

(Model.)

2 Sheets—Sheet 1.

L. B. BENTON.
TOOL GRINDER.

No. 422,874.

Patented Mar. 4, 1890.

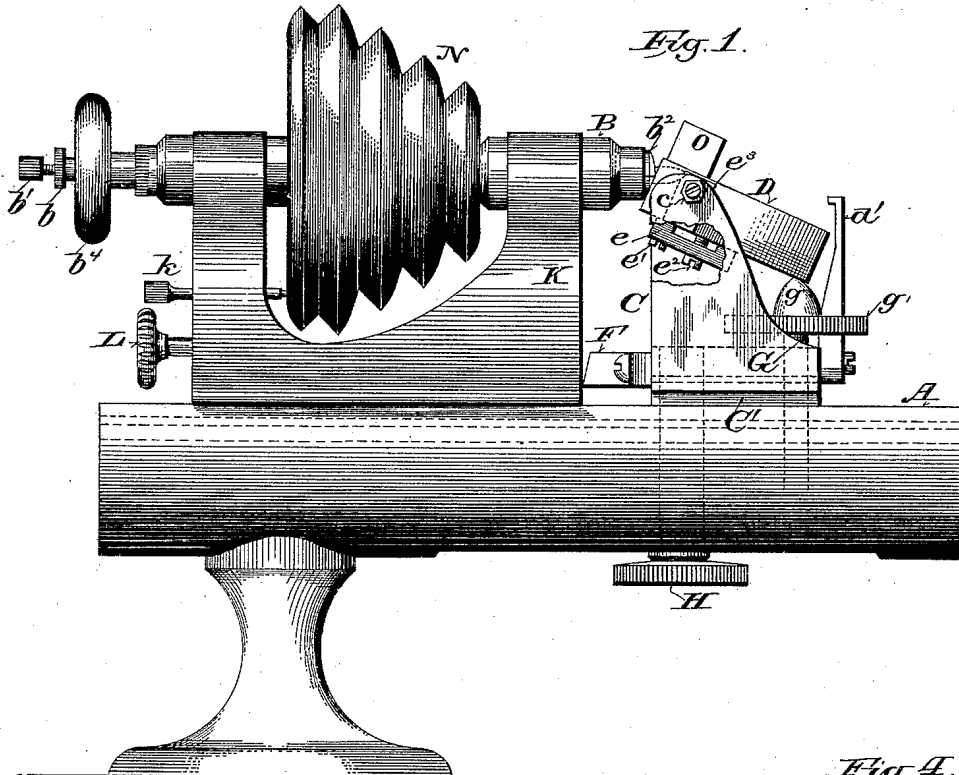


Fig. 1.

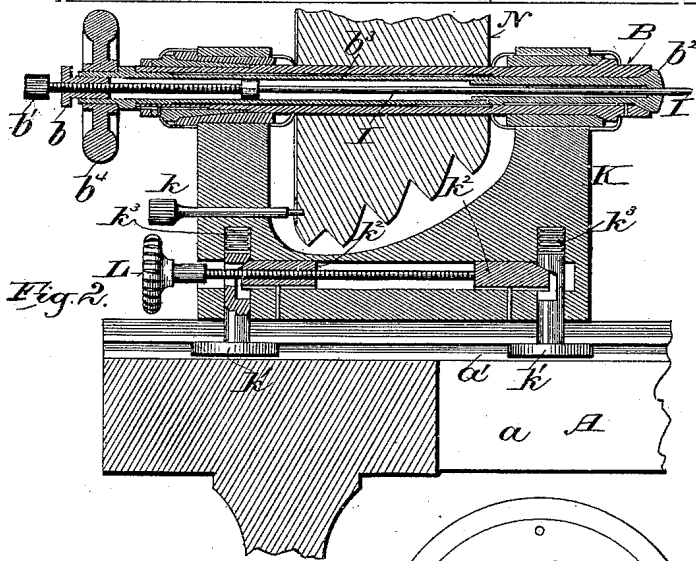


Fig. 2.

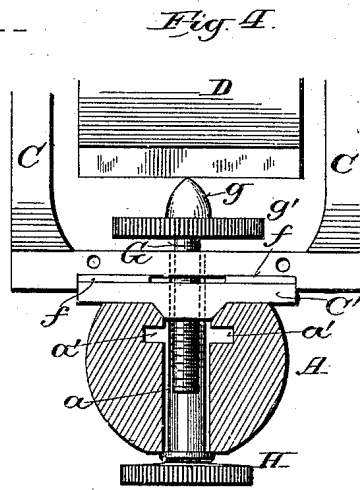
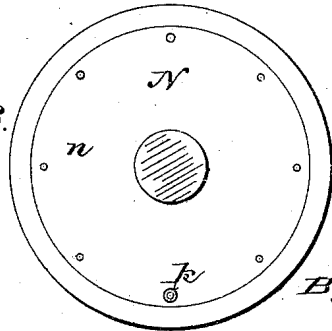


Fig. 4.

Fig. 3.



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(Model.)

2 Sheets—Sheet 2.

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Fig. 5.

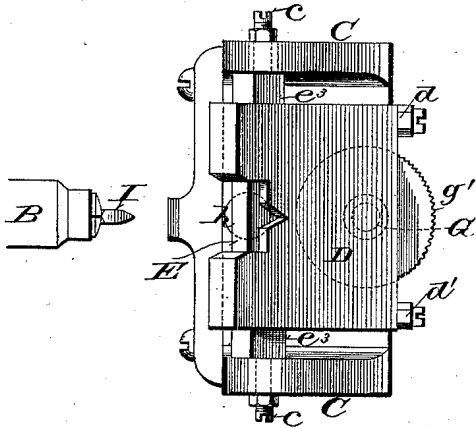


Fig. 6.

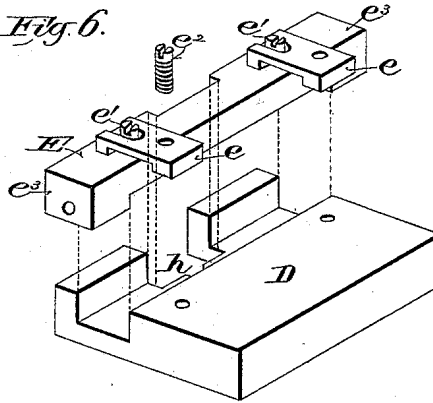


Fig. 7.

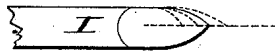
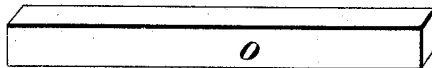


Fig. 8.



Fig. 9.



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UNITED STATES PATENT OFFICE.

LINN BOYD BENTON, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO BENTON, WALDO & CO., OF SAME PLACE.

TOOL-GRINDER.

SPECIFICATION forming part of Letters Patent No. 422,874, dated March 4, 1890.

Application filed January 17, 1888. Serial No. 261,053. (Model.)

To all whom it may concern:

Be it known that I, LINN BOYD BENTON, of the city and county of Milwaukee, and State of Wisconsin, have invented certain new and useful Improvements in Tool-Grinders; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The objects of my invention are to accurately grind, shape, or sharpen the working-edges of an engraving or other tool, and in sharpening the tool to preserve its exact original shape, also in grinding different tools to give to them or a portion of their cutting-edges precisely the same form, and to preserve the exact original adjustment of the tool or different tools when ground and replaced in the machine in which it is designed to be used.

It consists, essentially, of a tool-holder, an oscillatory guide-block, with their attachments and connections, and of certain peculiarities of construction and arrangement, hereinafter specifically set forth, and pointed out in the claims.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is a side elevation of the machine embodying my invention. Fig. 2 is a vertical axial section of the lathe-head and a portion of the bed. Fig. 3 is an end elevation of the pulley of the lathe-head seen from the left with reference to Fig. 1. Fig. 4 is an end elevation seen from the right with reference to Fig. 1 of a portion of the grinder-guide and its support with a cross-section of the bed of the machine. Fig. 5 is a plan view of the oscillatory grinder-guide and its support. Fig. 6 is a perspective view of the parts composing the oscillatory guide inverted. Figs. 7 and 8 are enlarged views of the working ends of tools, illustrating the method of grinding the same; and Fig. 9 is a perspective view of the stone or grinder.

I may employ for the bed A of my machine

a bed like or similar to the bed of a watch-maker's lathe having a vertical longitudinal slot *a*, through which passes the screw H, securing the oscillatory guide-support thereto. It is formed on the upper side with accurately-finished ways or faces, upon which the tool-holder and said guide-support rest.

For the tool-holder K, I may employ the head-stock of a watch-maker's lathe, furnished in the usual manner with a hollow spindle B, in which the tool I to be ground is inserted and held by a chuck or jaws *b*² of the ordinary construction. The hollow spindle B is provided with the usual pulley N, having around its outer end a perforated index-plate *n* to receive the index-pin *k* and stop and hold said spindle at the proper intervals in its rotation to produce a tool having the desired number of faces and cutting-edges of the required angle in cross-section.

The slot *a* in bed A has undercut grooves *a'* *a'* (shown in Figs. 2 and 4) in its sides to receive the heads *k'* *k'* of spindles which are inserted in vertical sockets in the tool-holder K. These heads are drawn snugly against the upper sides of said grooves, and the tool-holder K secured to the bed A by means of the thumb-screw L and the blocks *k*² *k*², which are inserted in a bore intersecting said sockets and have beveled ends engaging beveled notches in the spindles of heads *k'* *k'*, as shown in Fig. 2. The screw L, passing through a vertical slot in the first spindle, passes through and is threaded in the first block *k*², and bears at the tip against the butt of the other block *k*². It operates when turned to move said blocks simultaneously in opposite directions, and thereby to draw the heads *k'* *k'* toward the base of the tool-holder K. When released, the heads *k'* *k'* are forced outwardly by the springs *k*³ *k*³.

Any other suitable means may be employed for attaching the movable tool-holder to the bed A.

For the purpose of advancing the tool to the proper point for grinding, I provide a screw *b'*, which works in a nut *b*, inserted in the end of the hollow spindle B opposite the chuck *b*², and bears against the shank of the tool held therein, as shown in Fig. 2.

C is the guide-support provided on the

sides with standards, between which the guide-block D is pivoted upon the conical tips of the screws *c c*.

C' is a tongued plate fitted on the upper side into a recess in the under side of the guide-support C, and adapted on its under side to the bed A, to which it is secured, as before explained, by the screw H.

In a transverse groove in the under side of the oscillatory guide leaf or block D is nicely fitted the bar E, in the ends of which are formed the conical bearings for the tips of the pivot-screws *c c*. The guide-block D is secured to the pivot-bar E by means of clamps *e e* and screws *e²*, as shown in Figs. 1 and 6, and by means of the adjusting-screws *e' e'*, which pass through threaded perforations in said pivot-bar E and bear at their tips against the under side of said guide-block D. The upper working-face of said guide-block D is set nearer to or farther from said bar E, so as to cause the working-face of said guide-block to describe in oscillating on its axis the arc of a smaller or greater circle required to produce on the tool-faces and cutting-edges of a less or greater curvature, as desired.

In Fig. 6 the bar E is represented as detached from the guide-block D, the screws *e²*, which pass through perforations in the clamps *e e* and engage threaded holes in said block, having been removed. The edge of the oscillatory guide-block D nearest its axis of oscillation is cut out at *h*, as seen in Figs. 5 and 6, to clear the tool and permit the same to project beyond the working-face of said guide-block in position to be operated upon by the stone O, moved back and forth across it.

The pivot-bar E and screws *e' e'* also furnish means for taking up the wear on the working-face of the guide-block D and preserving its exact adjustment with reference to the axis of oscillation. This is accomplished by applying a gage to the back of the bar E and the upper face of the block D, and moving the latter by means of the adjusting-screws *e' e'* into exactly the same position with reference to the back of bar E and to its pivotal bearings as it originally occupied. This gage may be permanently attached to the device, so that the block D may be removed from time to time accurately faced, and then replaced and set with its working-face in precisely the same position with reference to the axis on which it oscillates.

G is a screw working with a threaded perforation in the base of the guide-support C and provided with a milled rim *g'* and a conical head *g*, which bears at its apex against the under side of the guide-block D near its outer edge and gradually raises the same on its axis, when said screw is turned up, and permits it to descend when the screw is turned down.

d d' are hooked stops pivoted to the base of the guide-support C, and each arranged when turned into an upright position to limit the

upward movement of the guide-block D. One of said stops is employed in grinding tools having curved edges, while the other is used in grinding tools having straight cutting-edges or a portion of their edges straight.

F is a stop-block attached to the guide-support, so as to engage with the lathe-head or tool-holder and hold the same at a certain fixed distance therefrom, so that when the lathe-head is returned to the engraving or other machine in which it is employed after the tool has been ground or sharpened it will occupy exactly the same position in the machine that it did before.

The axis of oscillation of guide D is raised or lowered for the purpose of grinding tools of different diameters or of greater or less acuteness by inserting between the base of the guide-support C and the block *C'* a block or blocks *f f* of different thicknesses.

O represents an oblong plane-faced grinder, which may be made of any suitable abrading substance or material, although I prefer a fine Arkansas stone for the purpose.

The guide-block D is made of hardened steel or any other suitable material that will not be abraded or easily worn by the action of the stone or grinder upon its face.

Tools are ground, shaped, or sharpened on my machine as follows: The tool-holder or lathe-head K is placed in the machine snugly against the stop F and secured to the bed A. The tool or tool-blank is then advanced by means of the screw *b'* far enough to permit of the necessary abrasion by the grinder O, moved over the guide-block D and then secured in place by the usual means in the hollow spindle B. Tools of three or more faces are formed by locking the pulley N successively at thirds, fourths, &c., of a revolution by means of the pin *k*. Each face is then ground by moving the stone or grinder O back and forth across the face of the guide-block D, which is gradually swung on its axis by screw G, causing said stone or grinder to traverse an arc intersecting the axis and upper side of the tool, thereby producing the desired curve to the faces and cutting-edges of said tool. One face having been ground flush with the working-face of the guide-block while the latter is swung, as described, upon its axis, the tool is turned and another face precisely like the first is ground thereon in the same manner, the guide-block D being moved through the same arc. The operation is thus continued till all the sides and the cutting-edges formed by their intersection are ground exactly alike.

For some purposes a tool I—such as is shown in Fig. 7—having the entire length of its cutting-edges formed on a curve is desired. Such a tool is produced by gradually swinging the guide D upon its axis between the limits required to produce the desired curvature and grinding each of the faces of said tool from base to point, or vice versa, in the manner described. Different curvatures are given to

the faces and edges of tools by changing the distance of the working-face of guide D from its axis of oscillation, and a sharper or blunter tool having sides of the same curvature is produced by lowering or raising the guide-support C, and thus changing the distance of the axis of oscillation of said guide from the axis of the tool. For other purposes a tool I', like that shown in Fig. 8, having its cutting-edges curved at the tip and straight from a point near the apex to the base, is desirable. Such a tool is produced by moving the guide D up into engagement with the stop *d*, properly constructed and set to give the desired inclination to the faces of the tool, and the several faces are then ground to a plane flush with the face of said guide to a point near the apex of the tool and between that point and the apex to a curve, in the manner previously described.

In order that the tool may project the same distance from the tool-holder when ground or sharpened after raising or lowering the guide-support C, together with the pivot-screws *c c*, or after changing the distance of the face of guide D from the axis on which it turns, it is necessary to employ different stops F, by which the tool-holder K may be set at correspondingly different distances from the guide-support C and guide D.

No precise limit to the downward angular movement of guide D is necessary, since any movement in that direction beyond what is necessary to complete the point of the tool on any side will either carry the stone out of contact with the tool or remove waste material, which would otherwise be necessarily removed in finishing the remaining side or sides of the tool. Neither is the upper angular movement of said guide necessarily limited with precision in grinding tools having curved cutting-edges, but I provide for greater convenience a stop *d'*, which limits its movement in that direction at a point beyond which the operation of grinding would be uselessly continued; but in grinding tools having straight cutting-edges throughout, or tools having a portion of each of their cutting-edges straight, as I', it is necessary to exactly limit the upward angular movement of said guide.

Different stops are provided for producing tools having faces of different inclinations.

It will be observed that the pivot-bar E is formed at the ends with upturned projections *e³ e³*, in which are formed the bearings for the pivot-screws *c c*. By this construction the axis of oscillation may be brought very close to the working-face of the guide D without encroaching upon the material allowed for wear or weakening said guide or causing the pivot screw-supports to project in the way of working the grinder O.

I claim--

1. The combination, in a tool-sharpening device, of a tool-holder, a grinder-guide capable of swinging on an axis transverse to the

axis of the tool held in said holder, and a grinder adapted to be moved upon said guide, substantially as and for the purposes set forth.

2. The combination, in a tool-sharpening device, of a tool-holder, and an oscillatory grinder-guide having adjustable pivot-bearings, whereby the working-face of said guide is adjusted with reference to its axis of oscillation, substantially as and for the purposes set forth.

3. The combination, in a tool-sharpening device, of a tool-holder, a guide-support, a grinder-guide pivoted in said guide-support and capable of oscillation on an axis transverse to the axis of the tool-holder, and a device arranged to swing said guide on its axis and to hold the same at the desired inclination to the tool, substantially as and for the purposes set forth.

4. The combination, in a tool-sharpening device, of a rotary tool-holder provided with a stop for securing it at different points in its rotation, a grinder-guide arranged to swing on an axis transverse to the axis of the tool held in said holder, and a grinder adapted to be moved upon said guide, substantially as and for the purposes set forth.

5. The combination, in a tool-sharpening device, with a supporting-bed, of a rotary tool-holder attachable to said bed, an oscillatory grinder-guide, and a stop by which the tool-holder and grinder-guide are exactly set at a determinate distance apart, substantially as and for the purposes set forth.

6. The combination, in a tool-sharpening device, of a tool-holder, a grinder-guide capable of turning on an axis transverse to that of the tool held in said holder, an adjustable guide-support whereby the axis on which said guide swings may be moved toward or from the axis of the tool, and a grinder adapted to be moved upon said guide, substantially as and for the purposes set forth.

7. The combination, in a tool-sharpening device, of a tool-holder, a grinder-guide capable of turning on an axis transverse to that of the tool held in said holder, a stop by which the angular movement of said guide is limited, and a grinder adapted to be moved upon said guide, substantially as and for the purposes set forth.

8. The combination, in a tool-sharpening device, of a head provided with a rotary tool-holder, a guide-support provided with an oscillatory guide recessed to receive the end of the tool, a device arranged to swing said guide on its axis, and a bed to which said head and guide are attachable, substantially as and for the purposes set forth.

9. The combination, in a tool-sharpening device, of a suitable bed, a removable tool-holder attachable thereto, a grinder-guide capable of swinging on an axis transverse to the holder, and a grinder adapted to be moved upon the working-face of said guide, substantially as and for the purposes set forth.

10. The combination, in a tool-sharpening device, of a tool-holder, a grinder-guide capable of swinging on an axis transverse to the axis of the tool held in said holder and provided with a movable wearing-block, and a grinder adapted to be moved upon the working-face of said wearing-block, substantially as and for the purposes set forth.

11. The combination, in a tool-sharpening device, of a rotary tool-holder, a stop arranged to secure said tool-holder at intervals in its rotation, an adjustable plane-faced guide, and a plane-faced grinder arranged to work with said guide, substantially as and for the purposes set forth.

12. The combination, in a tool-sharpening device, of a tool-holder, a plane-faced grinder, and an oscillatory grinder-guide, a pivot-bar secured thereto and offset at the ends, in

which are formed the pivot-bearings, whereby the axis of oscillation may be brought close to the working-face of said guide, substantially as and for the purposes set forth.

13. The combination, in a tool-sharpening device, of a tool-holder furnished with a clamping device and with an adjusting-screw arranged to advance the tool in said holder, a plane-faced grinder, and a plane-faced oscillatory grinder-guide, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

LINN BOYD BENTON.

Witnesses:

R. V. WALDO,
CHAS. L. GOSS.