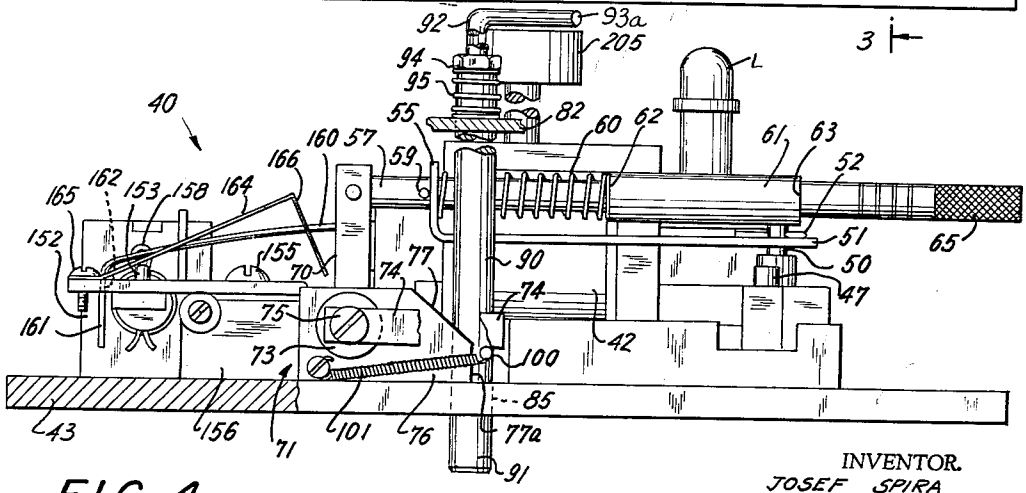


FIG. 4

INVENTOR.
JOSEF SPIRA

BY

J. J. Bassches
his ATTORNEY

Nov. 12, 1963 J. SPIRA 3,110,136

AUTOMATIC PRECISION CONTROL FOR CUTTING AND GRINDING OF DIAMONDS

Filed March 27, 1962 3 Sheets-Sheet 3

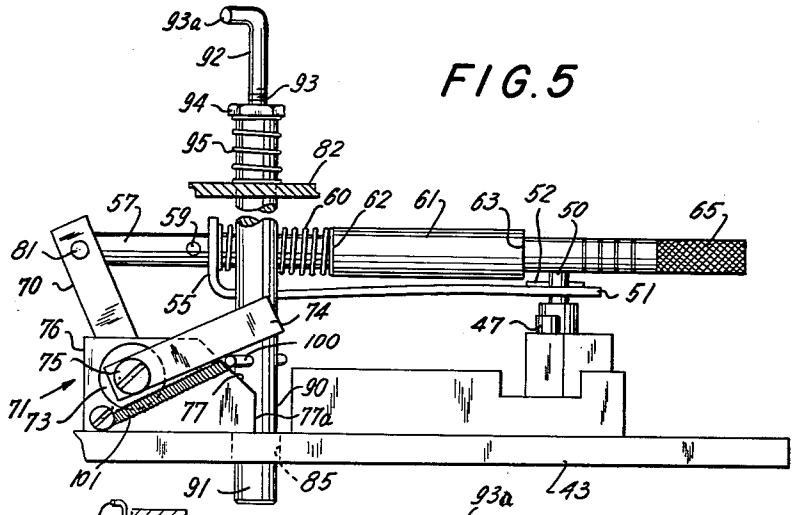


FIG. 5

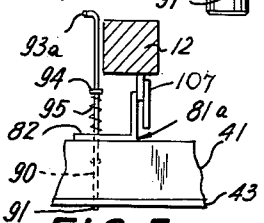


FIG. 5a

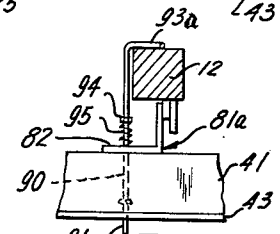


FIG. 5b

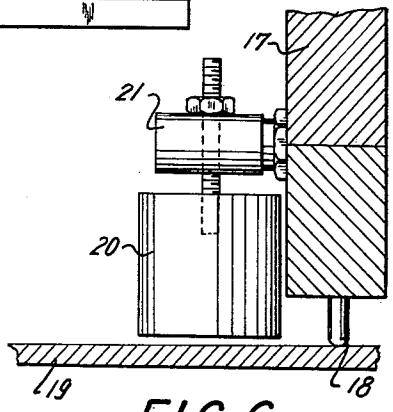


FIG. 6

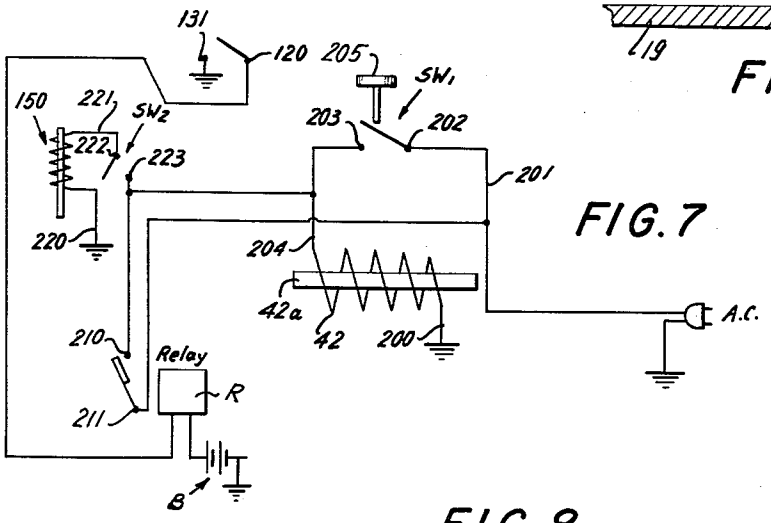
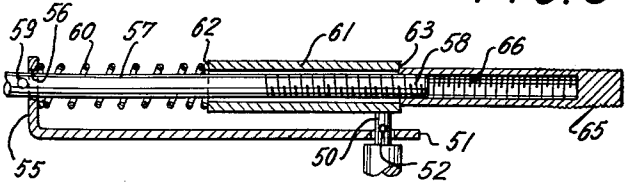


FIG. 7

FIG. 8



INVENTOR.
JOSEF SPIRA

BY

J. J. Bassechez
his ATTORNEY

United States Patent Office 3,110,136 Patented Nov. 12, 1963

3,110,136

AUTOMATIC PRECISION CONTROL FOR CUTTING AND GRINDING OF DIAMONDS

Josef Spira, New York, N.Y., assignor to Gamma Machine & Instrument Corporation, New York, N.Y., a corporation of New York

Filed Mar. 27, 1962, Ser. No. 182,857
14 Claims. (Cl. 51—125)

This invention relates to gem finishing equipment, and more particularly to cutting and polishing equipment for finishing and/or polishing gems, such as diamonds and the like.

Still more particularly, this invention relates to a device for automatically manipulating a gem polisher's tong. In the cutting, grinding and polishing of the facets of a diamond or the like, the gem is supported in a dop, secured to a dop carrier or tong. An example of such dop and dop carrier or tong is illustrated in United States Patent No. 2,527,592, issued to me on October 23, 1950.

In the normal operation of cutting, grinding and polishing of the facets of gems, such as diamonds, skilled workers utilizing tongs, as illustrated in the above United States patent, manually force the tong downwardly to urge the gem which is supported in the dop against the face of a horizontally disposed rotating skeif, lap or cutting wheel. In certain applications, as exemplified in the above mentioned patent, manual or weighted pressure on the tong may be supplemented by a mechanical device for urging the gem against the finishing wheel.

In the normal practice, as aforesaid, it is customary for the skilled worker frequently to lift the tong from the cutting wheel and invert the same to permit critical inspection of the surface being finished usually under magnification. Often, such inspections must be carried out at frequent intervals, and sometimes, as often as every three to five seconds. While the application of force mechanically in the manner illustrated in the above mentioned patent provides many advantages, as compared with a manually pressured device, these advantages are in part neutralized in mechanical pressuring devices heretofore known, by reason of the relatively time consuming operations required in removing the tong from the pressuring device for inspection. These disadvantages are obviously more apparent where frequent inspections are required.

Accordingly, it is an object of this invention, to provide a device for mechanically and automatically urging a diamond cutter's tong downwardly to force the gem being cut against the finishing wheel, which device is characterized by the ease with which the tong may be released for inspection and replaced in the pressuring mechanism.

A further object of the invention is the provision of an automatic control assembly for a diamond cutter's tong having sensing means for sensing the depth of the cut; which sensing means is effective automatically to release the tong pressing means and cause the tong and the gem carried thereon to be lifted clear of the finishing wheel when the cut reaches a predetermined depth.

Still a further object of the invention is the provision of a device of the class described having adjustment means whereby the pressure with which the gem is urged against the finishing wheel may be readily adjusted.

Still a further object of this invention is to provide in a diamond finishing apparatus, a tong depressor member shiftable between active and inactive positions, said depressor member in said active position bearing against the upper surface of said tong to resiliently urge the same downwardly; said depressor in the inactive position being disposed above and pivoted clear of said tong to permit

the tong to be lifted vertically without interference by any portion of the depressor member.

Still a further object of the invention is the provision of an electrically powered mechanism for controlling a diamond cutter's tong characterized by the ease with which the tong may be removed for inspection of the cut gem surface and replaced for further processing.

Still a further object of the invention is the provision of a control for a diamond cutter's tong which is semi-automatic in its operation whereby a plurality of such tongs may be operated by a single workman, if desired, on the same lap or cutting wheel without fear of overcutting or damaging the gems being processed.

In order more fully to describe the invention and illustrate its use, reference is made to the accompanying drawings, in which—

FIGURE 1 is a perspective view of the diamond worker's bench, including portions of the cutting wheel, and illustrating a tong carrying a dop and held in operative position by a device in accordance with my invention;

FIGURE 2 is a magnified plan view of the tong manipulating device with the housing portion removed;

FIGURE 3 is a vertical section taken on lines 3—3 of FIGURE 2;

FIGURE 4 is a section taken on line 4—4 of FIGURE 2;

FIGURE 5 is a magnified side elevational view of portions of the device in the unlocked position thereof;

FIGURES 5*a* and 5*b* are diagrammatic views showing the parts respectively in the released and operative positions thereof;

FIGURE 6 is a magnified side elevational view of portions of the rear tong support;

FIGURE 7 is a schematic wiring diagram of the device;

FIGURE 8 is a cross section taken on line 8—8 of FIGURE 2.

In accordance with the invention, 10 represents a horizontal work surface such as a diamond worker's bench, whereon there is mounted for rotation in a horizontal plane, a skeif, lap or cutting wheel 11. A tong or holder assembly 12 carries at its forward end 13 a dop assembly 14. The dop 14 is adjustably secured to the tong 12 by means of a knurled threaded nut 15. The dop 14 may be of any suitable design and since the same does not form a part of this invention, will not be described in detail, it being sufficient to indicate that a gem such as diamond D, is fixedly supported with respect to the dop 14 in a tip or collet 16, with portions of the gem exposed for processing. The tong holder 12, which in this operative position must be substantially horizontally disposed, is supported at its rear end by a stabilizing assembly 17 having spaced depending foot members 18, 18 seated on horizontal platform 19. Optionally, but preferably, the platform 19 is supported in parallelism with and spaced above the work surface 10, and is made of a ferrous material. A powerful permanent magnet 20 is adjustably supported on a horizontally extended strut 21, said magnet being normally adjusted so as to lie in close proximity to platform 19 to urge the assembly 17 against the platform whereby to resist any tendency of the tong assembly 12 to become unseated or canted under torque applied to the cutting tong by the rotating lap or cutter wheel 11. The foot supports 18 may be likewise adjusted through the use of the adjusting screws 18*a* and as will be readily recognized, will thus enable tong 12 to be maintained when in operative position in substantially horizontal orientation.

In accordance with the invention, tong control mechanism 40 is provided, which mechanism is effective to shift the tong between operative and inoperative positions wherein the gem secured in dop 14 is, respectively,

resiliently urged against the surface lap or wheel 11, and lifted clear of contact with such surface.

The control mechanism 40 is mounted in housing 41 and is powered by a main solenoid 42 fixed to base 43 of the housing 41. The solenoid 42 includes an axially shiftable armature 42*a* including bracket extension legs 44, 44 and a cross bar 45. A lever arm 46 is pivotally mounted on upstanding pivot post 47 secured to the base 43 of the housing so that free end 48 thereof is freely swingable in a horizontal plane. The lever arm 46 includes an upstanding abutment 49 in the path of movement of bar 45 whereby, upon energization of solenoid 42, the arm 46 will be clockwisely pivoted by the outward shifting of the armature 42*a* in the direction of the arrow (FIGURE 2).

The lever arm 46 includes an upstanding pivot pin 50 at an intermediate position along its length. A generally L-shaped bracket member 51 is provided with an aperture (not shown) which is sleeved over pin 50 to provide pivotal connection therewith, a cotter pin 52 passed through pin 50 serving to maintain the bracket member 51 on the pin 50. The bracket 51 includes an upwardly directed branch 55 having an aperture 56 formed therethrough (FIGURE 3). A control rod 57 having a threaded outer end portion 58 (FIGURE 8) is passed through aperture 56, a cross pin 59 being fixed to said rod 57 behind the branch 55 of bracket 51.

A compression spring 60 is sleeved over rod 57, the inner end of said spring bearing against branch 55 of bracket 51. A hollow cylindrical collar 61 is likewise sleeved over the rod 57, the inner end 62 of said collar bearing against the outer end of the spring 60. A knurled adjustment element 65 is provided with an inner threaded portion 66 matching the threaded portion 58 of rod 57 which is threaded over said portion 58 and bears against the outer end 63 of collar 61, to permit variable compression of spring 60 in accordance with the position of element 65 along rod 57.

The rod 57, at its inner end, is pivotally connected to the upstanding arm 70 of an offset bell crank lever assembly 71. The bell crank lever assembly 71 is journaled in block 72 made fast to base plate 43 and includes, in addition to arm 70, a horizontally disposed trunnion 73 journaled in a bearing formed through block 72 and an outer arm 74 made fast to the trunnion 73 as by bolt 75. A relatively thin plate 76 having an inclined cam portion or face 77 is secured to the front face of block 72, the plate 76 and the cam portion extending laterally beyond the side edge of the block 72. The plate 76 is provided with a bearing aperture in alignment with that of the block 72, and the outer arm 74 is positioned to be shiftable in a vertical plane and closely adjacent the outer face of plate 76. A bolt member 80 loosely passes through rod 57, the inner end 81 of said bolt being threaded into an arm 70 of bell crank assembly 71 to provide a pivotal connection between rod 57 and arm 70.

Atop the upper face 80*a* of housing 41 there is fixedly mounted an L-shaped bracket 81*a* including a horizontally disposed branch 82 and a vertical branch 83. The horizontal branch 82 is provided with an aperture, not shown, which is disposed in vertically spaced alignment with a complemental aperture 85 formed in base 43 of the housing. A generally vertically disposed cylindrical stud 90 is supported within the apertures to be rotatably and vertically shiftable. As seen in FIGURES 4, 5, 5*a* and 5*b*, the lowermost end 91 of the stud 90 extends beneath the base 43, a suitable recess for accommodation of this portion being provided in the work bench 10. The stud 90 is provided, adjacent its upper end, with an internal threaded portion (not shown), a stud extension element 92 having a complementally threaded portion 93 being adjustably secured to the stud 90 by the interthreaded relationship of the parts. The extension element 92 is locked to the stud 90 by a lock nut 94 threaded on portion 93 and bearing against the upper end of stud 90. An offset hold down arm 93*a* compressing a bent end portion of extension element 92 is provided at the upper end thereof. A compression spring 95, having its ends bearing respectively against branch 82 and nut 94, tends to keep stud 90 and the parts carried thereby in raised position. (FIGURES 5 and 5*a*.)

The stud portion 90 within the housing 41 is provided with a follower pin 100 which is disposed adjacent the lateral portion of plate 76. A tension coil spring 101 has its ends secured respectively to the follower pin 100 and to plate 76, thereby imparting a torque to the stud and maintaining the follower pin against the lateral portions 77 or 77*a* of cam plate 76.

The vertical arm 83 of bracket 81*a* is provided with a horizontally disposed trunnion in the form of a headed bolt 105. Mounted on the trunning 105 are lift lever 106, and depth sensing lever 107. The lift lever 106 includes portions extending both forwardly and rearwardly of trunnion 105. The rearward branch 108 of lever 106 is urged downwardly by a coil spring 109 tensioned between said rearward branch at its upper end and having its lower ends fixed to the housing. The action of the spring 109 causes the forward tip 110 of the lever to be raised with respect to the bracket for purposes which will become apparent.

The depth sensing lever 107 includes angularly oriented branches 115, 116. A wire spring 117 is fixed at its lower end by bolt 118 to the bracket 81*a*, the upper end 119 of said spring bearing lightly against the undersurface of branch 115 of lever 107 to urge the latter to a raised position as shown in FIGURE 3. In addition, branch 116 of lever 107 is provided with a rearwardly directed switch contact 120.

To the top 80*a* of housing 41, which is preferably formed of insulating material, there is mounted a support block 130 of conductive material. A conductive threaded member 131 is threadedly engaged in a complemental bore formed in block 130, the tip 132 of said member 131 being adjustably spaced from contact 120 by manipulation of adjustment knob 133.

A latching and unlatching assembly next to be described is provided for the main solenoid armature and functions to eliminate the necessity for maintaining a current flow in solenoid 42 during the operation of the device. For this purpose a release solenoid 150 (FIG. 2) is fixed to base 43. The armature 150*a* is provided with an extension 151 on which is pivotally mounted a cross lever 152 having an aperture pivotally supported on vertical pin 153 which is fixed to extension 151. The inner end 154 of lever 152 is pivotally mounted on vertical bolt 155 which is threaded into block 156 made fast to base 43. The armature 150*a* is normally outwardly biased by coil spring 157 which is compressed between solenoid 150 and a cotter pin 158 pivotally securing extension 151 to armature 150*a*.

A latch bar 160 of heavy wire is provided with a bent vertically disposed inner end portion 161, which portion 161 is pivotally mounted within vertical aperture 162 formed in cross lever 152. A wire spring 164 is fixed by bolt 165 to lever 152 and includes a bent portion 166 biased against latch bar 160, urging the latter counterclockwise as viewed in FIGURE 2. The outer end portion 163 of bar 160 is downwardly bent, and as will be hereinafter described, enters behind the rear end of armature 42*a* of the main solenoid in the operative position of the device, and holds said armature in the outwardly thrust position to which it had been urged by current flow in the solenoid 42.

The electrical circuit of the device will now be described in connection with FIGURE 7, it being understood that the wiring in the remaining figures has been eliminated for clarity. One lead 200 of solenoid 42 is grounded, as is a lead from the power input. The other

power lead 201 is connected to one terminal 202 of a normally open switch (SW1), the other terminal 203 of switch SW1 being connected to the remaining lead 204 of solenoid 42. A plunger 205 passing through housing 41 is positioned to close the contacts of switch SW1 so long as the plunger is retained in depressed condition.

A relay R is arranged, upon engagement of the terminals 120, 131, of the depth gauge switch to close temporarily the normally open relay contacts 210 and 211. A battery B, one terminal of which is grounded, has its opposite terminal connected to one winding lead of relay R. The other winding lead of the relay is connected to moving contact 120 of depth gauge switch, and as will be obvious from the diagram, the winding of relay R will be energized when the contacts 120, 131 are engaged, the contact 131 being grounded.

One winding lead 220 of solenoid 150 is grounded, the other winding lead 221 of said solenoid being connected to a terminal 222 of normally open limit switch SW2. The opposite terminal 223 of the limit switch is connected to relay terminal 210.

Terminals 223 of switch SW2 and 210 of the relay are connected to terminal 203 of start switch SW1. Terminal 211 of the relay is connected to the ungrounded power lead 201.

The limit switch SW2 is controlled by the position of the armature 42*a* of solenoid 42, said switch being normally open but being closed when the armature 42*a* is in the operative position (solid lines, FIGURE 2).

Operation

As shown in FIGURES 3, 5 and 5*a*, the device is in inoperative position, i.e., in position for the reception of a tong. In such position, the spring 101 has rotated stud 90 so that hold down arm 93*a* is pointed or disposed clear of the position which will be occupied by the tong (dot and dash lines, FIGURE 2). Also, spring 95 has lifted the stud and associated mechanism so that arm 93*a* is in a plane above the plane described by the upper surface of the tong (FIGURE 3).

The device as shown in FIGURES 3, 5 and 5*a*, is set for reception of a dop carrier or tong assembly. Positioning of a tong assembly in the device is a simple operation and may be accomplished by setting the rear support feet 18 atop platform 19 and lowering the tong assembly until a portion of the body of the tong lies atop the tip 110 of the lever 106. The force of spring 109 controlling such lever is sufficient to support the forward end of the tong assembly to which is fixed dop 14, so tht the latter is raised clear of contact with the lap or skeif 11.

To shift the dop 14 into operative position whereby the gem is engaged against the lap or cutting wheel 11, plunger 205 is depressed temporarily, closing contacts 202 and 203 of switch SW1, and thus energizing the main solenoid 42. The armature 42*a* of solenoid 42 is thus shifted from the dot and dash to the solid line position as shown in FIGURE 2. As the armature 42*a* shifts forwardly (to the right in FIGURE 2), the latch bar 160 rides along the side of the armature and when the rearmost portion of the armature passes the end 163 of the bar, spring 164 and bent portion 166 engaging the bar 160 bias said end 163 behind the armature 42*a* (solid line position, FIGURE 2), thus latching the armature and preventing it from returning to the initial position even after the current flow in solenoid 42 has been interrupted by release of plunger 205.

The movement aforesaid of armature 42*a* drives cross bar 45 against abutment pin 49 of lever 46, pivoting the latter clockwise as shown in FIGURE 2, and carrying bracket 51 to the right as shown in said figure. In the course of such movement, branch or leg 55 or bracket 51 compresses spring 60 against collar 61, thus urging bar 57, to which collar 61 has been adjustably secured by threaded adjustment member 65, also to the right. It will thus be seen that the rod 57 is not directly linked to the bracket 51, but rather spring 60 is interposed between these parts, and thus the force of the solenoid is in effect resiliently applied to the rod through the medium of the cocked or compressed spring 60. The force thus applied may be varied by adjustment of the member 65, it being readily recognized that by threading the member 65 leftwardly (as shown in FIGURE 2), the spring 60 will be compressed to a greater degree, and a proportionately greater force will be transmitted to rod 57, and vice versa.

The movement aforesaid of the rod 57 causes a concomitant clockwise movement of bell crank assembly 71 from the position of FIGURE 5 to that of FIGURE 4, through the connection of rod 57 with lever 70.

In the course of the movement of the lever assembly 71, the arm 74 shifts generally downwardly adjacent the face of plate 76 and engages pin 100 which is fixed to stud 90, causing the latter to be shifted downwardly and also inducing a simultaneous counterclockwise rotation of said stud from the dot and dash to the solid line positions shown in FIGURE 2. As best understood by comparing FIGURES 5*a* and 5*b*, the hold down arm 93*a* has by the movement of the stud 90, been shifted into registry with and downwardly against the tong 12, causing the forward end of the tong assembly carrying dop 14 to be brought downwardly into resilient engagement with the surface of lap or cutting wheel 11. The movement aforesaid is accomplished against the upward biasing influences of lift spring 95 on the stud 90 and the spring 109 acting through lever 106 on the tong 12. In the lowered or operative position of the tong, the contact 120 carried by depth sensing lever 107 is shifted rearwardly from the position of FIGURE 3 to the position of FIGURE 1, by the downward pressure exerted by the undersurface of tong 12 against the upper branch 115 of the depth sensing lever.

During the polishing or cutting operation, the dop 14 will shift slightly but progressively toward the cutting wheel 11. Such movement will result in a gradual downward pivoting of the tong assembly about supports 18 as a fulcrum, and will cause contact 120 to be shifted rearwardly progressively closer to adjustable contact 131. The engagement of contacts 120 and 131 will, in the manner below described, result in the release of the tong assembly by hold down arm 93*a* and thus the immediate removal of the gem from cutting engagement with the lap or skeif 11. It is therefore clear that by adjusting the positioning of contact 131, the depth of cut may be selected and overcutting of the gem guarded against. Also, since the gem is raised clear of the lap (and not merely held from proceeding beneath a selected position), constant attendance of the tong is not required, and it is feasible and, indeed recommended, that a plurality of tong assemblies be controlled by one operator working at a single lap or skeif.

The engagement of contacts 120, 131, temporarily closes the circuit through the windings of relay R and battery B, and thus also closes contacts 210 and 211 of said relay.

During the period in which the contacts 210, 211 are closed, current flows in the windings of main solenoid 42 and release solenoid 150. It will be recalled that the contacts of limit switch SW2 are closed in the extended (operative) position of armature 42*a*, and are opened in the inoperative position thereof, the switch SW2 thus serving to prevent current flow in the release solenoid when switch SW1 is depressed to shift the tong to operative position.

The closing of contacts 210 and 211 thus activates solenoids 42 and 150, causing armature 42*a* initially to shift slightly further to the right, as shown in FIGURE 2, and urging armature 150*a* upwardly as depicted in said figure. The slight additional movement of armature 42*a* has the effect of reducing the force which must be exerted by release solenoid 150 in withdrawing the latch rod 160

from behind armature 42*a* by reducing the backward pressure of armature 42*a* against the rod 160.

The armature 150*a* is thus freed to shift in the direction of the arrow (FIGURE 2), tilting lever 152 clockwise, as shown in FIGURE 2, and removing the bar 160 from its blocking position behind armature 42*a*. When the armature is thus released, stud 90 is permitted to rise and turn respectively under the influence of springs 95 and 101. The hold down arm 93*a* is thus cleared above and turned away from tong 12, permitting the forward end carrying dop 14 to be lifted from the cutting wheel 11 by spring 109 acting on lever 106. Also, the lifting of the tong will open the contact between points 120 and 131, the spring 117 pivoting the released depth sensing lever 107 forwardly. The opening of contacts 120, 131 interrupts current flow in relay R, opening relay contacts 210, 211, and thus breaking the circuit through solenoids 42 and 150.

The device is now in its inoperative position, and the tong may be lifted and inverted for critical inspection of the gem held in dop 14. It should be noted that release of the tong from operative position may be effected by the operator by shifting the branch 116 of lever 107 rearwardly manually to engage contacts 120, 131.

Since the voltage across contacts 120, 131 is provided by battery B and not by the main power source, there is no danger of shock to the operator.

Also, it should be noted that engagement of a conductive portion, i.e., the dop against the cutting wheel, will automatically effect release of the device to inoperative position, since such engagement will ground the dop completing the circuits through the windings of relay R. If desired, a pilot light L may be included in the circuit.

Although not shown in the accompanying drawings, the dop holder or tong includes the usual rearwardly extending extension rod engaging against the lateral surface of a vertical standard to stabilize the tong assembly during cutting of the gem.

It will be understood by those skilled in the art that after partial or complete finishing of one surface of the gem, the orientation of the dop 14 with respect to the tong 12 may be varied. The use of the novel depth release feature of the device permits extremely accurate, coordinated facets to be formed, and eliminates the necessity of constant supervision. Also, the removal and replacement of the tong assembly is readily accomplished, permitting inspection of the progress of the cut.

The novel linkage and other novel mechanisms of the device provide high mechanical advantage, thereby eliminating the need for large or costly operating components, and permitting compact arrangement of the parts. The novel latching and releasing assembly for the main solenoid armature permits interruption of current flow to that solenoid during operation, thereby prolonging solenoid life.

It will be understood that while the sensing contacts 120 in relation to the tip 131 may be employed in using dops cutting the bezel facets and the pavilion facets, and are activated to release the tong when a predetermined depth position is reached, where the bezel dop that is used holds the diamond for finishing the bezel, a contact needle carried by the bezel dop may be employed to touch the wheel or skeif and ground the dop and tong, alternatively to provide releasing means for the tong, as described, by the use of the circuit in which contacts 120 and tip 131 control the sensing feature. A form of such bezel contact needle and skeif contact is shown in my United States Patent No. 2,449,423, September 14, 1948.

It is important to observe that the supporting shaft for the dop 14 on which the knurled threaded nut 15 is extended should have its axis in an accurate vertical plane, to provide the vertical adjustment which makes a true parallelogram between the skeif surface and the plate 19, thereby presenting a true horizontal path with relation to the pressure fingers 93*a* and further making certain that as a skeif is replaced by thinner or thicker stock, that accurate relationship may be preserved to hold the tong bar upper edge accurately.

It is also to be observed that by this horizontal relationship, the pressure of the magnet 20 described acts as tong stabilizing means, especially effective when placed adjacent to the rear end of the tong or holder assembly 12.

The invention hereof is not to be limited to the specific form shown, but should be deemed to include various modifications within the spirit thereof and, accordingly, the same should be broadly construed within the scope of the appended claims.

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

1. In a gem faceting device including a work surface having a horizontally disposed gem finishing wheel thereon and an independent gem holder including a generally horizontally disposed tong having a tong support at one end and gem gripper means at the other end, a tong control member comprising, a housing, a stud member generally vertically extending from said housing and having a laterally projecting arm portion normally lying in a plane above the upper surface of said tong, first spring means engaging said stud and normally urging said arm out of registry with said tong, powered means operatively associated with said stud and shiftable to actuated and released positions thereof, said last named means being adapted, upon actuation thereof, to shift said arm of said stud into engagement with said upper face of said tong, and second spring means cocked by actuation of said powered means resiliently urging said arm downwardly against said tong when said powered means is in the actuated position thereof.

2. A device in accordance with claim 1, wherein said second spring means is provided with variable tensioning means, whereby the resilient downward force applied to said tong may be adjustably controlled.

3. In a gem faceting device including a work surface having a horizontally disposed gem finishing wheel thereon and an independent gem holder including a generally horizontally disposed tong having a support at one end and gem gripper means at the other end, a gem holder control member comprising a housing, a stud member shiftably mounted in and generally vertically extending from said housing and having a laterally projecting arm portion normally lying in a plane above and out of registry with the upper surface of said tong, spring means operatively associated with said stud, motor means operatively associated with said spring means adapted to shift said spring means to cocked and released positions, said spring means in the cocked position thereof resiliently urging said arm of said stud downwardly against said upper surface of said tong.

4. In a gem faceting device including a work surface having a horizontally disposed gem finishing wheel thereon and an independent gem holder including a generally horizontally disposed tong having horizontal supports at one end and a dop at the other end, a gem holder control means comprising a housing, a vertically disposed stud mounted in said housing for axial and rotative movement with respect thereto, first spring means interposed between said stud and housing and biasing said stud to raised position with respect thereto, a follower finger on said stud, a cam member on said housing having an inclined cam face, second spring means associated with said stud and turning said finger against said inclined face, a hold down arm on said stud in a plane above said tong and normally maintained out of registry with said tong by the action of said second spring means and powered means operatively associated with said stud actuable to shift said stud downwardly and rotatably against said tong to apply a downward pressure thereto.

5. A gem finishing device comprising a work table, a horizontally disposed finishing wheel rotatably mounted on said table, a gem holder frame including a generally horizontal tong portion including at one end a tong support and at the other end a dop, a housing on said table, a vertically disposed stud mounted for rotative and axial movement with respect to said housing, an eccentric hold down arm portion extending from said stud, spring means operatively associated with said stud and normally biasing said arm portion to a first position above and out of registry with said tong portion, and powered means actuable to shift said stud portion downwardly and rotatably to engage said arm portion against said tong portion.

6. A gem finishing device comprising a work table, a horizontally disposed finishing wheel rotatably mounted on said table, gem holder frame incluring a generally horizontal tong portion including at one end a tong support and at the other end gem gripper means, a housing on said stable, a vertically disposed stud mounted for rotative and vertical movement with respect to said housing, an eccentric hold down arm portion extending from said stud, spring means operatively associated with said stud and normally biasing said arm portion to a first position spaced from and out of registry with said tong portion, powered means on said housing, second spring means interposed between said powered means and said stud, and positioned to be cocked by activation of said powered means, said spring means in the cocked position thereof applying a downward and rotative movement to said stud whereby said arm portion is engaged against said tong portion and applies resilient downward pressure thereagainst.

7. A device in accordance with claim 5 and including depth sensing means positioned to sense downward movements of said other end of said tong of a selected predetermined magnitude, and arranged to release said stud to said first position upon sensing a movement of said magnitude.

8. A gem finishing device comprising a work table, a horizontally disposed finishing wheel rotatably mounted on said table, a gem holder frame including a generally horizontal tong portion including at one end a tong support and at the other end a dop, a housing on said table, a vertically disposed stud mounted for rotative and axial movement with respect to said housing, an eccentric hold down arm portion extending laterally from said stud, spring means operatively associated with said stud and normally biasing said arm portion to a first position spaced from and out of registry with said tong portion, powered means on said housing, second spring means interposed between said powered means and said stud and positioned to be cocked by activation of said powered means, latch means adapted to retain said second spring means in said cocked position, depth sensing means on said housing positioned to sense downward movements of said other end of said tong of a selected predetermined magnitude, said sensing means being arranged to retract said latch means to release said second spring to the uncocked position thereof upon sensing movement of said magnitude.

9. In a gem faceting device including a work surface, a horizontally disposed finishing wheel rotatably mounted on said surface and an independent gem holder member including a dop at one end thereof and a support portion at the other end, gem holder control means comprising a hold down portion shiftable between first and second positions respectively clear of said holder member and resiliently downwardly bearing against said holder member, a first electrical contact operatively associated with said holder and mounted to be movable responsive to downward movement of said one end of said holder member, a second electrical contact mounted to be variably spaceable with respect to said first contact and in the path of movement of said first contact as said one end of said holder member moves downwardly, and electrically operated means activated responsive to engagement of said first and second contacts adapted to shift said hold down portion from said second to said first positions thereof.

10. A control assembly for use in combination with a gem holder assembly having a gem gripped at one end, support means at the other end and an extended generally horizontally disposed tong between said ends comprising a housing, a vertically disposed stud extending from said housing and rotatably and vertically shiftably supported therein, a laterally projecting hold down arm fixed to said stud at a point above said housing, cooperative cam and follower portions, one of said portions being fixed to said stud and the other of said portions being fixed to said housing, said cam portion including a cam face inclined to the horizontal, spring means operatively associated with said stud biasing said follower portion against said cam portion to yieldably urge said stud to a first raised limiting position, and powered means actuable to shift said stud axially downwardly, said cam and follower portions cooperating during said downward movement to impart a rotary movement to said stud.

11. A device in accordance with claim 10 and including a spring lift member engaging said tong and exerting an upwardly directed biasing force thereon whereby said dop is lifted clear of said wheel when said stud is in said first raised limiting position.

12. A control assembly for a gem tong, comprising a housing, a tong depressor member movably mounted on said housing, spring means engaging said depressor member and normally urging the latter to a position clear of said tong, a solenoid in said housing including an armature shiftable to axially extended position, link means including a variably compressible spring operatively associating said armature and said depressor member, said link means being operative, upon extension of said armature, to shift said depressor member into operative engagement against said tong, and spring latch means adjacent said armature effective to engage and retain said armature in said extended position upon activation of said solenoid.

13. An assembly in accordance with claim 12 and including switch means on said housing comprising a fixed contact and a movable contact responsive to downward movement of said tong, means including a second solenoid in circuit with said switch means, said second solenoid including a movable element operatively connected to said spring latch means and arranged to shift said latch means to releasing position of said armature upon closing of said switch.

14. In a gem finishing device mounted on a work table, a tong including dop means at one end, tong support means at the other end of said tong and including spaced stabilizer foot portions, a horizontally disposed platform of ferrous material fixed to said table, a magnet member disposed between said foot portions and vertically adjustable toward and away from said platform arranged to urge said other end toward said platform to offset upsetting influences on said dop developed when a gem secured in said dop is urged against a cutting wheel.

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