Dec. 1, 1936. E. REANEY 2,062,607

STREAMLINED BIT CLAMP AND HOLDER

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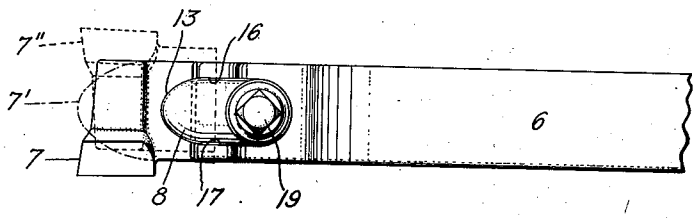


FIG. 3

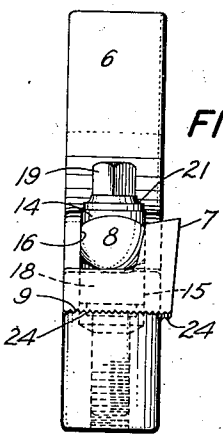


FIG. 2

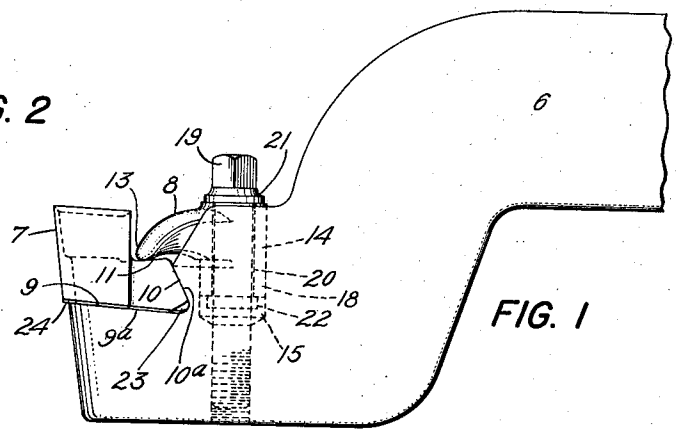


FIG. 1

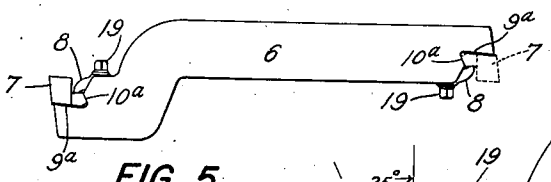


FIG. 5

FIG. 4

INVENTOR
Ernest Reaney
BY
Albert F. Nathan
ATTORNEY

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STREAMLINED BIT CLAMP AND HOLDER

Ernest Reaney, Bridgeport, Conn., assignor to The O. K. Tool Company, Inc., New York, N. Y., a corporation of New York

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4 Claims. (Cl. 29—96)

The present invention relates to heavy-duty metal-cutting tool-bits and holders and more particularly to shank-tools of the type used on large planers and car-wheel lathes.

As such tools operate on very large and massive work pieces and take extremely heavy cuts, they necessarily must be constructed to stand up under the severe cutting pressures and excessive heat generated in such operations without yielding or flexing in any way.

In the constructions heretofore in use, difficulty has been experienced in mounting a cutting bit in a holder in a manner capable of withstanding the heat and heavy cutting thrusts of such operations. It is one of the aims of this invention to render available a tool-bit that is structurally designed to take the heaviest of cuts and capable of being repeatedly resharpened without weakening the bit or interfering with the means for clamping it in the holder.

A further aim of the invention is to render available a tool bit that may be relatively inexpensively made in a variety of different forms characterized by a standard and relatively large foot portion or base by means of which it is seated and clamped rigidly in a holder in any desired laterally adjusted position.

Although a tool bit per se may be scientifically designed to withstand any normal working condition, unless a sufficiently strong rigid holder be available, the bit alone could not render the service of which it is inherently capable. The present invention aims to correlate the desired qualities of a properly designed tool bit and properly contrived holder into one coherent unit, each portion of which may be relatively easily manufactured and assembled.

Another difficulty experienced with the prior construction was the tendency of the chips, curling up from the workpiece, to dig into and wear away that portion of the holder slightly back from the cutting bit. In constructions heretofore used the bit socket in the tool holder was designed in a manner such that a portion of the holder came up close to the working face of the bit. And although such a design seemed proper for reasons of sturdiness, it was not long before the sharp edges of the curling and breaking chips dug into the relatively softer body of the holder, and roughened and materially weakened the holder at the region of the bit. The rough pitted surface also caused severe jamming and clogging of chips around the nose of the tool and, as a consequence, the tool as a whole was rendered less strong for the operation and unsatisfactory in use because the hot and sharp chips clogged the forward end of the tool and effectively prevented the operator from watching what was happening at the cutting edge.

Accordingly, a primary aim of this invention is to render available a tool that will not readily clog or be eaten away and weakened by the erosive action of the chips. That end is accomplished by the present invention by making that portion of the holder that projects forwardly close to the bit a separate piece, and of considerably harder and more wear resistant material. As such a piece represents but a small portion of the entire holder, it may be heat treated and hardened to the degree desired. Before hardening, however, the guard piece is given a rounded tapered shape designed to present a cone-shaped curved surface to the flow of chips. The guard is so positioned that as the chips come off the work and the cutting face of the bit, they strike the diverging sides of the hardened guard and are deflected away from the main body of the holder. Wear on the holder and the clogging of chips around the forward end are by this invention effectively prevented.

A further object of the invention is to obtain a strong bit clamping means which will cooperate with a relatively large base portion of the bit to hold the latter rigidly in its socket in the holder. In accomplishing that object, it is proposed to provide the guard with a rearwardly extending portion and provide that portion with a depending anchor and bearing adapted to closely fit a complemental bore in the holder. A clamp screw, having a loose fit in the guard piece and a threaded engagement in the holder, is provided for effecting a clamping of the bit between the forward end of the guard piece and the underlying wall of the bit socket. With such a construction, any thrusts tending to rock the bit and guard piece are directly absorbed by the bearing walls of the holder and not by the clamp screw. Interlocking means, comprising a series of parallel serrations between the relatively large seating surfaces of the bit and holder are provided for increasing the frictional area of contact between the bit and holder and for simultaneously guiding the bit rearwardly in the V opening under the combined action of the tooling forces and clamp means. The serrations also provide a positive means for locating the bit laterally in its socket whereby it may be used more efficiently in taking left or right handed cuts.

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 is a side elevation, approximately ⅔ full size, of the forward portion of a tool constructed in accordance with this invention.

Figure 2 is a front view thereof showing more clearly the interlocking serrations between engaging faces of the members.

Figure 3 is a plan view of the holder illustrating in dotted lines different types of tool bits adapted to be clamped therein.

Figure 4 is a longitudinal vertical section of the holder through the stream-lined chip guard and bit clamp means.

Figure 5 is a view of a holder, showing the applicability of the invention to holders of either the goose-neck or straight shank type or both combined.

Referring more particularly to Figure 5, the invention is illustrated as applied to a tool of the double ended type whereby a combination straight shank and goose-necked holder is provided. The holder proper comprises a body member 6, preferably constructed of a metal having great strength and toughness, such as a chrome-nickel forging. Each end of the body is provided with a tool bit receiving aperture and bit clamping and chip guarding means as illustrated, and inasmuch as these are alike in every particular, description of one end of the holder is believed sufficient.

With reference to Figures 1, 3 and 4, the assembled tool comprises the body member 6, recessed to receive and firmly support a cutting bit 7, (7′ or 7″) and the bit clamping and chip guard means 8. The bit proper is constructed of high grade material possessing the desired properties of strength and durability and the ability to hold its cutting edge under the severe stresses and heat of the cutting operation. However, a tool bit having all of these desired qualities is necessarily made of metal difficult to machine into shapes or designs that may be accurately and firmly clamped in a holder. The present invention however, renders it possible to fabricate the tool bit of the hardest of metals and/or of cemented carbides, for the reason that the seating and clamping thereof is designed as to necessitate only a few simple machining operations.

As viewed in Figures 1, 2 and 4, of the drawing the bit is forged or otherwise made substantially L shaped. The lower surface and base of the bit is relatively large and flat, is rearwardly inclined, and merges with the bottom surface 9 of the tail portion of the bit.

The forward upstanding portion of the L shaped bit is so constructed to provide ample material for repeated regrindings whereby the life of a bit fashioned in this manner is greatly lengthened. The rear and upper surfaces of the tail portion of the bit may be constructed as desired. A highly satisfactory and rigid clamping, however, is obtained by inclining the rear wall 10 of the tail forwardly, and the upper wall 11 downward in the forward direction. This formation gives the bit a dove-tailed character with its rear and bottom surfaces wedge-shaped. Thus, the tooling forces acting upon the upstanding portion react to force the bit rearwardly and downwardly in its socket. Any tendency of the bit to overturn, is, in the absence of any other clamping means effectively resisted by the overhanging rear wall 10 of the socket.

The bit socket is likewise formed with complementally inclined walls 9^a and 10^a which cooperate with the surfaces 9 and 10 of the bit in securing the bit in the holder. Very satisfactory results are obtained if the walls and surfaces 9 and 10 are inclined, for example, 5 and 25 degrees from the horizontal and vertical respectively, and as these surfaces are flat and extend in a horizontal plane the full width of the bit and holder, they may be machined or ground without great difficulty.

As hereinbefore mentioned an important feature of the invention concerns the means whereby the chips that are forced off the upstanding portion of the bit are prevented from digging in and clogging about the forward end of the tool. Such digging of the chips causes wear and in time dangerously weakens the holder. To prevent those evils, it is proposed to apply to the forward end of the holder an auxiliary guard member 8, arranged to overlie the tail of the bit and assume a position relatively close to the rear of the upstanding portion thereof. The chips that come off the work strike the guard, and in order that they be deflected away, the guard is provided with a forwardly extending rounded and tapered nose portion 13. Thus there is provided a stream-lined surface which cams the chips away from the holder irrespective of the direction from which the chips come.

The guard is made preferably of material considerably harder and more wear resistant than the body of the holder in order that it be capable of effectively resisting the erosive action of the chips and thereby add measurably to the life of the tool. That end may also be accomplished by forming the guard of steel and hardening the surface thereof, as indicated at 13^a of the drawing, to the proper degree. The center of the guard may be left relatively soft to give to the guard the strength required for another function now to be described.

As explained above, the relatively large and inclined platform 9^a and the rear wall 10^a in conjunction with the complemental surfaces 9 and 10 of the bit, serve to maintain the bit firmly seated under the action of the tooling thrusts. This may not in itself be sufficient to maintain the bit rigid, particularly if there is any spring to the workpiece or fixture or if the tool is arranged vertically, as in a planer. Therefore, to insure that the bit will remain with the holder under all conditions, means have been provided for clamping the bit in its socket.

A preferred form of a device for accomplishing that purpose as shown most clearly in Figure 4, includes the chip guard 8. The rear part of the guard has formed integral therewith a downwardly extending sleeve 14 adapted closely to fit a socket 15 provided in the holder 6. The upper forward portion of the holder is cut away to allow the nose 13 to project therethrough into cooperative relation with the tail of bit. The walls 16 and 17 of the channel thereby formed, serve as guide means restraining the guard against lateral shift. The sleeve 14 is provided with an extended bearing portion 18 which fits substantially entirely within the bore 15 and acts as a

bearing for the sleeve. As shown in the drawing the rear of the sleeve is supported in its bearing its entire length, and the forward portion of the sleeve at its lower end is likewise supported, consequently any lifting or turning forces reacting on the nose of the clamp are effectively resisted by the solid walls of the holder body.

The guard clamp 8 is adapted to be moved into clamping and unclamping relation by means of an adjusting screw 19. The screw 19 loosely fits a bore 20 formed in the sleeve and has a threaded connection with that portion of the body of the holder directly beneath the socket 15. The clamp screw is provided with an annular shoulder 21 which overlies the outer end of the sleeve, and a collar 22 which underlies the inner end of the sleeve, and accordingly, as the screw is actuated in or out, the guard clamp is bodily lowered or raised. The loose fit of the clamp screw in the sleeve 14 is provided for the purpose of relieving the screw of any lateral thrusts that may be imposed upon the guard 8.

As shown more clearly in Figures 1 and 2 the extreme forward end of the rounded portion of the guard dips downwardly so as to engage the upper surface of the bit somewhat forward of its rear end. Thus, it is possible securely to clamp the bits 7, 7′ or 7″ though the latter be adjusted forwardly as by means of a shim placed between the surfaces 10 and 10^a.

The arched and pointed formation of the nose portion 13 is a construction meriting great strength and universal adaptability to a variety of different styles and shapes of tool bit. Figure 3 illustrates in dotted lines a few representative styles of bits that may be selectively clamped in the holder.

This invention also contemplates a provision of means for adjusting the bit laterally in the socket in the holder, and that is achieved by forming a series of serrations 24 on the adjacent seating surfaces 9 and 9^a of the bit and holder. The serrations extend longitudinally of the holder and provide interlocking means whereby the bit is positively prevented from twisting or shifting under load, and simultaneously, means whereby the bit may be adjusted to the right or to left of the axis of the tool as the need requires. The clamp screw and guard means being located in the center of the holder do not interfere with adjustments of that character or with the right or left hand usage of the tool and may be conveniently manipulated at all times.

To insert or remove a bit, the clamp screw is elevated a distance sufficient to allow a bit to be moved sidewise along the serrated bottom surface to the position desired, or, if sufficient end room is available, the bit may be moved longitudinally in its aperture from the end of the holder. In adjustments of this character the serrations serve as guide means for guiding and for locating the bit squarely on its seat. As the bit is moved into position, any dirt or grit collecting on the serrated surfaces is scraped off during the operation, and deposited in the clearance space 23 provided for that purpose.

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 claims.

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:

1. A chip guard for lathe tools for preventing erosion of the tool holder body by chips, comprising a hardened element adapted to be superimposed upon the holder body immediately adjacent the cutter, said element being tapered toward the cutter and provided with a convex upper surface rounded in a vertical longitudinal plane and in a plane perpendicular thereto whereby a hard wear resisting substantially spherical surface is presented to the flow of chips for deflecting the flow upwardly and laterally away from the holder irrespective of the direction of approach of the chips.

2. A tool holder combining a shank member having a bit receiving aperture at its forward end, said aperture extending across the full width of the shank and provided with a rearwardly inclined bottom wall and an intersecting rear abutment wall; a tool bit inserted in said aperture, said bit having a forwardly disposed upstanding cutting portion and a base portion provided with an inclined bottom surface and a rear abutment surface, the reactionary pressure of the tooling forces acting on said upstanding portion normally tending to maintain said surfaces firmly in engagement with said walls; means for deflecting the chips incident to the tooling operation away from the upper surface of the shank member comprising a rounded cone-shaped hardened element that decreases in every major dimension toward the cutter superimposed upon the tool bit immediately to the rear of said upstanding portion; and means for supporting said hardened element in said position comprising a depending sleeve member formed integral with said hardened element snugly fitted in a recess provided in the shank rearwardly of said bit aperture; and screw means having a loose fit within said sleeve and a threaded connection with the shank member for maintaining the guard and tool bit firmly in position, the snug and loose fits between said sleeve and recess and said screw and sleeve affording a construction in which lateral thrusts on said hardened element are transmitted directly to the shank member proper.

3. A lathe tool of the character described combining a shank member provided at its forward end with a bit receiving aperture, said aperture having solely a bottom wall and a rear wall mutually inclined thereby providing a wedge shaped opening; a metal cutting bit member provided with complementally shaped bottom and rear walls insertable in said aperture; means for clamping the bit in said aperture; and means for guarding said holder in the region of the bit aperture against erosion by the chips occasioned during the tooling operation, comprising a forwardly tapered hardened element superimposed on said shank member at the forward end thereof and overlying a portion of the upper surface of the bit, said tapered element having a convex upper surface rounded in transverse planes presenting a substantially spherical surface to the flow of chips for deflecting the chips upwardly and laterally away from the shank irrespective of the direction of approach of the chips.

4. A heavy duty lathe tool combining an elongated body member having one end thereof depressed out of the plane of the main body, said

end of the body member also being provided with a bit receiving aperture extending horizontally completely across the forward end thereof, said aperture having a flat rearwardly inclined lower surface for supporting a tool bit; a bit member insertable in said aperture and having a downwardly inclined seating surface adapted to seat upon the said lower surface of said bit aperture; adjustable and positive interengaging means between said seating surfaces adjustable to permit lateral adjustment of the bit and normally restraining said bit against lateral movement relative to its support; guard means for protecting the body member at the rear of said bit aperture from chip erosion comprising an element having a relatively hard exterior surface and a relatively soft but strong core secured to said holder adjacent said aperture, said element also having a forwardly extending rounded portion tapering cone-like toward the cutting portion of the bit adapted to overlie said aperture and engage the upper surface of the bit inserted therein for deflecting the chips upwardly and laterally away from the bit and holder; and screw means carried by said holder and inclined forward toward the inclined bottom wall of the aperture for effecting a clamping of the bit between said guard means and the said bottom wall and simultaneously tending to urge said bit rearwardly in said aperture.

ERNEST REANEY.