July 12, 1960 H. W. EBERHARDT 2,944,447

HOLE CHAMFERING TOOL

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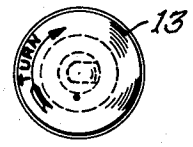

FIG. 1

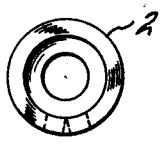

FIG. 3

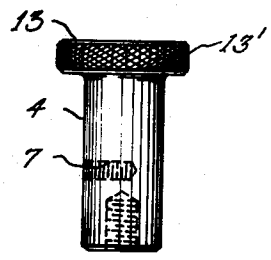

FIG. 5

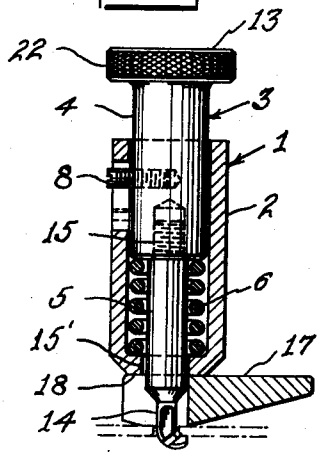

FIG. 2

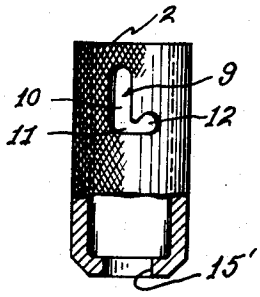

FIG. 4

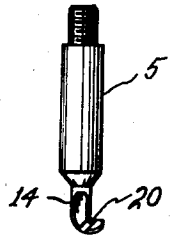

FIG. 6

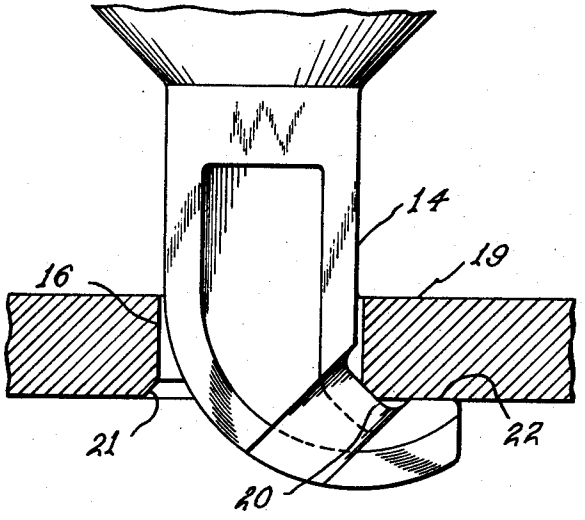

FIG. 9

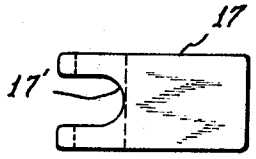

FIG. 7

FIG. 8

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HOLE CHAMFERING TOOL

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3 Claims. (Cl. 77—73.5)

My invention relates to a hole chamfering tool and is particularly directed to means for chamfering a hole with a "hidden edge."

When both sides of a workpiece are accessible, holes through the part are easily chamfered with conventional chamfering tools. If, however, one side of the workpiece is inaccessible, as for example, in closed or substantially closed shapes, a special tool is required to chamfer the "hidden edge" of the hole, that is the edge on the inaccessible side of the piece. Special tools employed heretofore for this purpose have not been too satisfactory either in operation or in results obtained. One of the difficulties encountered in chamfering a "hidden edge" of a hole is that the operation cannot be observed and in consequence the depth of cut is not readily controlled.

The prime object of this invention is to provide a generally improved tool for chamfering the "hidden edge" of a hole and to provide for a controlled depth of cut on a "hidden edge" with such a tool.

Other objects and advantages of the invention will become apparent hereinafter.

The invention is explained in detail in the ensuing description, which should be read in conjunction with the annexed drawing in which similar reference characters designate similar parts and in which:

Fig. 1 is a top plan view, and Fig. 2 is an elevational view, partially in section, showing the tool of the invention;

Figs. 3 and 4 are top and elevational views respectively of a cylindrical member constituting the tool body;

Figs. 5 and 6 are elevational views of portions of the tool movable within the cylindrical member of Figs. 3 and 4;

Fig. 7 is a top plan view of a wedge used in conjunction with the tool of the invention;

Fig. 8 is a side elevational view of the wedge of Fig. 7;

Fig. 9 is an enlarged elevational view illustrating the cutting portion of the tool.

Referring to the drawings, reference character 1 designates the tool of the invention. Such tool includes a cylindrical body member 2 which houses a two-part member 3. The two-part member 3 comprises an upper cylindrical portion 4, having a sliding fit with member 2, and a lower cylindrical portion 5 of lesser diameter than the portion 4. A spring 6 within the member 2 abuts at opposite ends against member 2 and portion 4 of the member 3. The purpose of the spring 6 in carrying out the function of the tool will be explained hereinafter.

As shown, portion 4 of the two-part member 3 is tapped at 7 to receive a screw 8. The body member 2 is provided with an L-shaped slot 9, and the screw 8 registers with and protrudes into this slot in the assembled tool. When the tool is in use the screw 8 is disposed in some intermediate position in the vertical portion 10 of the

slot 9. When the tool is being readied for use or for withdrawal from a hole upon completion of a chamfering operation, the screw 8 is positioned in the horizontal portion 11 of the slot 9 and caused to lock in place in the end 12 of slot portion 11. The screw is positioned by depressing the knob 13 formed on the upper end of portion 4 of the two-part member 3 to compress the spring 6. With the screw at the lower end of the vertical portion 10 of the slot 9 the knob 13 is turned slightly in a counterclockwise direction to lock the screw in place in portion 12 of the slot. The screw is released from its locked position by depressing the knob slightly and turning the knob in clockwise direction.

As already indicated, portion 5 of member 3 is of smaller diameter than portion 4. The portion 5 carries a hook-shaped working part of the tool 14 at its lower end. The two parts, 4 and 5, are separable, being joined by a screw connection at 15. If replacement of the working part becomes necessary due to damage or if a different working part is required for any other reason, the lower portion 5 of two-part member 3 may be separated from upper portion 4 and withdrawn from the housing 2, through opening 15' at the lower end of the housing and the part 5 replaced. Portion 4 of the two-part member remains within the cylindrical member 2.

As stated, the tool is readied for use by locking the screw 8 in portion 12 of the slot 9, thereby disposing the two-part member and the cutting portion 14 of the tool in their lowest positions relative to the member 2. When the screw has been so located, the working part 14 of the tool protrudes a considerable distance below the extreme end of member 2 and can be inserted through a hole for chamfering the "hidden edge." Because of the configuration of the working part 14, such part must be manipulated into the hole by first inserting the extreme end of part 14 into the hole with the axis of the tool at an acute angle to the surface of the workpiece, and then moving the tool into a vertical position to complete the insertion.

After insertion of the cutting portion of the tool into a hole as 16 (Fig. 9) a wedge 17 is inserted between the lower end 18 of cylindrical member 2 and the workpiece 19, the wedge being recessed at 17' to fit about portion 5 of two-part member 3. The knob 13 of the member 3 is then slightly depressed and turned to release the member 3 from its locked condition. The spring 6 becomes effective to urge the member 3 upwardly in cylindrical member 2 and force the cutting edge 20 of the tool against the edge 21 of the hole. The spring 6 urges the lower end 18 of cylindrical member 2 against the upper surface of the wedge. The knob 13 of the tool is then turned so as to rotate the tool and cause the cutting edge 20 to chamfer the edge 21 of the hole. Knob 13 is preferably knurled as at 13' to facilitate the turning of the tool with the fingers. Preferably the diameter of the working portion 14 of the tool is only slightly less than the diameter of the hole.

The cutting portion 14 of the tool is formed with an abutment shown as a flat surface at 22. This surface serves as a stop by means of which the depth of cut is controlled, and is an important feature of the invention. When a predetermined depth of cut has been made, the surface 22 comes into engagement with the underside of the workpiece and prevents further cutting of the metal. The cutting portion 14 of the tool may be designed with an abutting surface 22 to provide any depth of cut and different parts may be substituted for portion 5 as required to obtain a different depth of cut, the depth of cut being determined by the position of surface 22 in relation to cutting edge 20.

After the edge 21 of the hole has been chamfered,

knob 13 is depressed and turned to lock the screw 8 in the end 12 of the slot. The wedge 17 is then withdrawn from the work area and the tool is tilted permitting the working portion 14 of the tool to be completely removed from the hole.

As indicated, the device of the invention is particularly intended for use in chamfering the inside edge of holes, that is, the edge on a side of a workpiece, and in this area achieves various desirable results as must now be apparent from the foregoing description. The construction of the device is, for example, extremely simple and the parts are easily assembled. Also the working portion of the tool is easily removed and replaced when necessary. In addition, a controlled depth of cut is provided for even though the actual cutting during a chamfering operation is not directly observable by one using the tool.

While only one form of the invention has been shown in the drawings and described in the specification, it will be obvious to those skilled in the art that various changes and modifications may be made in structure without departing from the spirit and scope of the invention as set out in the appended claims.

I claim:

1. A hole chamfering device comprising a tool portion with a cutting edge for chamfering the inside edge of the hole of a workpiece, a pair of members one of which is attached to said tool portion and is axially movable relative to the other member, a support for the said other member having a substantially U-shaped portion insertable between the said other member and the workpiece, spring means which bears against said members

urging the cutting edge against the inside edge of the hole and the said other member against said support, and means for turning the tool portion to accomplish the chamfering of the hole.

2. The combination as defined in claim 1 including locking means for holding the said one member in a fixed position against the biasing force of the spring means.

3. A hole chamfering device comprising a tool portion with a cutting edge for chamfering the inside edge of the hole of a workpiece, a pair of members one of which is attached to said tool portion and is axially movable relative to the other member, a support for the other member having a substantially U-shaped end portion insertable between the other said member and the workpiece and being substantially wedge shaped in a plane perpendicular to the plane of the U-shaped portion, spring means which bears against said members urging the cutting edge against the inside edge of the hole and the said other member against said support, and means for turning the tool portion to accomplish the chamfering of the hole.

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