

UNITED STATES PATENT OFFICE

2,140,940

VERTICALLY ADJUSTABLE SHANKLESS
TOOL BIT AND HOLDER THEREFOR

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Application October 17, 1936, Serial No. 106,183

1 Claim. (Cl. 29—100)

The present invention relates to improvements in insertable tool bits and holders and is directed more particularly to a novel means and method of initially adjusting the bit in the holder and of compensating for the reduction in size and shape of the tool bit incident to wear and regrinding operations.

The invention is particularly adapted to what are commonly called shankless bits and holders therefor. In such tools the bit is generally L-shaped, the lower extending portion providing the base upon which it is seated and clamped in the holder, and the upstanding portion providing the cutting edges and ample material for regrinding operations. The upstanding portion is contoured to suit the particular character of the cut to be taken and is undercut away from the top surface and cutting edge to provide the necessary rake angles and clearances. My prior application Serial No. 24,028, filed May 29, 1935 discloses a tool of this general character and in respect to which the invention herein disclosed is an improvement.

As the shankless bit became dulled during use, its cutting edge was restored by grinding off a layer from the top of the upstanding portion. In consequence, the height of the bit was reduced and necessitated upsetting the position of the holder in the tool post and the resetting thereof to bring the cutting edge of the resharpened bit to its proper elevation with respect to the workpiece.

A primary object of the invention is to render available a tool holder adapted to hold securely at one end thereof one of a plurality of different shapes or styles of shankless tool bits which may be readjusted in an upward and a lateral direction to compensate for the reduction in height occasioned by resharpening operations and thereby eliminate the time consuming and delicate operation of resetting the holder in the tool post each time the bit is reground.

The invention further aims to increase the life of a tool bit and to prevent needless waste of bit material in resharpening operations. Heretofore, the bits were ground sharp by removing a layer from top surfaces, with consequential loss in material over the whole expanse. By the aid of this invention by which a compound adjustment of the bit is provided, the bit may be ground upon its side as well as its top surface, depending upon the extent and direction of the fracture, and reinserted in the holder in its proper elevated and laterally adjusted position.

A further object of the invention is to provide in such a tool, a simple means for effecting compound adjustments of the bit that requires no extraneous or supplemental parts or devices, and which operates to lock the bit equally securely in any position to which it is normally capable of adjustment, and to utilize to full advantage, the forces incident to the tooling operation and reacting in the tool bit, to assist in holding the tool bit firmly and rigidly in its seat in the holder.

In carrying out the objectives of the invention it is proposed to construct a tool holder with a bit aperture at its forward end, the lower and rear walls of which are mutually inclined thereby forming a wedge shaped opening for the reception of a complementally formed cutting bit. In order to obtain the compound adjustment, laterally and vertically, the line of intersection of the inclined planes, that form the lower and rear walls of the bit socket, is designed to lie in a plane perpendicular to the longitudinal axis of the holder at an angle to a longitudinal plane. Such a construction thereby affording a wedge shaped bit socket in which the bottom and rear walls are compoundly sloped in a direction transverse to the axis of the holder.

Interlocking means, preferably in the form of interfitting parallel serrations are provided between the mating surfaces of the bit and holder and are so related to the angle of incline of the lateral slope given to the bit seat that the amount the bit is elevated, upon being stepped from one serration to another, is the normal amount required for resharpening. The cutting edges of the resharpened bit, when next inserted in the holder are thus caused to assume their original position in relation to the workpiece without further adjustment.

The tooling forces acting upon the forward upstanding portion of the bit cooperate with the bit clamp in tending to urge the bit rearwardly in its socket and the serrations into positive interlocking relation. Pivoting action of the bit or lateral shifting thereof under the impacts of tooling operation are thus positively prevented.

Other objects and advantages will be in part indicated in the following description and in part rendered apparent therefrom in connection with the annexed drawing.

To enable others skilled in the art so fully to apprehend the underlying features hereof that they may embody the same in the various ways contemplated by this invention, a drawing depicting a preferred typical construction has been

annexed as a part of this disclosure and, in such drawing, like characters of reference denote corresponding parts throughout all the views, of which:—

- 5 Figure 1 of the drawing is a side view of a tool incorporating the principles of this invention.

Figs. 2 and 3 are end and plan views thereof respectively.

- 10 Figs. 4 and 5 are views of a tool embodying this invention provided with a bottom clamp for the bit instead of a top clamp.

Fig. 6 is a geometric figure more clearly representing the relation of the planes of the seating surfaces to each other and the location of their line of intersection with respect to the tool axis.

- 15 Referring more particular to Fig. 1 of the drawing the invention is disclosed incorporated in a heavy duty lathe tool consisting of three main parts, the holder A, bit B, and clamp means C. The holder A is made from tough, strong material, such as chrome nickel steel, and is provided at one end with a depressed anvil portion 10 that supports the tool bit. The portion 10 is, for strength, formed integral with the main shank portion 11 and provided at its rear with a perpendicular wall 12, which, in cases of extremely heavy cutting operations, may be backed up against the tool post and thus give further strength and support to the part 10.

The upper forward part of anvil portion 10 is provided with a wedge shaped socket 13 within which a complementally shaped base portion of the tool bit B seats. As illustrated more clearly in the geometric diagram Fig. 6, the plane of the seating surface 14 of the bit socket is compoundly inclined relative to the longitudinal plane *b*, *c*, *f*, *e*, and the rear surface 15 inclined with respect to the plane of the seating surface 14. Starting at point *b*, the lower surface 14 slopes upwardly toward the forward end of the holder approximately 5° and also upwardly in a lateral direction approximately 10°. The abutment surface 15 slopes upwardly and forwardly relative to the plane of the surface 14 with the line of intersection (*b*—*g*) of these planes lying in the perpendicular plane *a*, *b*, *c*, *d*. The line of intersection *b*—*g*, indicates the direction of shift of the tool bit i. e., upwardly in the plane of the holder, as it is shifted laterally across the end of the holder. With a left hand holder the lateral slope of the surface 14, will extend opposite to that illustrated to effect vertical and lateral adjustment in the opposite direction.

- 55 As illustrated in the drawing, the lower seating surfaces of the bit and holder are provided with a series of serrations 16 which interengage and positively prevent transverse shifting or pivoting of the bit. The serrations extend longitudinally of the holder, which it will be seen, is transverse to the lateral slope of the surface 14 and likewise transverse to the compound or diagonal slope of the surface 14. Any tendency of the tooling forces to shift the bit laterally or diagonally is thus positively obstructed. The serrations, moreover, perform the function of guiding the tool bit rearwardly and simultaneously an index for indicating the amount the bit will be elevated when stepped over one or more serrations.

- 70 I have found that by sloping the blade seat 10° laterally and by spacing the serrations 15 to the inch, the bit will be elevated a little over .01" per serration which is ample for most resharpening operations. If a greater layer is removed from the top surface the bit may be indexed over two

or more serrations, and in this way compensation for reduction in bit height is quickly and easily made.

In cases where the bit is severely fractured on its lateral side, the fracture may be removed by grinding away both the top and side of the bit, or the side alone, the lateral adjustment of the bit being in the ratio of about 6 to 1, provides ample material for side grinding. Bad fractures in the side cutting edges, may by reason of the compound adjustment afforded by this invention, be removed and the cutting edge and its contour restored, with the removal of a minimum amount of cutter bit material. After the bit has been resharpened it is again clamped in the holder in its proper elevated position. Figs. 2 and 3 of the drawing illustrate the progressive vertical and lateral positions, *x*, *y*, and *z*, to which the bit may be adjusted.

In Fig. 1, I have illustrated a form of bit clamp that is operable from the top of the holder, whereas, in Fig. 4 I have illustrated a form of clamp that is operable from the rear of the holder. In both forms, however, a manually operable screw means urges the bit rearwardly between upper and lower portions of the holder and against the rear wall.

In the construction disclosed in Fig. 1, the clamp means C comprises a sleeved horn-like member 17, the forward projecting portion 18 having a curved hardened surface that overlies the dovetailed base portion 9 of the bit B. The rear portion of the clamp element is formed with a sleeve 19 that slidably fits a bore 20 formed in the body of the holder. The upper part of the forward wall of the bore 20 is cut away to provide an opening 21 through which the hardened portion 18 of the clamp element projects and is held against lateral movement. A clamp screw 22, fitted loosely to the clamp element 17, has a threaded connection with the body portion 10 and by means of which the bit is clamped in position.

It will be observed that the axis of the clamp screw is inclined rearwardly so that when actuated in a clamping direction the clamp element 17 likewise moves rearwardly thus urging the bit rearwardly as it clamps the bit in the holder.

In the form of bit clamp disclosed in Fig. 4, the bottom inclined seating surface 14^a is made on a separate piece 18^a and is keyed at 10^b to the body for longitudinal movement. A clamp screw 22^a and nut 22^b operable from the rear of the underlying portion of the shank of the holder, serves in this instance, to draw the clamp element rearwardly in effecting the clamping action. Rearward movement of the clamp element likewise tends to move the bit rearwardly toward the abutment wall 15^a until clamping is achieved between the over-hanging laterally sloped portion 18^a and the seat 14^a.

With this design of clamp the overlying shelf 18^a, and likewise the top surface of the dovetailed base portion 9^a of the bit A¹, are laterally sloped coincidentally with the lateral slope of the seating surface 14^a to allow for upward adjustment as the bit is indexed laterally. In Figs. 1-3, the upward movement of the top clamp element 17 permits of lateral shift of the bit and accommodates itself to any irregularity in thickness as the bit is laterally adjusted. In respect to the compensating features of the invention, both structures embody the same principles.

The serrated surfaces in addition to providing guide-means for the bit and a means positively

preventing twisting or lateral shift of the bit on its seat, guide the bit rearwardly under the reactionary cutting forces and serve as the unit measuring the precise amount of vertical adjustment that may be given to the cutting edge of the bit, for each serration of lateral shift. For example, the user may set and clamp the tool holder in the tool post of his machine in the approximate vertical position required and then with extreme facility make the final minute adjustments in elevation of the cutting edge at the very nose of the tool, directly with the bit itself. When the proper elevation has been obtained the clamp screw is tightened which effects a firm interlocking of the bit in the holder in that particular position.

As the cutting edge becomes dulled during the tooling operation, it is removed, reground and replaced in its socket, the seating surfaces of which have been so designed that the cutting edge of the bit may be elevated incrementally to compensate for the loss in height due to regrinding. In effect the bit always stands on end on the seating surface 14 or 14^a and the major thrusts of the tooling operation are transmitted directly thereto, in all positions of adjustment to which the bit is normally capable of being moved. Thus, the use of shims or other auxiliary devices are dispensed with and a firm, solid bit seat embodying height compensating characteristics is provided.

The term lathe tool is used herein generically to indicate the general type of tool used in the performance of cutting operations on workpieces in machines such as lathes, planers, boring mills, shapers and analogous machine tools.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can, by applying current knowledge, readily adapt it for various utilizations by retaining one or more of the features that, from the standpoint of the prior art, fairly constitute essential characteristics of either the generic or specific aspects of this invention and, therefore, such adaptations should be, and are intended to be, comprehended within the meaning and range of equivalency of the following claim.

Having thus revealed this invention, I claim as

new and desire to secure the following combinations and elements, or equivalents thereof, by Letters Patent of the United States:

A heavy duty lathe tool combining an elongated holder member adapted to be secured in a given position in a tool post and having an open sided recess at one end thereof adapted to receive a laterally removable cutting tool bit, said recess having a lower longitudinally inclined bottom seating surface terminating in a mutually inclined rear abutment wall, said bottom seating surface being also sloped laterally relative to a plane perpendicular to the vertical axis of the holder in a direction transverse to said first mentioned incline, the line of intersection of said seating surface and said rear wall lying in a plane perpendicular to the longitudinal axis of the holder member; an L-shaped tool bit fitted to said recess, said bit having its bottom surface inclined in two directions from a plane perpendicular to its vertical axis and being complementary to the rearward incline and lateral slope of the bottom seating surface of said recess and having an upper coacting clamping surface disposed substantially perpendicular to its said vertical axis, said two surfaces defining a clamping portion on the bit wedge shaped in a vertical plane perpendicular to the longitudinal axis of the holder, said tool bit also having an elevated portion at its forward end extending above said upper clamping surface and cutting edges thereon defining a substantially flat chip engaging top surface of the bit; a series of interfitting serrations between said bit and said bottom surface of said recess extending in the direction perpendicular to said line of intersection, said serrations in cooperation with said lateral slope operating as positive means for elevating or lowering the elevated cutting edge and chip contacting surface of said bit relative to said holder in parallel spaced planes as the bit is shifted laterally on its seat in said recess to compensate for loss in height due to regrinding; and independently operable means for clamping said bit firmly in adjusted position in said recess.

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