Dec. 20, 1938. E. REANEY 2,140,941

TRIPLE ADJUSTMENT SHANKLESS TOOL BIT AND HOLDER THEREFOR

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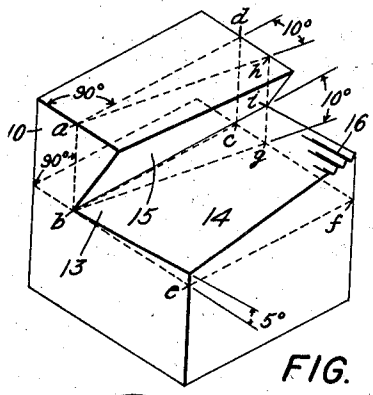


FIG. 6

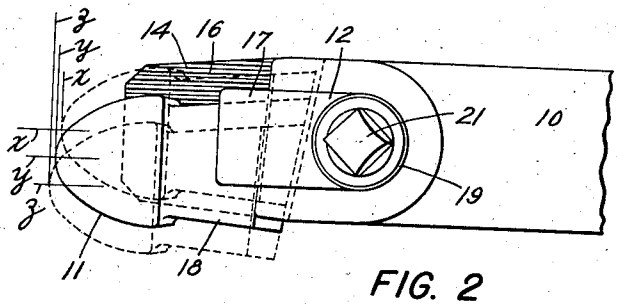


FIG. 2

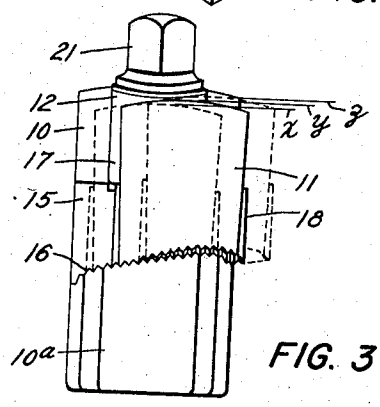


FIG. 3

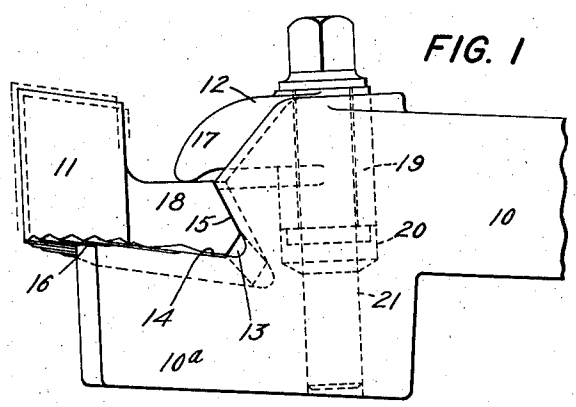


FIG. 1

FIG. 5

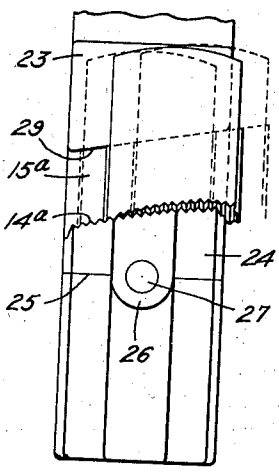
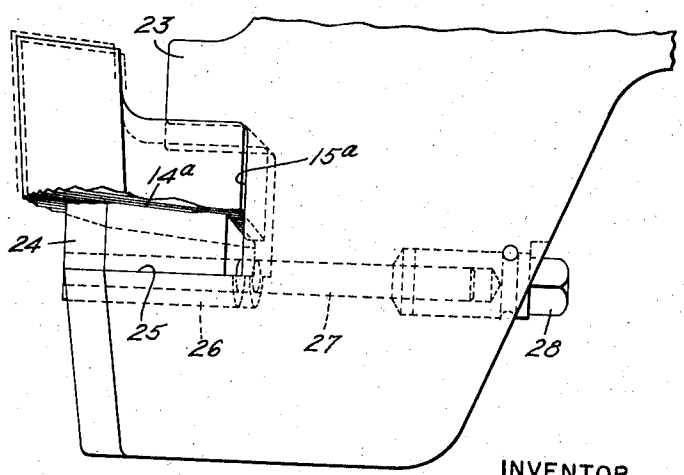


FIG. 4



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TRIPLE ADJUSTMENT SHANKLESS TOOL BIT AND HOLDER THEREFOR

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Application October 27, 1936, Serial No. 107,862

1 Claim. (Cl. 29—100)

This invention relates to insertable bit metal cutting tools of the lathe type and is concerned more particularly with an improved method and means of resetting the tool bit in the holder to obtain an adjustment of the bit in three directions simultaneously.

In its more specific aspects the invention is best adapted to shankless bits and holders such as disclosed in my copending application Serial No. 24,028, filed May 29, 1935, with respect to which this invention is an improvement.

In my aforesaid copending application there is disclosed a tool holder adapted to hold one of a plurality of different styles of L-shaped cutting bits. The contour of the bit receiving aperture and the complemental portion of the bit are so constituted, however, that the cutting edge of the bit may be adjusted laterally only to adapt the tool to either a "right hand" or a "left hand" cutter. Such a construction does not admit compensation being made for reduction in height or length of the bit, due to the grinding off of layers in resharpening.

In the machining of certain pieces, such as cylindrical work, hard spots are occasionally encountered by the cutting point of the tool and frequently the extreme forward end of the tool bit receives a fracture or becomes badly chipped. Heretofore, it has been necessary not only to remove the bit from the holder for regrinding but also to unclamp and reset the holder in the tool post of the machine in its proper advanced and elevated position to allow for the foreshortening of the bit occasioned by grinding a new contour on the end thereof.

This mode of operation was troublesome and difficult to make and could be practiced only once or possibly twice because each time the end of the bit was ground anew, it materially shortened the bit, thereby reduced its overhang, and it was not long before it became unfit for use.

The present invention aims to overcome disadvantages of this nature and to render available a construction in which the cutting point of the bit may be repeatedly advanced relative to the holder to compensate for the foreshortening of the bit resulting from the grinding out of fractures occurring at the forward end.

A further object of the invention is to render available an insertable bit tool in which the original or normal overhang of the bit from the holder, and its position vertically therein, essential and necessary in tools of this character, may be preserved and retained after repeated resharpening operations have been performed upon the cutting edges of the tool bit.

Another objective of the invention is to accomplish the triple adjustments above mentioned without the use of auxiliary locking devices, shims, etc., and to provide an insertable bit tool in which the reactionary tooling forces are utilized in assisting the manually operable clamp in holding the bit firmly in its adjusted or reset position in its seat in the holder.

A preferred manner of carrying out these objectives is to form an open sided bit receiving recess in one end of a tool holder, defined by at least two planes compoundly inclined relative to each other. The lower wall of the aperture provides the lower seating surface for the tool bit and terminates in a rear abutment wall that slopes laterally upwardly and forward relative to the compoundly sloped bottom wall, the marginal edges of the two surfaces converging in the general direction in which the triple adjustment forward, upward and laterally, is desired. With a right hand holder the convergence is toward the right and with a left hand holder the convergence is toward the left.

The base portion of the L-shaped tool bit is provided with similarly inclined and sloped bottom and rear surfaces, and when the bit is moved laterally in the recess it is caused to advance simultaneously in a forward direction, in an upward direction and in a lateral direction. After the bit has been properly positioned it is then clamped positively in place in the holder. Interlocking means preferably in the form of serrations are provided between one of the pairs of seating surfaces for locking the bit against twisting and lateral shift in the holder under the impacts of the tooling operation. By extending the serrations in a longitudinal direction and transverse to the general slope of the compoundly inclined seating surface a positive means is provided for locking the bit to its seat. By correlating the angles of the planes of the bit seating surfaces with the spacing of the serrations, the vertical and forward shift of the bit relative to the holder, when the bit is indexed one or more serrations, may be set to yield an advance commensurate with the amount removed during a normal resharpening operation. When the bit is reinserted in its socket, the cutting edge thereof will be caused to assume its original position.

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:

Figure 1 of the drawing is a side elevation of a lathe tool embodying the principles of this invention.

Figs. 2 and 3 are plan and end views respectively thereof illustrating in dotted lines progressive forward, vertical and laterally adjusted positions of the tool bit.

Figs. 4 and 5 are side and end views respectively of a holder incorporating the principles of this invention equipped with an alternative form of bit clamp.

Fig. 6 is a geometric diagram more clearly illustrating the origination and relation between the compoundly inclined seating surfaces and the tool axis for effecting triple adjustments of the bit.

Fig. 1 of the drawing discloses the invention embodied in a heavy duty lathe tool consisting of three main elements, a holder member **10**, a bit member **11** and a clamp device **12**. The holder **10** is preferably made of chrome nickel steel, for strength, and is provided with an open sided bit receiving recess **13** at the forward and depending end **10a** thereof. The lower wall **14** of the recess forms the main seating surface for the tool bit and is inclined rearwardly and sloped laterally, at angles approximately 5 and 10 degrees respectively, thereby forming a compoundly inclined flat seating surface of ample proportions for the bit **11**. The bottom wall **14** terminates in a relatively inclined rear wall **15**, which wall is also inclined from a plane perpendicular to the longitudinal axis of the holder, i. e., the wall **15** is inclined with respect to the bottom wall **14** and slopes diagonally across the holder at the base or rear of the bit recess.

Fig. 6 of the drawing illustrates more clearly the origination and relation of one seating surface to the other and to the axis of the holder whereby a tool bit complementally formed may be repositioned laterally therein and advanced simultaneously in three directions. In this figure, the vertical plane *a, b, c, d,* is indicated as being perpendicular to the longitudinal axis of the holder **10**. The horizontal plane *b, c, f* and *e* is perpendicular to the said vertical plane and extends longitudinally of the holder. Starting at the point *b,* the lower surface **14** extends forwardly and upwardly making an angle of approximately 5° with the horizontal plane *b, c, f* and *e*. From point *b,* the lower surface also extends upwardly in a lateral direction at an angle of approximately 10° with respect to the said horizontal plane, thus providing a flat compoundly inclined seating surface, the highest point of which is diagonally opposite the lowest point *b*.

The rear abutment surface **15** is preferably inclined relative to the surface **14** so as to form a V-shaped recess, and to obtain the triple adjustment feature, the line of intersection *b, i* of the surfaces **14** and **15** is made to occur in the transverse plane *a, b, g, h* which as illustrated in Fig. 6, extends transversely of the holder at an angle of approximately 10° from the perpendicular plane *a, b, c, d*. The line of intersection of the surfaces **14** and **15**, accordingly, is caused to extend forwardly and upwardly from the point *b* and indicates the line or direction of shift of any given point on the tool bit. By appropriately varying one or more of the angles of incline, the direction of line *b, i* may be altered to vary the ratios of movement between the forward, lateral or vertical movements of the tool bit.

The forward incline of the surface **15** away from the transverse plane *a, b, g, h,* cooperates with the downward and rearward incline of the surface **14** in locking the bit on its seat. The included angle the surface **14** makes with the surface **15** may be increased to substantially 90° before the benefit of the overhang for that purpose is lost.

Referring more particularly to Figs. 1–3 of the drawing, the lower seating surfaces of the bit and holder are illustrated provided with complementally formed interfitting serrations **16** extending longitudinally of the holder **10**, which also is in a direction transverse to both angles of incline of the lower seating surface **14**. A multiplicity of abutments extending transversely to the general diagonal slope of the surface **14** are thereby provided and serve positively to lock the bit against twisting on its seat or against lateral shift in the general direction of the line *b, i*.

By correlating the spacing of the serrations with the angles of slope of the walls **14** and **15**, the serrations perform the further function of definitely indicating the increment of forward, vertical, and lateral shift of the bit relative to the holder for each serration of lateral movement. In the example illustrated, where the angles of slope indicated are 5° in a vertical longitudinal plane, 10° in the vertical perpendicular plane, and 10° in the transverse plane, and with serrations spaced 15 to the inch, the lateral stepping of the bit one serration effects an adjustment forwardly of approximately .01'' and vertically approximately .01'' which is the amount that would be ground away during a normal resharpening operation. Compensation for more severe grinding operations may be effected by laterally stepping the tool bit two or more serrations. Figs. 2 and 3 of the drawing illustrate in full and dotted lines positions *x, y* and *z* the progressive movement of the bit in the three directions simultaneously.

To clamp the tool bit in adjusted position, a screw operated clamp operable from the top or from the underside of the holder may be provided. In Figs. 1–3, the top clamp is illustrated which comprises a downwardly and rearwardly acting clamp member **17** that extends forward in overlying relation with the tail portion **18** of the tool bit. The member **17** is formed with a sleeve portion **19** that slidingly fits in a recess **20** in the holder **10**. A clamp screw **21** loosely fits the sleeve **19** and has a threaded connection with the body of the holder. Preferably the axis of the screw **21** and sleeve **19** is inclined forward relative to the seating surface **14** so that the clamp exerts a rearwardly acting force on the bit as well as a vertical force. By actuating the clamp screw **21** in a clamping direction the bit is firmly clamped between the surface **14** and overlying portion **17** and against the rear abutment wall **15**.

In the construction depicted by Figs. 4 and 5 the same sturdy clamping action results. In this type of clamp, the overlying portion **23** of the

holder is integral therewith and a vertical and rearwardly acting clamp element 24, underlying the bit, effects the clamping action. The clamp element 24 slides on the horizontal surface 25 of the holder and is guided by the key 26 and draw bolt 27. The upper surface 14a of the member 24 and rear wall 15a are relatively compoundly inclined, as above explained in connection with Fig. 6, and when the member 24 is urged rearwardly by the clamp nut 28, a clamping of the bit between the overlying portion 23 and seating surface 14a, and simultaneously against the rear abutment wall 15a occurs. In this form of clamp, the undersurface 29 of the overlying shelf 23 slopes laterally coincidently with the lateral slope of the seating surface 14a, whereas, in the construction represented in Fig. 1 the vertical movement of the top clamp takes care of any variation in cross-sectional thickness of the bit as the latter is moved laterally and the undersurface of the overlying portion 17 may therefore be straight. With either form of clamp, however, triple adjustments of the bit may be simultaneously obtained.

By the aid of this invention it will be seen that an operator may clamp the tool holder in the tool post of the machine in the approximate position, and then adjust the position of the bit at the forward end to place the cutting edge thereof in the precise position vertically, laterally or forwardly as the nature of the machining operation demands. After the cutting edge of the bit has become dulled it is removed from the holder and resharpened by grinding off a layer from the top surface. In the event of a bad fracture occurring at the forward end of the bit, it may be removed by grinding on the front end instead of all from the top.

End grinding of the bit materially conserves its height and inasmuch as the foreshortening of the bit is compensated for by this invention, objectionable loss in bit overhang is not occasioned. As the bit is reduced in height, due to regrinding from the top, its original elevation may be restored by progressively stepping the bit laterally and reclamping it in the desired elevated position.

The life of any given tool bit may, by this invention be materially lengthened, and relatively expensive bit stock may be reground at its end and top surfaces repeatedly and compensation quickly and easily made for the amount ground away.

While the invention has been disclosed herein, in connection with a lathe tool, it will be understood that it is equally applicable to other tools of that general type, such as used on planers, boring machines, 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 lathe tool combining an elongated holder member having a recess at one end thereof adapted to receive an upstanding tool bit, said recess being defined by a lower rearwardly inclined bottom seating surface and a rear abutment wall that extends crosswise the holder at an angle to a plane perpendicular to the longitudinal axis thereof, said bottom seating surface being also sloped laterally relative to a plane perpendicular to the vertical axis of the holder and in a direction transverse to said first mentioned incline, with the line of intersection of said laterally inclined surface and said rear wall lying in a plane disposed at an angle to an imaginary plane perpendicular to the longitudinal axis of the holder; a shankless L-shaped tool bit fitted to said recess and adapted to abut against said rear abutment wall of the recess in all positions of adjustment, said bit having an upper clamping surface extending in a plane substantially perpendicular to the vertical axis of the bit and an upstanding portion adapted to stand on said seating surface affording an upper front cutting edge and material for resharpening by successively removing layers from the top or end surface thereof whereby said upstanding portion is successively reduced in height and length, said bit also having its bottom surface inclined relative to its said clamping surface in two directions complemental to the incline and slope of the bottom seating surface of said recess and its rear surface transversely inclined complementally to the incline of said rear wall of the recess; a series of interfitting serrations between said bottom surface of said bit and recess extending in the direction of said first mentioned incline and transversely to said line of intersection, said serrations in cooperation with said lateral slope of said bottom wall and the transverse slope of said rear wall serving as positive means for indexing said bit forwardly and simultaneously vertically in predetermined increments to compensate for loss in length and height resulting from the resharpening operation; and manualy operable screw clamp means coacting with said holder for urging said bit rearwardly in clamped position in said recess.

ERNEST REANEY.