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ADJUSTABLE CRANK MEANS

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FIG. 1.

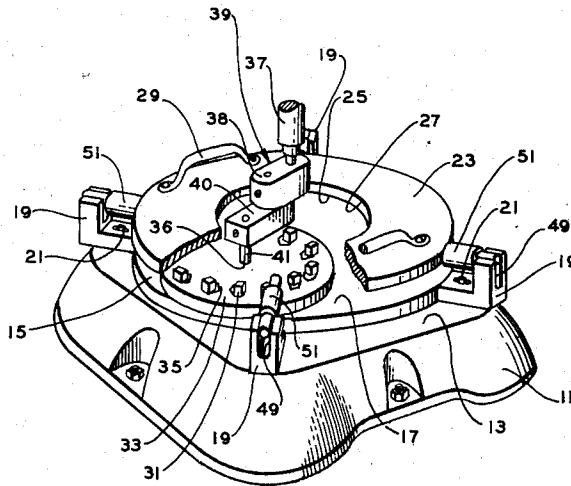


FIG. 3.

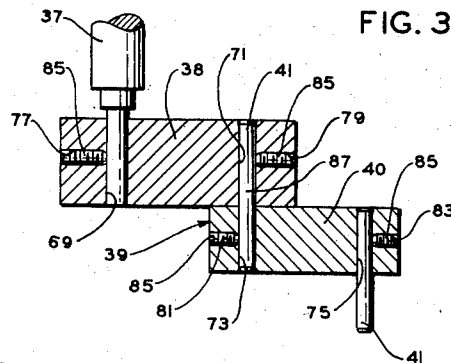
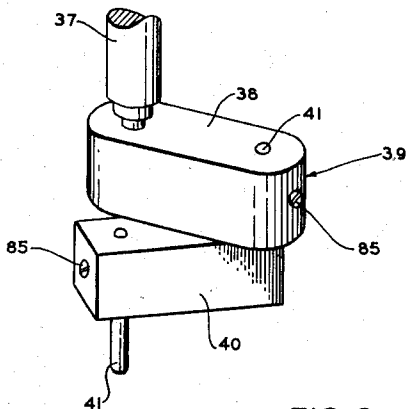


FIG. 2.

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2,518,501

ADJUSTABLE CRANK MEANS

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3 Claims. (Cl. 74-600)

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1

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to improvements in lapping machines.

Due to the enormous demand created by the war for crystals of the piezoelectric type for frequency control purposes, mass production grinding methods have been developed. One important grinding or lapping machine has evolved from the drill press and is capable of simultaneously lapping a large number of crystals on both sides. Every effort has been made to perfect these machines to save time and materials and to simplify the lapping operation.

Such a machine is provided with two, spaced, horizontally disposed, lapping plates, one above the other. Loosely positioned between said plates is a crystal carrier which holds a plurality of crystals. A rotary motion is imparted to said crystal carrier by the spindle of the drill press which operates through a small crank and thereby moves the crystals between the lapping plates. It has been found that such machines have the disadvantage of using the same crank for different sized crystals. In such operation, small crystals will not reach the inner and outer edges of the lapping surfaces and large crystals will go beyond said edges. An adjustable eccentric, small in size, simple to operate, requiring a minimum of machining and requiring a minimum of material (in view of the shortage of materials, tools and labor due to the war effort) is desired.

It is, therefore, an object of the present invention to provide an adjustable eccentric which is small in size and simple in operation.

It is another object to provide an adjustable eccentric which requires a minimum of material and machine work to manufacture.

It is a further object to provide an adjustable eccentric for a crystal lapping machine which will allow machines in present use to be efficiently used for lapping crystals of different sizes so that they may be adjusted to utilize the full lapping surfaces irrespective of crystal size.

It is a further object to provide an adjustable eccentric which is readily variable from zero to maximum eccentricity.

It is another object of this invention to provide an adjustable crank arm wherein the depending pin at the outer end of the said arm may be readily replaced when worn, without requiring unnecessary labor and machining.

It is still another object to provide an adjust-

2

able crank arm which may be adjusted without the likelihood of breakage of crystals or other parts.

In crystal grinding machines generally, under usual quantity production arrangements, the operator has access to the machine—conveniently—only from one direction which may be termed the front. In the stopping of the machine, the crank will stop in various positions, and a large number of these possible positions are not convenient for access to the fastenings by which the crank elements are secured in their adjusted radius positions. The same is true of adjustment of holders and cranks for varying thicknesses of crystals. This is particularly true in the drill press machines, where the usual standard or post (springing from the drill press base and carrying the spindle and its drive) will prevent the presentation of the hand or a tool from the rear or effectively from a wide range of angles toward the sides. Where a bank of such machines is set up in close relation side by side, also, there is considerable risk of injury to the operator by the next machine if an attempt is made to present a tool from either side, as well as involving danger of disturbance of adjustments on the neighboring machine by impact of its parts against the arm or garments of the operator.

On this account, it is an object of the invention to evolve a simple and low cost device having the capabilities of adjustment required, of radius and height of an eccentric which will at the same time afford access to fastenings on the adjustment from opposite sides, so that if one such fastening is exposed toward the rear in such machines there will also be afforded access from the front to an equivalent fastening; and at the same time to keep these fastenings in the smallest, simplest form, requiring no special or bulky tools for operation.

Other and further objects will become clear from the specification and claims hereinafter set forth.

The objects aforesaid are achieved by making up an adjustable eccentric of a main crank, an auxiliary crank, and several pins, the said parts being joined by some simple means, such as set screws. The auxiliary crank may be rotated relative to the main crank so that the combination may be adjusted from zero to maximum eccentricity. As the auxiliary crank may be locked at any position, intermediate these two extremes, any amount of eccentricity therebetween may be readily obtained.

The novel features which it is believed are

characteristic of this invention are set forth with particularity in the appended claims, but the invention itself will best be understood by reference to the embodiment set forth in the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a perspective view of the lower portion of a crystal lapping machine embodying the present invention, wherein the adjustable eccentric is shown in its fully extended position, and part of the upper lapping plate is cut away for clarity;

Figure 2 is an enlarged perspective view of the adjustable eccentric of Figure 1, wherein it is shown adjusted for relatively small eccentricity; and

Figure 3 is a vertical radial cross sectional view of the said adjustable eccentric, wherein it is shown adjusted for maximum eccentricity.

The lapping machine, shown in the drawings, stands upon a base 11, having a flat, horizontally disposed, top surface 13. Resting upon said surface 13 is a metal, disc-like, planiform lower lapping plate 15; the top, flat, horizontal surface 17 of which forms the lower lapping surface of the machine. Positioned about the lower lapping plate 15 are four aligning brackets 19, each of which is secured to the base 11 by means of a machine screw 21.

Spaced above the lower lapping plate 15 is a metal annular upper lapping plate 23 of the same diameter, the lower, flat, horizontal surface 25 of which forms the upper lapping surface of the machine. The central portion of said upper lapping plate 23 is cut out to form a circular aperture 27 concentric with the plate's outer periphery. Said upper lapping plate 23 is also provided with two lifting handles 29. The outer periphery of said upper lapping plate 23 is pierced by four horizontally disposed holes, into each of which is inserted a spacer bar 51. The outer reduced ends of said spacer bars 51 extend respectively into vertical slots 49, in the brackets 19, and they (and consequently also the plate 23) are free to move vertically in said slots.

Interposed between the two lapping plates 15, 23 are a plurality of crystals 31 to be lapped. Said crystals 31 are retained in spaced relationship relative to each other by a carrier 33 which is a disc of insulating material, such as Bakelite, of smaller diameter than the lapping plates 15, 23 (but of substantially greater diameter than the aperture 27), and pierced by a small circular axial hole 36 and a plurality of holes 35 shaped to loosely receive the crystals 31. The carrier 33 is not as thick as the crystals 31 which are to be lapped. The machine may be provided with several carriers 33 of different thicknesses and having different sized holes 35 so that a suitable carrier may be used in lapping crystals of a particular thickness and size.

Axially positioned above the lapping plates 15, 23 is a spindle 37 which is rotatable by a motor (not shown), and raisable and lowerable by familiar means (not shown). Secured to the lower end of the spindle 37 is an adjustable eccentric 39 fitted with a depending wrist pin 41 which is of a size to make a rotatable fit in the center hole 36 of the carrier 33.

The adjustable eccentric 39 comprises the upper main and radial crank 38 and the lower auxiliary and variable-radius crank 40. The main crank 38 is pierced by two vertically disposed circular bores 69, 71. The auxiliary crank 40 is similarly pierced by two vertically disposed

circular bores 73, 75. Formed in the ends of the respective cranks at right angles to each of said bores 69, 71, 73, 75, and communicating respectively therewith, are horizontally disposed, threaded, set screw holes 77, 79, 81, 83, each of which holes receives a set screw 85. The lower end of the spindle 37 fits into the bore 69. A single straight, circular knuckle pin 87 fits into the apertures 71, 73. A second straight, circular pin, which is the wrist pin 41 before mentioned, fits into the aperture 75 and extends downwardly beyond said aperture. Said spindle 37, and said pins 87, 41 are held and locked in place by the four set screws 85 aforesaid. It may be noted from Fig. 3 that pins 87 and 41 are of approximately the same diameter, so that assembly is correspondingly simplified.

In operation of the lapping machine, shown in the drawings, the two lapping plates 15, 23 are disposed in register, the carrier 33 and the crystals 31 being so positioned between the lapping plates 15, 23 that the crystals 31 will move over the full width of the lapping surface 25, but will not go beyond the edges thereof. The set screw 85 in the set screw hole 79 is then loosened and, while the auxiliary crank 40 is being supported in place manually, the spindle 37 is moved downwardly until the depending pin 41 is lowered into the center hole 36 of the carrier 33, through the central aperture 27. The said set screw 85 in the set screw hole 79 is then tightened. Rotation of the spindle 37 by means of the motor (not shown) will then cause the crystals 31 to move about horizontally between the upper and lower lapping surfaces 17, 25, a suitable grinding compound being applied.

It is readily seen that the parts of the adjustable eccentric just described require a minimum of machining, that the eccentricity is readily adjustable and that any parts which may wear may be easily and inexpensively replaced, such wear usually occurring mainly in the depending pin 41.

Although the embodiment herein described, to illustrate the present invention, is shown in connection with a crystal lapping machine. It will be understood that it is within the spirit of the invention to apply it to other lapping or grinding machines and to other uses.

What is claimed is:

1. In a crystal grinding machine of the character described, wherein a vertical spindle is operable over a bottom planiform grinding plate having an annular planiform grinding plate vertically free thereover, and wherein a circular crystal carrier is free between the plates having a variable radius eccentric connection with said spindle; an improved variable throw crank to connect the spindle and carrier comprising an upper crank arm constructed to be fixed to the spindle, a vertical bore therethrough adjacent its outer end, a knuckle pin slidable therethrough, pin-locking means on the arm having an operating part exposed outwardly on the radius of the arm, a lower crank arm having a vertical bore therethrough adjacent each end, either of the last-named bores being capable of receiving slidably therethrough said pin, a wrist pin slidable alternatively in said holes of the lower crank arm to project therebelow and engage the carrier, and respective pin-locking means at the ends of the lower crank arm having respective operating parts exposed longitudinally on the ends of the arm and constructed for operation by a tool while positioned approximately along the longitudinal axis of the respective arm.

2,518,501

5

2. The structure of claim 1 wherein each said pin-locking means comprises an operating member set in the extremity of the respective arm accessible by a tool presented approximately in alignment with the longitudinal axis of the arm.

3. The structure of claim 1 wherein the said upper crank arm is vertically bored to receive the spindle slidably therethrough, and a spindle-binding member thereon exposed radially opposite the outer end of the arm.

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REFERENCES CITED

The following references are of record in the file of this patent: 15

6

UNITED STATES PATENTS

Number	Name	Date
96,643	Wanzer	Nov. 9, 1869
625,150	Crutchlow	May 16, 1899
1,553,193	Siddle	Sept. 8, 1925
2,214,523	Christiansen	Sept. 10, 1940

FOREIGN PATENTS

Number	Country	Date
348,286	Italy	May 15, 1937