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ROUTER BIT GRINDER

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2 SHEETS—SHEET 2

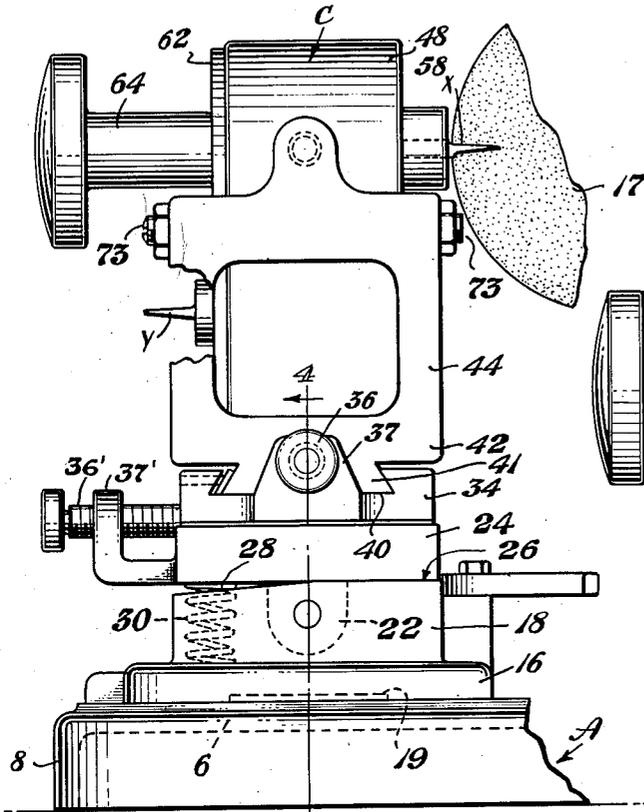


Fig. 2.

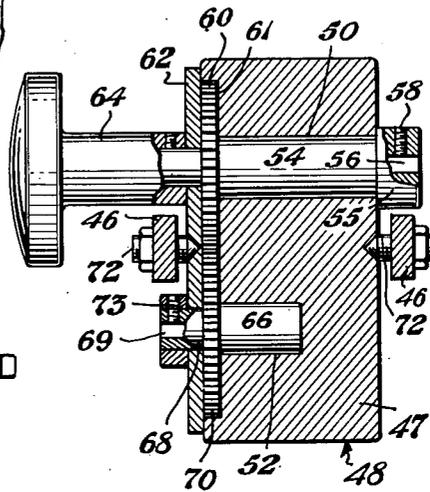


Fig. 3.

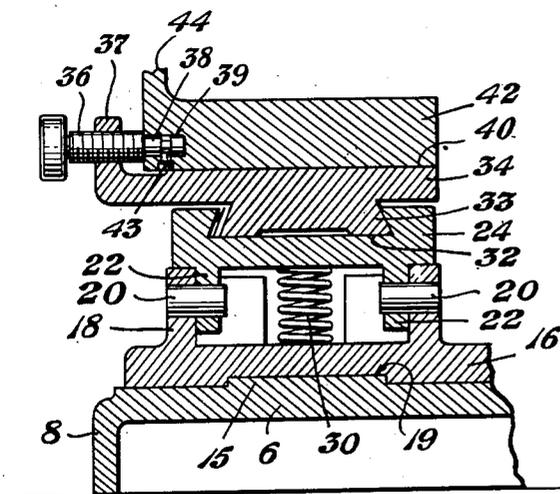


Fig. 4.

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ROUTER BIT GRINDER

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6 Claims. (Cl. 51—127)

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The present invention relates to a sharpening or grinding device comprising generally an improved work holder and grinder arranged in co-operating relationship for the accurate and controlled reconditioning of bits or the like.

More particularly the device embodying the invention herein is intended for use in the reconditioning of small router bits such as those used by photo-engravers, electrotypers and stereotypers. Heretofore it has been common practice for a craftsman to recondition a bit by placing it in a small extension holder and thereafter sharpen it by manually holding the bit against the disk or peripheral face of a bench grinding wheel. The fact that the operation is entirely dependent upon the skill of the individual performing it, creates a number of different results inasmuch as the clearance and backing off of the bits will vary tremendously. When a tool is re-sharpened under these conditions excellent results are often accomplished by skilled workers but only at the expense of cutting away an undesirable amount of the metal, thus substantially reducing the life of the drill or bit.

The object of the present invention is to provide a device wherein the above mentioned difficulties are overcome by utilizing means whereby accurate positioning of the work relative to the grinder may be accomplished and thereafter the work is firmly held in set position throughout the sharpening operation.

Another object is a device wherein body cuts are accurately controlled by providing a master bit which functions to gauge the amount of material being removed. Furthermore upon completion of the body cut or sharpening the device may be readily and quickly adjusted to a second position whereby point sharpening may be accomplished.

A still further object is to provide a device which will accomplish the aforementioned results, yet is of relatively simple design, is readily manufactured and is of such substantial construction that it will last indefinitely.

With these and other objects in view, which may be incident to my improvements, the invention consists in the parts and combinations to be hereinafter set forth and claimed, with the understanding that the several necessary elements, comprising my invention may be varied in construction, proportions and arrangements, without departing from the spirit and scope of the appended claims.

In order to make my invention more clearly understood, I have shown in the accompanying

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drawing means for carrying the same into practical effect, without limiting the improvements in their useful applications to the particular constructions, which for the purpose of explanation, have been made the subject of illustration.

In the drawings:

Figure 1 is a plan view of a device embodying the invention herein, the parts being positioned for body sharpening, and a part being broken away to show the master bit and follower.

Fig. 2 is a side view as seen from the right of Fig. 1, the grinder being omitted except for a segmental portion of the grinding wheel.

Fig. 3 is a vertical sectional view of the chuck holder, and showing its pivotal supports.

Fig. 4 is a vertical sectional view taken on the line 4—4 of Fig. 2.

Fig. 5 is a view similar to Fig. 2 but with the work holder in point sharpening position; and

Fig. 6 is a vertical sectional view on the line 6—6 of Fig. 1.

Referring to the drawings, the embodiment illustrated comprises generally a base A which serves as a common support for the grinder B and work holder C, the grinder being located on the base A in the first quadrant thereof and the work holder in the third quadrant for reasons which will hereinafter become apparent as the description progresses.

More specifically the base A is of rectangular shape having a base plate 6 supported by depending side walls 8. Secured to the base plate, in any suitable manner, is a foundation 10 for supporting the motor 12, the latter being removably secured thereon in any desired manner. The motor 12 operates a cutting wheel 17 carried by an extension of the motor shaft and rotatable therewith, the starting and stopping being controlled by the usual throw switch 14. As the grinder is of usual construction, a more detailed description is not required for an understanding of the invention herein.

Looking now to the work holder C it is designed to carry a piece of work or bit X upon which a grinding operation is to be performed and a second bit Y which functions as a master gauge during the body cutting operation. This work holder is so constructed that the bit X may be transversely moved toward and away from the disk face of the grinder or across the peripheral face thereof; longitudinally adjusted toward and away from the axis of the grinder; angularly adjusted in a horizontal plane and also angularly adjusted in a vertical plane.

The manner in which these adjustments are

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accomplished will best be understood from the description of the structural parts of the work holder starting with the lowermost member thereof. This member comprises a swivel table 16 having a flat bottom face with a cylindrical center recess 19 adapted to overlie a cylindrical raised portion 15 of the base plate 6 (see Fig. 4). The raised portion 15 serves to center the holder and guide it as the latter is rotated to any desired angular position and thus to angularly adjust the bit X in a horizontal plane.

To lock the swivel member 16 in any desired position, there extends therefrom a radial projection 21 having an opening through which a locking bolt 11 passes. The bolt 11 also passes through an arcuate slot 9 in the base plate 6 and terminates at its lower end in an enlarged head 13 (Fig. 6). The upper end of the bolt 11 is threaded to receive a nut 7, which when tightened against the upper face of projection 21, draws the head 13 against the base plate and secures the turntable 16 in adjusted position.

The member 16 supports a pivot member 24 and for this purpose further includes a substantially rectangular supporting frame 18 extending vertically from the upper face thereof. As best seen in Fig. 2, the upwardly facing peripheral surface portion 25 of the frame 18 forward of the vertical center line (Fig. 2) is parallel to the base whereas the after portion 28 tapers downwardly from the center line, for reasons hereafter described. Centrally located in the side walls of the frame 18 are openings for receiving pivot pins 20, the pins extending thru like openings in the depending ears 22 of the pivot member 24. The pivot member 24 is also rectangular and of sufficient size to rest on the frame member 18. The pivot member normally rests with the forward portion of its bottom face overlying the horizontal face portion 26 of the frame 18, being held in this position by the weight of the holder and the spring 30 located between the side walls of frame 18 adjacent the tapered portions thereof. When the pivot plate is in its normal horizontal position, the vertical axis of the holding means C is perpendicular to the base and the bit X is in horizontal position for body grinding operations, whereas if pivoted to overlie the tapered portion 28 the vertical axis is at an acute angle to the base and the bit X has been correspondingly adjusted in a vertical plane and positioned for point grinding as seen in Fig. 5.

The pivot member 24 constitutes a support for a longitudinally movable slide 34 and to carry the same, the upper face of the pivot member is provided with an external dovetail slot 32 cut therein, for receiving the corresponding dovetail bearing 33 of the slide 34, as shown in Fig. 4. The slide 34 is also provided with an external transversely extending dovetail 40, cut or otherwise formed in its upper face, for receiving a corresponding bearing 41 of a carrier 42.

It will be noted that the slide 34 is adapted to be moved longitudinally of pivot member 24 by a micrometer screw 36' (Fig. 2), and that the carrier 42 is adapted to be moved transversely of slide 34 by a similar screw 36 (Fig. 5). In view of the fact that each of the screws is mounted in identical manner, the one associated with carrier 42 will be described. As will be seen in Fig. 4, the inner unthreaded end 38 of the screw 36 is received in a short bore 39 in the end of the carrier 42. The end 38 of the screw is undercut to receive the end of a locking pin 43, whereby the screw 36 may be rotated without being with-

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drawn. The threaded portion of the screw 36 extends through a threaded opening provided in the vertical arm of a right angle guide member 37, this member having its lower arm secured to the slide 34. The threaded portion of the screw 36' extends through a threaded opening provided in the vertical arm of a right angle guide member 37', this member having its lower arm secured to the pivot member 24.

With the above arrangement it will be seen that upon rotation of the screw 36' or 36 the associated member will be moved toward or away from the adjacent guide member 37' or 37. In this way, slide 34 may be moved longitudinally to carry the bit X toward or away from the axis of the grinding wheel, and the carrier 42 moved transversely to carry the bit toward or away from the disk face of the wheel.

As best seen in Figs. 1 and 2, there extends vertically from the base of the carrier at the right edge thereto, a supporting frame 44 having a pair of spaced parallel arms 46 projecting horizontally from the side edges thereof, these arms forming with the other elements of the carrier a cradle for supporting the chuck holder 48. The chuck holder 48 comprises a solid metal rectangular housing 47 having an upper bore 50 extending longitudinally therethrough and a lower bore 52 extending longitudinally from the front face to the center. The bores are arranged on the vertical center line of the holder at equal distances above and below the horizontal center line.

The upper bore 50 has mounted therein a spindle 54, the clearance between the spindle and bore being just sufficient to permit rotation while assuring accurate centering at all times inasmuch as the surface of the bore constitutes a bearing for the spindle. The spindle 54 extends beyond both faces of the holder, the inner end being enlarged and provided with a center opening 56 to constitute a chuck 55 for holding the work to be sharpened, in this case, the bit X. The work or bit may be secured within the chuck by any suitable means as by a radial screw 58.

The outer end of the spindle 54 is reduced in diameter and secured thereon in any suitable way is a gear 60 which fits within a suitable recess 61 in the holder, the recess being covered by a face plate 62. The reduced end of the spindle also extends through an opening in the face plate and secured thereon as by a set screw is a handle 64 whereby the spindle may be rotated to rotate the gear, chuck and bit.

Mounted in the lower bore 52 is a second spindle 66, this spindle also having just sufficient clearance to permit rotation yet be accurately centered. The outer end of spindle 66 has a reduced end 68 on which there is secured a gear 70. This gear also fits within the recess 61 and is of like size to the gear 60 and meshes therewith. The reduced end 68 of spindle 66 also extends through an opening in the face plate and its outer end is enlarged and provided with a center opening 69 to constitute a chuck for holding a master gauge which may be secured in position by a radial screw 73, in this instance the gauge being the bit Y.

With the chucks arranged as indicated, the holder 48 is further provided with pivots 72 arranged midway between the chucks on the vertical center line thereof, these pivots extending through openings in the spaced arms 46 of the carrier 42, thus pivotally mounting the chuck holder on the carrier. The purpose of this pivotal mounting is to allow constant biasing or ro-

tation of the holder to carry the master bit Y into engagement with a follower screw 78 (see Fig. 1), threadedly mounted in the frame member 44, and the bit X into engagement with the cutting wheel. The holder is normally rotated to position the bit Y against screw 78 by a spring 80 interposed between the upper end of the member 44 and holder 48, the spring thus continuously acting to pivot or rotate the holder in a counterclockwise direction, as indicated by the arrow in Fig. 1.

With the grinding means and holder constructed in the manner described, it becomes apparent that with the grinder located in the first quadrant and the holder in the third, the grinding wheel and bit to be sharpened are normally positioned in close proximity to one another. Because of this arrangement, a minimum of adjustment of the holder is required to properly set the bit for sharpening operation.

With this relative positioning when a sharpening operation is to be performed, there is initially placed in the chuck 69 a new bit Y to function as a master gauge, the bit being arranged with its cutting edge in contacting engagement with the follower, 78. Thereafter a like bit to be ground is placed in the chuck 55 and the necessary angular, longitudinal and transverse adjustments are made to bring the bit into proper positioning relative to the abrasive wheel 17, by respectively adjusting the turntable 16, slide 34 and carrier 42.

Thereafter the grinding wheel is started and simultaneously the handle 64 of the holder is rotated causing rotation of the two chucks. Inasmuch as the chuck holder 48 is pivotally mounted, it will duplicate the radial movement of the master bit as the latter moves over the follower screw 78 and the clearances of the master bit will be duplicated on the bit being ground. Inasmuch as the bits are firmly set in the chucks, the resultant grinding is extremely accurate and only a minimum amount of metal is cut from the body, thence the life of the bits will be substantially prolonged.

Following the completion of the body grinding, the holder may be angularly adjusted in the vertical plane by turning it on the pivots 20 until the bottom face of member 24 rests on the tapered portion 28 of the frame 18. Thereafter the holder may be adjusted longitudinally to withdraw the bit and then transversely adjusted to bring the end into contact with the peripheral edge of the grinding wheel, whereupon end sharpening may be accomplished.

In order to secure the holder in its point sharpening position, there is provided a right angle locking lever 90 having a handle 92 and locking arm 94 with an inwardly extending tongue 96. The lever 90 is pivotally mounted at 98 on the turntable and when the holder is out of vertical, the tongue 96 is moved under the slide to lock the holder. Upon removal of the tongue by pivoting the lever, spring 30 will urge the holder back to vertical.

From the foregoing it will be seen that there is provided a holder which permits accurate grinding and sharpening of bits by unskilled workmen. Once set, the bit to be ground is constantly urged into proper position by spring 80, this spring biasing the holder so that the master bit engages the follower. As the movement of the master bit controls the movement of the bit to be ground toward and from the grinding wheel, the proper clearance is always maintained and as a result, successive bits of like size will be uni-

formly ground without excessive removal of metal thus substantially prolonging their life.

It will also be seen that the device is so constructed that by manufacturing the chuck holder from a solid piece of metal, once the chuck spindles 54 and 66 are centered, the large bearing surfaces and minimum clearances will assure permanent centering throughout the life of the device. As all other parts are likewise of rugged construction, the amount of maintenance required to keep the device in proper operating order is insignificant.

While I have shown and described the preferred embodiment of my invention, I wish it to be understood that I do not confine myself to the precise details of construction herein set forth, by way of illustration, as it is apparent that many changes and variations may be made therein, by those skilled in the art, without departing from the spirit of the invention or exceeding the scope of the appended claims.

The following is claimed:

1. A router bit grinder of the character described, comprising a base, a grinding wheel mounted on the base, a swivel plate rotatably mounted on the base, a slide member mounted for longitudinal movement on the swivel plate, a carrier mounted for transverse movement on the slide, a chuck holder mounted on the carrier, pivot means pivotally mounting the holder on the carrier, a pair of vertically aligned chucks carried by the holder, one of the chucks extending from one face of the holder above the pivot means and the second chuck extending from the opposite face of the holder below the pivot means, means for simultaneously rotating the chucks, a follower supported on the carrier adjacent the second chuck and resilient means positioned between the holder and the carrier whereby the holder is normally biased about the pivot means and said second chuck is moved in the direction of the follower.

2. A router bit grinder of the character described, comprising a base, a grinding wheel mounted on the base, a swivel plate rotatably mounted on the base, a carrier supported on the swivel plate, a chuck holder pivotally mounted on the carrier, said holder comprising a solid rectangular shaped housing having a first bore extending therethrough and having a second bore below said first bore and in vertical alignment therewith, said second bore extending partially into the housing, a spindle mounted in the first bore and extending outwardly from both ends of the bore, a chuck mounted on one end of said spindle, a handle mounted on the other end for rotating the spindle, a second spindle mounted in the second bore and extending outwardly from the housing, a chuck carried by the extending end of the second spindle, means inter-connecting said spindles for simultaneous rotation, a follower supported on the carrier adjacent the chuck on the second spindle and resilient means positioned between the holder and the carrier whereby the holder is normally biased with respect to the carrier and the chuck on the second spindle is moved in the direction of the follower.

3. A router bit grinder of the character described, comprising a base, a grinding wheel mounted on the base, a swivel plate rotatably mounted on the base, a slide member mounted for longitudinal movement on the swivel plate, a carrier mounted for transverse movement on the slide, a chuck holder pivotally mounted

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on the carrier, said holder comprising a solid rectangular shaped housing having a first bore extending therethrough and having a second bore below said first bore and in vertical alignment therewith, said second bore extending partially into the housing, a spindle mounted in the first bore and extending outwardly from both ends of the bore, a chuck mounted on one end of said spindle, a handle mounted on the other end for rotating the spindle, a second spindle mounted in the second bore and extending outwardly from the housing, a chuck carried by the extending end of the second spindle, means inter-connecting said spindles for simultaneous rotation, a follower supported on the carrier adjacent the chuck on the second spindle and resilient means positioned between the holder and the carrier whereby the holder is normally biased with respect to the carrier and said chuck on the second spindle is moved in the direction of the follower.

4. A router bit grinder of the character described, comprising a base, a grinding wheel mounted on the base, a swivel plate rotatably mounted on the base, a slide member mounted for longitudinal movement on the swivel plate, a carrier mounted for transverse movement on the slide, a chuck holder pivotally mounted on the carrier, said holder comprising a solid metal housing, said housing having a pair of bores therein, the axes of said bores lying in the same vertical plane, one above the other, a spindle journaled in each of the bores, each spindle having an end extending from the housing, a chuck carried by the extending end of each spindle, means interior of the housing inter-connecting the spindles for simultaneous rotation, means exterior of the housing for operating the rotating means, a follower supported on the carrier adjacent one of the chucks and resilient means positioned between the holder and the carrier whereby the holder is normally biased with respect to the carrier and said last mentioned chuck is moved in the direction of the follower.

5. A router bit grinder of the character described, comprising a base, a grinding wheel mounted on the base, a swivel plate rotatably mounted on the base, a carrier for a chuck holder supported on the swivel plate, a chuck holder mounted on the carrier, pivot means pivotally mounting the holder on the carrier about an axis, a pair of rotatable chucks carried by the holder, one of the chucks having a work piece receiving opening only at one face of the holder, said chuck being rotatable about an axis parallel to and at one side of the pivotal axis of the chuck holder, the second of said chucks having a master tool receiving opening only at

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the opposite face of the holder, said second chuck being rotatable about an axis parallel to and at the opposite side of the pivotal axis of the chuck holder, means for simultaneously rotating the chucks, a follower supported on the carrier adjacent the second chuck and resilient means positioned between the holder and the carrier whereby the holder is normally biased about the pivot means and said second chuck is moved in the direction of the follower.

6. A router bit grinder of the character described, comprising a base, a grinding wheel mounted on the base, a carrier for a chuck holder supported on the base, a chuck holder mounted on the carrier, pivot means pivotally mounting the holder on the carrier about an axis, a pair of rotatable chucks carried by the holder, one of the chucks having a work piece receiving opening only at one face of the holder, said chuck being rotatable about an axis parallel to and at one side of the pivotal axis of the chuck holder, the second of said chucks having a master tool receiving opening only at the opposite face of the holder, said second chuck being rotatable about an axis parallel to and at the opposite side of the pivotal axis of the chuck holder, means for simultaneously rotating the chucks, a follower supported on the carrier adjacent the second chuck and resilient means positioned between the holder and the carrier whereby the holder is normally biased about the pivot means and said second chuck is moved in the direction of the follower.

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