Dec. 24, 1957 M. J. LEIMAN 2,817,194

DIAMOND POLISHING ADJUSTING DEVICE AND DOP

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Fig. 1.

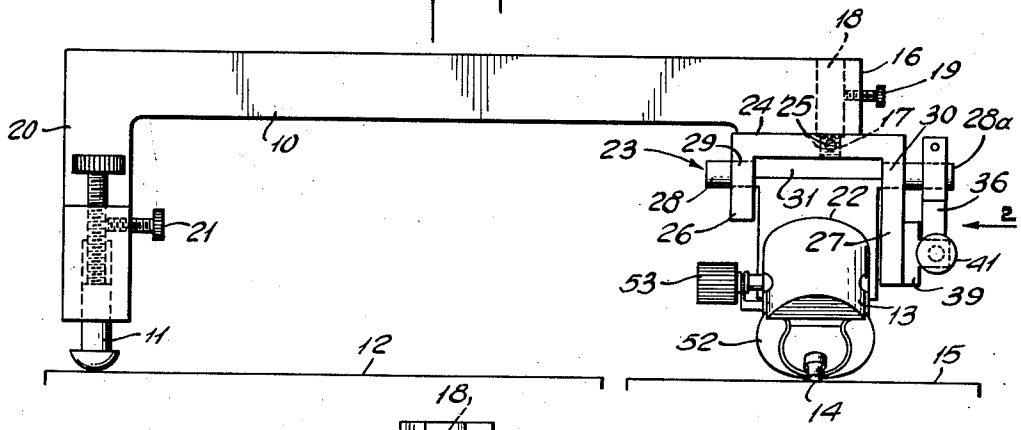


Fig. 2.

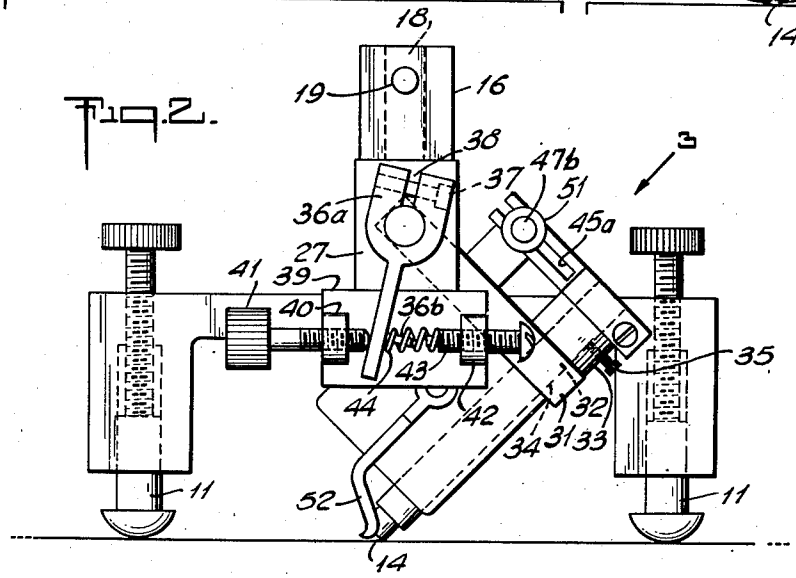
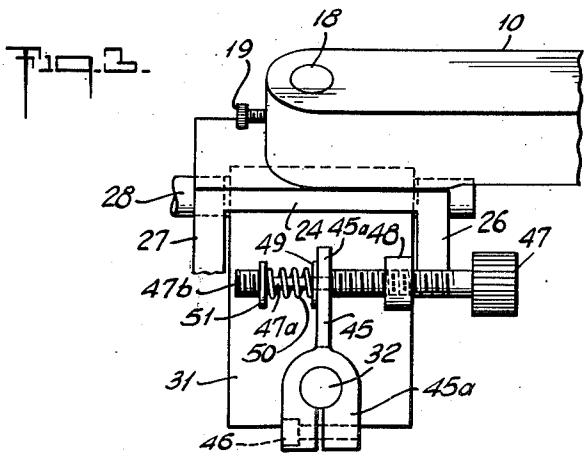


Fig. 3.



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Fig. 4.

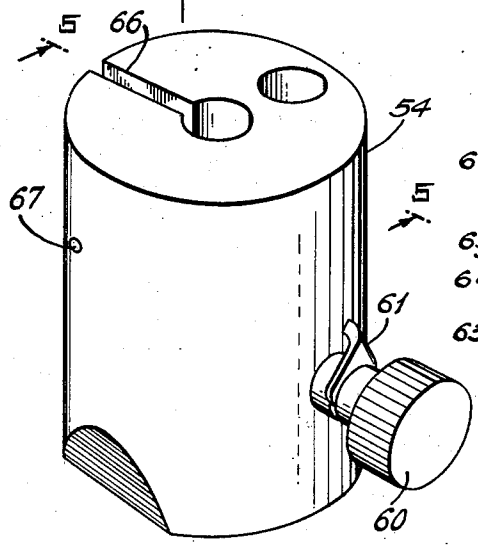


Fig. 5.

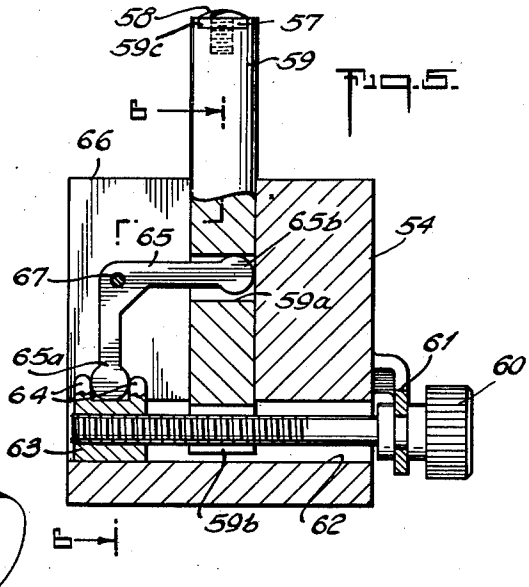


Fig. 7.

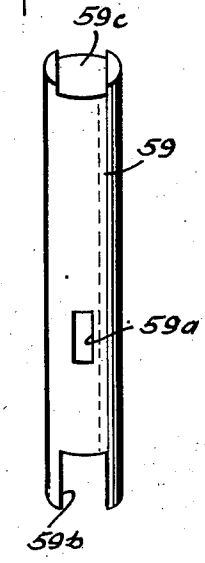
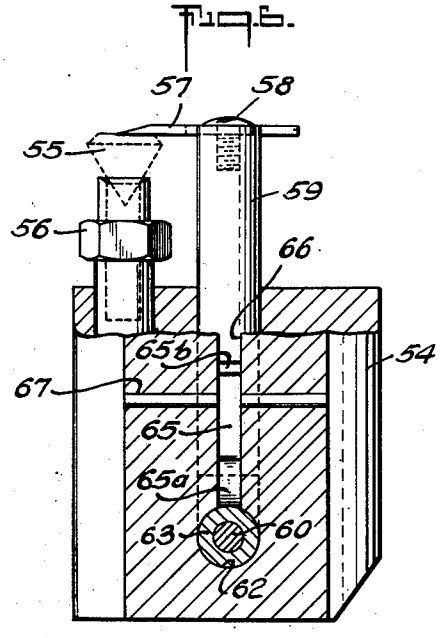


Fig. 6.



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DIAMOND POLISHING ADJUSTING DEVICE AND DOP

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8 Claims. (Cl. 51—229)

This invention relates to diamond polishing adjusting devices and has for its main object to provide improved means for setting the horizontal and vertical angles of each face of the diamond to be polished on the grinding wheel, which two settings today are arrived at by a great number of time-consuming and tedious trials and tests. And also to provide an improved diamond clamping mechanism for use in diamond chucks or "dops," said mechanism being particularly effective in use together with my angle setting device and also generally desirable for use in conjunction with any methods heretofore employed for the grinding and polishing of diamonds.

Another object of this invention is to provide a device as indicated hereinbefore, which will be readily adapted to be inserted into the equipment used at present by diamond polishers.

Another object of this invention is to provide a device as indicated above which will be simple in construction, easy to apply and use, inexpensive to manufacture, involving no change in the operation of diamond polishing, with the exception of the great advantages in the novel adjustment of the two angles through my invention together with the improved mechanism for clamping of diamonds in polishing chucks.

Still other objects of this invention will be apparent as the specification of the same proceeds or will be pointed out therein.

In the drawings forming a part of this specification and accompanying the same:

Fig. 1 is a side view of a usual diamond polishing arm, or "tong" as it is called in this art, showing my invention applied thereto;

Fig. 2 is a detailed front or end view thereof taken in the direction of arrow 2 of Fig. 1 showing the mechanism controlling the vertical angle of my device.

Fig. 3 is an enlarged view taken in the direction of arrow 3 of Fig. 2 showing the mechanism controlling the horizontal angle of my device.

Fig. 4 a perspective view of a dop into which is built a novel clamping mechanism.

Fig. 5 a sectional view of dop shown in Fig. 4 taken on line 5—5 of Figure 4.

Fig. 6 is a sectional view of dop taken on line 6—6 of Fig. 5.

Fig. 7 is a detailed view of a post showing internal slot.

Referring now to the drawings, more in detail by characters of reference, the numeral 10 indicates a usual polishing arm or tong as used by diamond polishers today, the same having adjustable legs 11, by which the inner end thereof may rest on an appropriate support, like a working table 12, while at the outer end thereof it carries the diamond receiving chuck or dop 13.

The diamond is indicated at 14, secured in said chuck as it is well known and as it will be explained hereinafter, and is engaged by the rotating grinding disk or wheel 15.

As has been indicated hereinbefore, the tong 10 and

the dop 13 are the usual devices now used by diamond polishers. Diamond polishers however, now have a different way of securing the dop 13 at the outer end 16 of the tong than the one illustrated herein and invented by me.

A rigid rod 17 is inserted into a bore 18 which is near the outer end of the tong 16 and is secured by means of a set screw 19 which is threaded through the outer end of the tong 16 and exerts pressure against the rod 17 sufficient to permit controlled rotation of the pin 17 within the bore 18, said rotation being necessary to find the grain along which the diamond will grind.

The supporting legs 11, two of them being used at the sides of the inner end 20 of the tong, will also be adjusted as to height, and secured in their position, as by the set screws 21. First, however, the tong 10 is carefully levelled, both in the longitudinal and transverse directions, as is well known to those versed in this art.

The diamond polishing will be executed by the polisher holding the tong 10 in its adjusted position.

As it is well known, the diamond 14 must be adjusted as to its position, angularly, both vertically and horizontally. The chuck or dop 13 is adjusted through rotation on both horizontal and vertical axes.

According to my invention, the rigid, non-flexible rod 17, will be secured in the bore 18 near the outer end 16 of the usual tong, but a novel adjusting device, generally indicated by the numeral 23, will be interposed between the rod 17 and the dop 13, said device 23 permitting an easy, accurate and controlled adjustment of the dop in the two desired angular positions and then permitting a rotation of the dop, without disturbing its two angular settings, around the rod 17, or on a vertical axis, whereby the diamond is set to the best direction for grinding along the grain.

In my device 23, a horizontal plate or bar 24 will be secured to rotatable rod 17 as by having the lower end of rod 17 inserted into the center of rectangular bar 24 and secured therein by means of cross-pin 25.

Two vertical bars 26 and 27 of unequal length are secured to rectangular bar 24 at either end of said bar by any appropriate means thus forming an inverted U-shaped or yoke like member consisting of bar 24 and legs 26 and 27 reaching downward from bar 24 on either side thereof.

Two co-axial bores 29 and 30 through vertical bars 26 and 27 provide a horizontal channel through which shaft 28 is inserted.

A horizontal plate 31 may be integral with or be otherwise attached to horizontal shaft 28 by suitable means and extend horizontally outward therefrom a sufficient length to accommodate dop 13 which is attached to the lower side of horizontal plate 31. The dop 13 is secured to horizontal plate 31 by means of a screw threaded pin 32 which is inserted into a threaded socket of dop 13 and passes through a sleeve 33 which is attached to and made a part of a vertical bore 34 through horizontal plate 31. The pin 32 is secured in said sleeve 33 by means of a set screw 35 threaded through wall of sleeve 33. Set screw 35 is adjusted to supply just enough tension for rotation of pin 32 without play and thereby rotation for horizontal or lateral angular adjustment of dop 13.

A lever 36 is secured vertically to outer end 28*a*, see Fig. 1, of horizontal shaft 28 by means of a sleeve arrangement 36*a* made by forking the upper end of lever 36. The sleeve encircles shaft 28 at its outer end 28*a* and is tightened against it by a screw 37 threaded through both sides of divided sleeve 36*a* at its uppermost end and passing through slot 38 separating the forked sides of sleeve 36*a*.

A rectangular plate 39, see Figs. 1 and 2, is secured to lower end of the vertical yoke leg 27 by suitable means. A raised edge 40 on plate 39 is threaded to receive a

knurled thumb screw **41** which advances against lever **36**, causing rotation of shaft **28** and thereby adjusting vertical angle of dop **13** and diamond **14**.

It is important to have platform **31** extend sufficiently beyond shaft **28** in order to form a right angle connection with pin **32** within dop **13** so that the distance from the diamond to the point of jointure of pin **32** with platform **31** is equal to the length of extension platform **31** from shaft **28**. This equi-distant right angular construction serves to maintain diamond **14** always centered beneath yoke **24** in proper cutting position. Constant centering of the diamond with a maximum 8° arc under its supporting yoke avoids costly damage to the stone by maintaining the same facet in arms **52** no matter what other adjustments are made to the device **23**. In this connection it is noted that the yoke revolving with rod **17** always remains parallel to the grinding wheel.

It will be seen that this improved construction enables the polisher advantageously to center his working operations on a selected area of the polishing or cutting wheel.

A raised edge **42** on opposite end of plate **39** is threaded to receive screw **43** which is advanced to carry a torsion or similar spring **44** at inner end of said screw against pin **36***b* which is set in lever **36**. Spring **44** resists advance of lever **36** and serves to lock it in position or to cause return of lever **36** against thumb screw **41** as desired.

Such construction effects immediate positive action of clamp lever **36** controlling shaft **23** by the slightest turn of screw **41**. This improved control of the vertical angular adjustment results from the delicately adjusted counter-action of screw **41** and torsion spring **44** on either side of lever **36**. Applicant thus avoids use of lock screws with their undesirable tendency to displace the facet when released to make corrections and to lag two or three turns before catching in reverse direction and pulling the dop with it.

Attached to upper side of platform **31** as in Fig. 3 is a means for controlled adjustment of the horizontal angle of diamond **14**. A lever **45** is secured to pin **32** by means of screw **46**. Thumb screw **47** is threaded through raised edge **48** on an upper side of platform **31** and passes through slot **45***a* in lever **45**. A section **47***a* of thumb screw **47** is narrowed as by being turned on a lathe. Mounted on section **47***a* of thumb screw **47** is a washer **49** locked against lever **45** by spring **50** which is mounted on section **47***a* followed by washer **51** which contains spring **50** within limits of section **47***a* and is followed by threaded cap **47***b* which locks against washer **51**.

An important feature of my device resides in the fact that socket **34** serves a dual purpose of seating the diamond in dop **13** and housing the means of connecting dop **13** with platform **31**. This coaxial positioning of diamond **14** with its lateral or horizontal angular adjustment means **32** permits lateral facet corrections to be made without change of position of the diamond relative to its grain.

The diamond **14** is set in the dop **13** in any of the usual manners, the one shown in the drawings consisting of two pivoted arms **52** which are moved inwardly or outwardly simultaneously, as by the operating screw **53**, and they either release the diamond or clamp it between the inner ends. This dop is well known in the art, and is used for polishing of facets or faces on the bottom of the diamond and is readily adapted to be machined for connection with my device **23** as above set forth.

In Figure 4, however, is shown a dop **54** with original and new features for polishing of faces or facets on the top of diamond **55**, see Fig. 6, and also for superimposing so-called brilliant facets upon the basic bottom facets. The faces on the top of the diamond are those which are polished from the edge of the table or flat upper surface of the diamond down to the girdle; the rough round ring which encircles the diamond and separates the top of the diamond from the bottom thereof.

It is obvious that the dop **54** may be similarly connected to my device **23** by extending and threading hollow tube **56** to receive screw threaded pin **32** connecting it to platform **31** as does socket **34** in threaded dop **13**.

The diamond **55** is inserted in a pot **56**, which is a hollowed tube for receiving the point or culet of the diamond. A flat finger **57** secured by means of threaded screw **58** to base of channel **59***c* at top of post **59** is raised or lowered to clamp or release finger **57** upon table of diamond **55**. The raising or lowering of post **59** is accomplished by turning of operating thumb screw **60** which is rotatable but stationary being held in position by forked arm **61**. Threaded upon inner end of screw **60**, which passes through dop **54**, see Fig. 5, horizontally entering through slot **62**, is a shuttle **63** with two raised arms **64** which has a to and fro motion as determined by use of operating screw **60**. Between the two arms **64** is handle **65***a* of flat and angled lever **65**. Lever **65** is pivotally held in position in slot **66** by means of cross-pin **67**. The opposite handle **65***b* of lever **65** rests in slot **59***a* of post **59**. The direction of shuttle **63** will determine the direction of pressure of handle **65***b* upon limits of slot **59***a* in post **59** and thus cause the raising or lowering of said post **59**. There is a groove **59***b* at bottom of post **59** to permit free movement of arms **64** on shuttle **63**.

As indicated in Fig. 6, tube **56** may be exteriorly threaded to receive a threaded nut (as shown) having flat springs mounted on opposite sides thereof acting as stabilizing means to prevent the stone from moving in the tube when the clamp **57** is released for turning the tube to make a new facet on the stone.

The operation of thumb screw **60** will thus make possible a simple but dependable and effective device for releasing or clamping down on diamond in a flat plane through the novel medium of the lever **65** and slotted post **59**.

The use and operation of my invention will be practically obvious from the herein description, but I want to offer the following further explanation in relation thereto.

It will be seen that the rotation of shaft **28** in its horizontal axis will cause plate **31** to swing upward or downward and the dop **13** along with plate **31**, thus adjusting the vertical angle of the diamond **14** as desired.

It will also be seen that the rotation of pin **32** in its sleeve **33** on a vertical axis will cause the dop **13** to rotate along with vertical pin **32**, thus adjusting the horizontal angle of diamond **14** as desired.

It will be seen further that if the tong **10** has been levelled by means of adjustment of legs **11**, the rotation of rod or pin **17** in its vertical axis to search for the grain along which the diamond will grind, will not affect or alter the previous horizontal and vertical angular settings of the diamond **14** clamped in dop **13** by arms **52**.

This invention provides a positive controlled vertical adjustment without any lag in reversal of direction owing to spring locking feature in operation of lever **36**.

A controlled horizontal or lateral angular adjustment is provided in conjunction with a simultaneous swing of the grips, clamps or arms **52** which hold the diamond. Previous devices for rotating the diamond horizontally have necessitated the release of grips since such previous devices were operated independently of the diamond cup or holder.

The simultaneous swing of the grips or clamps with the diamond in the horizontal angular adjustment is essential as is obvious to those versed in the art, since release of the grips is precarious and in fact will almost certainly result in upsetting the position of the diamond in its holder.

I have therefore sought to use conventional dops in conjunction with my angle setting device and have devised my novel clamping mechanism as indicated hereinabove which is especially effective for use and insertion in standard diamond dops. My diamond dop **54** is therefore similar to a standard dop used by those skilled in the art, but is completely novel and original in the use of

the clamping mechanism **57** as embodied in the post **59** operated by the lever **65** in a distinctly novel manner.

It will be understood that my device is adapted to be used with any other dop and securing means for the diamond than the one described.

While I have shown a preferred embodiment of my invention, it is to be understood that changes and variations may be resorted to in the elements, combinations and operation of my invention, and I reserve my rights to such changes and variations as are within the spirit of this specification, and the scope of the claims hereunto appended.

What I claim as new and want to protect by Letters Patent of the United States, is:

1. A cutting and polishing adjusting device for simultaneously swinging diamond clamping means while regulating the lateral angular adjustment of a stone to a cutting wheel comprising an adjustable tong, a rigid rod rotatably mounted on one end of said tong, a yoke depending from said rod, a shaft rotatably mounted on said yoke, a platform carried by said shaft, a dop mounted on said platform, a socket in said dop for seating the stone, clamping means on said dop for retaining the stone in said socket, means for rotating said shaft for vertical angle adjustment of said dop, a rotatable pin mounted within said dop for adjusting the lateral angle of said socket, whereby the position of the stone clamped in said socket is unaffected by simultaneous rotation of said yoke, said shaft or said pin.

2. A device according to claim 1 wherein said dop is mounted on one end of said platform and said pin is coaxial with said socket.

3. A device according to claim 2 wherein said shaft rotating means comprises a lever pivotally mounted upon one end of said shaft, operable means for directly adjusting the angle of said lever and resilient means engaging said lever and counteracting said operable means to effect immediate positive vertical adjustment of said dop.

4. A device according to claim 2 wherein means is disposed on said platform for rotating said pin, said means comprising a lever pivotally mounted on one end of said pin, operable means for directly adjusting the angle of said lever, resilient means engaging said lever and counteracting said operable means effecting immediate positive lateral adjustment of said socket.

5. A device according to claim 1 wherein said dop is mounted at right angles to said platform to position the stone centrally beneath said yoke in all vertical, lateral and horizontal adjustments of said device.

6. A device according to claim 1 wherein said dop has a center bore, a slotted post removably mounted in said bore, said post having a horizontal clamp mounted on the outer end thereof, angular means mounted within said slot and means cooperating with said angular means for raising and lowering said post within said bore to clamp and release the stone in said socket.

7. A cutting and polishing adjusting device for controlling the position of a stone on a polishing and cutting wheel comprising an adjustable tong, a rigid rod rotatably mounted on one end of said tong, a yoke depending from said rod, a shaft rotatably mounted on said yoke, a platform carried by said shaft, a dop mounted on one end of said platform, a socket in said dop for seating the stone therein, clamping means on said dop for retaining the stone in said socket, means for rotating said shaft for vertical angle adjustment of said dop comprising a lever pivotally mounted upon one end of said shaft, operable means for directly adjusting the angle of said lever and resilient means engaging said lever and counteracting said operable means; a rotatable pin mounted within said dop for adjusting the lateral angle of said socket and coaxial therewith, means for rotating said pin comprising a second lever pivotally mounted on one end of said pin, a second operable means for directly adjusting the angle of said second lever, a second resilient means engaging said second lever and counteracting said second operable means, whereby the position of the stone clamped in said socket is unaffected by simultaneous rotation of said yoke, said shaft or said pin.

8. A dop for use in combination with a cutting and polishing adjusting device comprising a threaded socket for seating the stone, a nut mounted on said socket, flat springs oppositely disposed on said nut for stabilizing the stone during rotation of said socket, a center bore, a slotted post removably mounted in said bore, said post having a horizontal clamp mounted on the outer end thereof, angular means mounted within said slot and shuttle means cooperating with said angular means for raising and lowering said post within said bore to clamp and release the stone in said socket.

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