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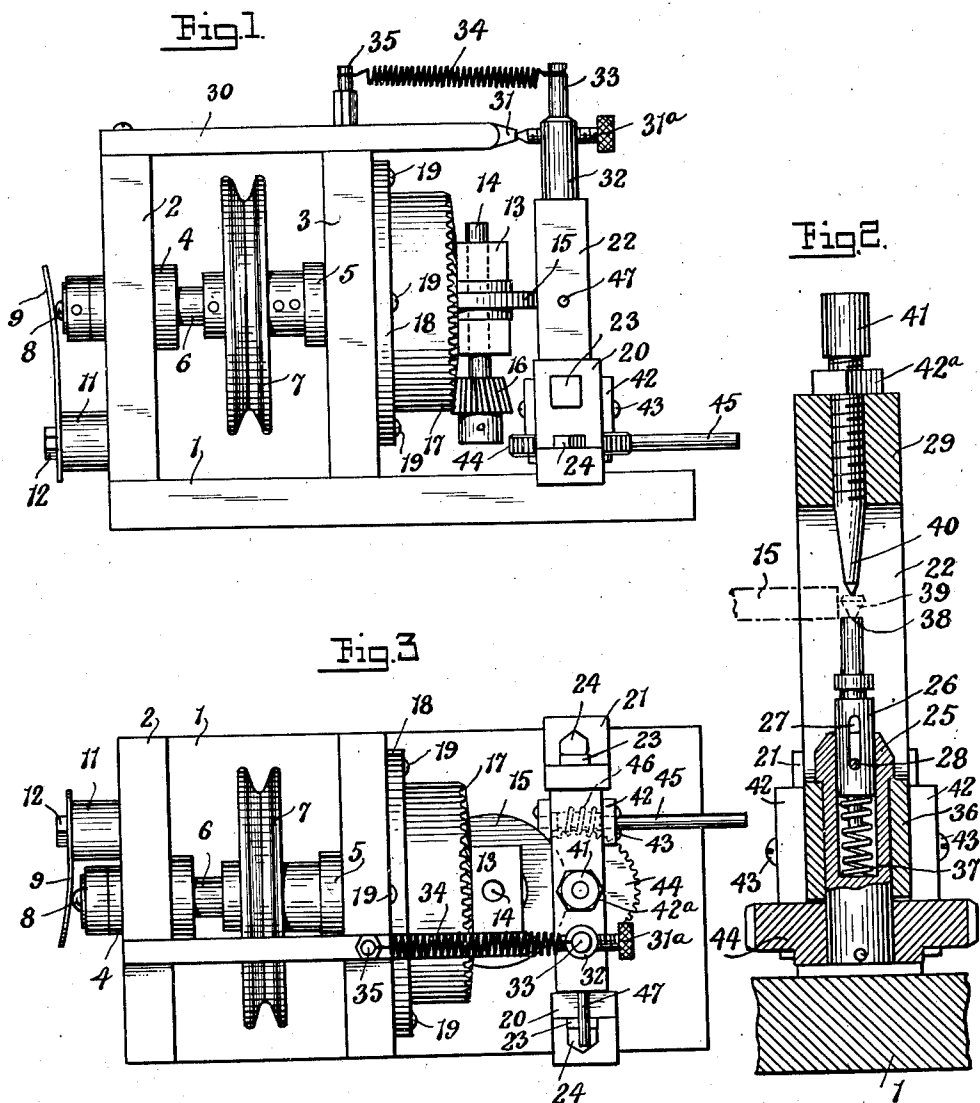
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GRINDING OR POLISHING MACHINE

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GRINDING OR POLISHING MACHINE

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This invention relates to grinding or polishing machines, and more particularly to machines of this character which are used for the polishing of diamonds and other precious stones.

In the polishing of diamonds, difficulty is often encountered in working on certain portions of the stone, such as, for example, the girdle of the stone, and unless the polishing operation upon this part of the diamond is done by hand operation and by skilled workers, the polishing of the girdle portion of the stone is often left undone. An object therefore, of the present invention, is to provide an apparatus by means of which the girdle and other normally inaccessible portions of the stone may be readily and effectively polished without especial skill on the part of the operator.

Another object of the invention is to provide, in a machine of this character, means by which the polishing operation is performed by a rotating polishing wheel, rotating in several directions, whereby the polishing is done in such a manner and from various angles that a complete and exceptionally uniform polishing result is attained.

In hereinafter describing the apparatus as a polishing machine intended for work upon diamonds, I wish to be understood as not limiting the machine to such use, since the polishing or grinding functions performed by the apparatus can be used for a multitude of other grinding purposes.

In the accompanying drawing, wherein an illustrative embodiment of the invention is disclosed, Fig. 1 is a side elevation of a polishing machine constructed in accordance with the invention; Fig. 2 is a top plan view of the same; Fig. 3 is a sectional view on the line 3-3 of Fig. 4, looking in the direction of the arrows; Fig. 4 is an end view of the machine, looking at the right end of Fig. 1; Fig. 5 is a sectional view transversely of the machine, looking at the gearing, and Fig. 6 is an end view of the machine, looking at the left end of Fig. 1.

In the drawings, 1 indicates the base plate of the machine. At one end of the base is located the vertical end wall 2 and spaced therefrom and located parallel thereto, is a second vertical wall 3. Wall 2 is provided with a centrally located bearing 4, and wall 3 with the bearing 5, a shaft 6 being rotatively mounted in these bearings. Secured on the shaft 6 is a pulley 7 adapted to be engaged by a belt extending from an electric motor to thereby rotate the shaft 6 at the required speed.

At one end, the shaft is provided with a clevis 13 in which a shaft 14 is rotatively mounted, said

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shaft 14 having its axis disposed at right angles to the longitudinal axis of the shaft 6. Secured upon the shaft 14 is the polishing wheel 15, so that it will be apparent that when the shaft 14 is rotated, a rotation of the polishing wheel on an axis parallel to its plane will take place. On one end of the shaft 14 is attached a pinion 16 which is in mesh with a large stationary ring gear 17, the latter being provided with a flange 18 secured to a face of the upright wall 3.

It will be clear from the foregoing, that the arrangement described is such that when the shaft 6 is rotated by a motor (not shown) and which drives the pulley 7, the clevis 13 will be rotated, this acting to rotate the shaft 14 about a transverse axis. As such rotation of the shaft 14 takes place, it is caused to also rotate about its own longitudinal axis by the rotation of the pinion 16 in meshed engagement with the fixed ring gear 17. As a result of the arrangement described, the polishing wheel 15 will not only be rotated about its own axis but will also be rotated about the axis of the shaft 6, or in other words, about an axis extending parallel to the plane of the polishing wheel.

Provided at the opposite sides of the base plate 1 are the brackets 20 and 21, said brackets being secured to the base by the screws 24. These brackets act as a support for a frame 22 pivotally held between the brackets 20 and 21 by means of the screws or bolts 23, the pivots for the frame 22 being thus located adjacent to the lower end of the frame.

Rotatively mounted in the lower cross-bar 36 of the frame 22 is a hollow shaft 25 in which a vertically movable stem 26 is located, the upper end of said stem being provided with a seat 38 (Fig. 2) for the diamond 39 to be polished. The stem 26 is provided with an elongated, longitudinally extending slot 27 through which a cross-pin 28 extends, this slot-and-pin arrangement permitting raising and lowering movement of the stem 26 within the limits of the slot. The stem is normally urged upwardly by means of the coil spring 37 located within the shaft 25 and operative against the lower end of the stem 26 as clearly seen in Fig. 2.

The diamond 39 to be polished, is thus placed upon the seat 38 and is held thereon by means of a threaded pin 40, threadably received through the top cross-bar 29 of frame 22. The pin 40 is provided with a head 41 by which it may be adjusted through the cross-bar 29, and with the nut 42a, by means of which its adjustment can be maintained and repeatedly secured. A feeler pin

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47 extends through one of the sides of the frame 22 and aids in securing the desired location and positioning of the diamond 39 on the seat 38.

The diamond being carried by the seat 38, is rotated relative to the polishing wheel 15, and the rotative movement of pin 26 is secured by means of a gear 44 secured at the lower end of shaft 25, and driven by a worm 46 (Fig. 3) secured on a shaft 45 rotative in bearings 42. The bearings 42 are in the form of plates attached to the sides of the frame 22 by the screws 43. Shaft 45 is provided with a pulley or other means, not shown, by means of which it may be driven from the motor which rotates shaft 6, or from a separate motor or other source of power.

The adjustment of the diamond to be polished to bring it to and from the periphery or edge of the grinding wheel 15, is secured by swinging the frame 22 on its pivots 23 to or from the wheel. Extending across the tops of the upright plates 2 and 3 and secured to the tops of said plates, is a bar 30, having a tapered end portion 31, the end of which serves as an abutment or seat for the end of an adjusting screw 31a. Screw 31a is threadably adjustable through a vertical post 32 rising from the top of the frame 22. From the top of the post 32 projects a pin 33 which serves as an anchorage for one end of a coil spring 34 which has its opposite end attached to the upright post 35 attached to and rising from the top of the bar 30.

The arrangement just described is such that the spring 34 normally tends to draw the frame 22 toward the polishing wheel 15 to bring the stone 39 against the edge of the wheel. The distance which the frame is drawn by the spring 34 is regulated by the adjusting means 31, 31a as just described, and through this arrangement a precise adjustment of the diamond in respect to the polishing wheel is secured. To aid in maintaining a precise adjustment and thereby accurately regulating the extent to which the diamond is polished, it is desirable that no end play be permitted in the shaft 6, carrying the polishing wheel 15. Accordingly, the shaft 6 is maintained under endwise pressure by means of a leaf spring 9 secured at one end to a stud 11 by the screw 12. The opposite end of the spring 9 exerts pressure on a ball 8 held in a recess in the end of the shaft 6. Through this arrangement, wheel 15 is held against movement axially of the shaft 6 and its position relative to the diamond upon which it is operating is consistently maintained.

From the foregoing, the operation of the machine will be readily understood. The diamond 39 or other object to be polished, is placed upon the seat 38 and is held thereon by the contact of the end of the pin 40, the stone being accurately set on the seat by use of the feeler pin 47. By adjustment of the screw 31a the extent to which the diamond is ground or polished can be regulated.

When the diamond is in place, as above described, shafts 45 and 6 are set in motion. Rotation of shaft 45 will cause rotation of the stem 26 about a vertical axis, so that the diamond held on the seat 38 of the stem 26 will be rotated. As shaft 6 is rotated it will rotate the polishing wheel 15 about the longitudinal axis of the shaft 6 or about an axis parallel to the plane of the polishing wheel 15. As shaft 6 rotates as above described, the pinion 16 is caused to rotate through its mesh with the ring gear 17, this causing rotation of the shaft 14 and spinning of the wheel 15 about the axis of the shaft 14. It will thus be

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obvious that the polishing wheel not only rotates about its own central axis, or about the axis of the shaft 14, but it is also rotated about the axis of the shaft 6, and thus by this arrangement a very effective polishing result is secured, and particularly on the girdle and on other normally inaccessible parts of the diamond. While the wheel 15 is operating in the manner just described, the diamond is also being rotated about a vertical axis. The relative sizes of the pinion 16 and the ring gear 17 are to be noted since it is desirable to rotate the polishing wheel about the axis of shaft 14 at a higher speed than the shaft 6 is rotated. In the present arrangement, a four-to-one gear ratio is used, but this can be modified to suit different requirements.

While I have shown and described one embodiment of the invention, it is obvious that the same is not to be restricted thereto, but is broad enough to cover all structures coming within the scope of the annexed claims.

What I claim is:

1. In an apparatus of the character described, a main shaft provided with a bearing at one end, a short shaft rotative in said bearing, a polishing wheel mounted on said short shaft, a pinion carried on the short shaft, a fixed ring gear with which the pinion meshes, a pivoted frame, a diamond-holding device carried by said frame and adapted to hold a diamond against the periphery of the polishing wheel, means for normally urging the frame toward the polishing wheel, adjusting means for limiting the extent of movement of the frame toward the polishing wheel, and means for rotating the diamond-holding device in the frame.

2. In an apparatus of the character described, a base, uprights arising therefrom, a main shaft rotatable in said uprights, a clevis at one end of said shaft, a short shaft rotatively mounted in said clevis, a polishing wheel secured on the short shaft, the axis of said short shaft being disposed transversely to the longitudinal axis of the main shaft, a pinion carried by the short shaft, a ring gear surrounding the main shaft and secured to one of the uprights, the pinion being in mesh with the ring gear, a support for a diamond, and means for adjusting said support to and from the polishing wheel to hold the diamond thereon against the polishing wheel.

3. In an apparatus of the character described in claim 2, wherein the support for the diamond is provided with a rotatable seat for the diamond, and means for rotating said seat.

4. In an apparatus of the character described comprising, a support, spaced uprights arising from the same, a main shaft rotative in the supports, a ring gear secured to the face of one of the supports, the main shaft extending through the center of the ring gear, a short shaft rotatively carried at the end of main shaft, the axis of the short shaft being at right angles to that of the main shaft, a polishing wheel carried by the short shaft, a pinion secured on the short shaft and in mesh with the ring gear, means for exerting endwise pressure on the main shaft, a pivoted frame, a diamond seat in said frame, means for normally urging the frame toward the polishing wheel, means for adjustably limiting the movement of the frame toward the polishing wheel, and means for rotating the diamond seat within the frame.

5. In an apparatus of the character described, a base, a shaft rotatable above the base, supporting means rising from the base and rotatably sup-

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porting the shaft, one of said supports carrying a fixed ring gear, the shaft extending through said ring gear, a bearing at the end of the shaft, a polishing wheel rotatively mounted in the bearing, a projection from said polishing wheel carrying a pinion in mesh with the fixed ring gear, a frame pivoted above the base, a diamond-holding device carried by the frame and holding a diamond against the periphery of the polishing wheel, means for normally urging the frame toward the polishing wheel, adjustable stop means for limiting the extent of movement of the frame toward the polishing wheel, and means for rotating the diamond-holding device in the frame.

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