Nov. 3, 1953 G. H. PICKERING ET AL 2,657,597

DEBURRING AND CHAMFERING TOOL

Filed May 25, 1950

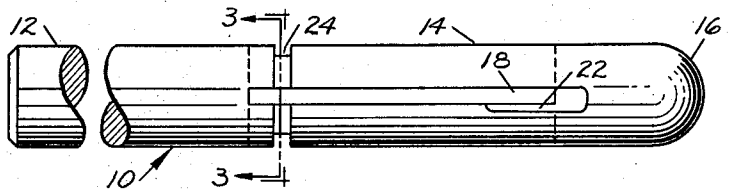


FIG. 1

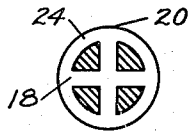


FIG. 2

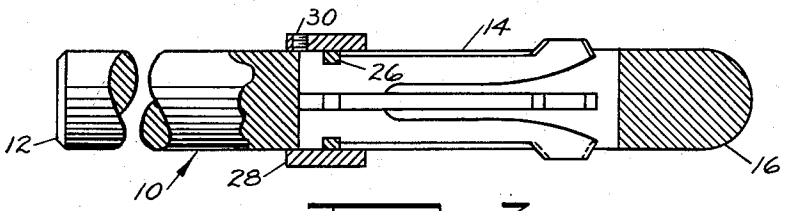


FIG. 3

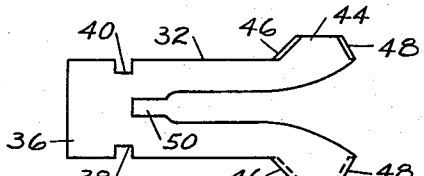


FIG. 4

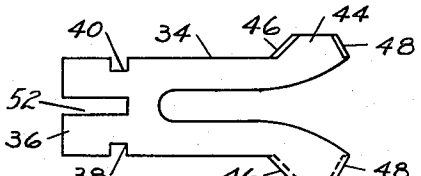


FIG. 5

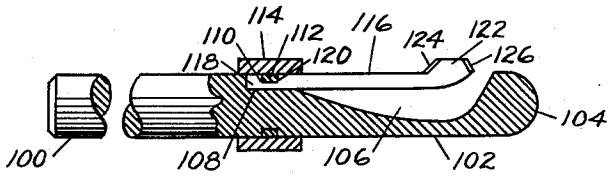


FIG. 6

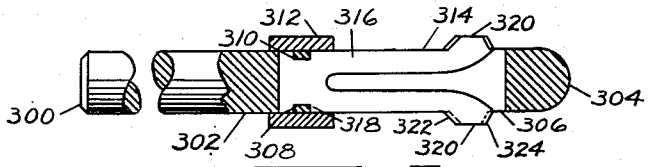


FIG. 7

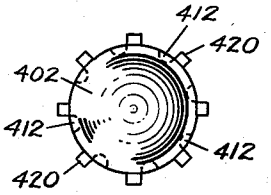


FIG. 9

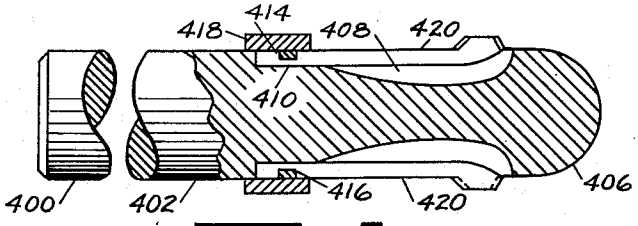


FIG. 8

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DEBURRING AND CHAMFERING TOOL

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4 Claims. (Cl. 77—73.5)

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This invention relates to machine tools and more particularly to deburring and chamfering bits.

It is well known in the art of metal working that when drilling metal, the conventional bit upon cutting through the work leaves more or less burr surrounding the outlet of the bore made by the bit. The incident invention aims to overcome this difficulty.

Broadly, the invention comprehends a bit having therein a flexible blade provided with a shoulder normally extended beyond the circumference of the bit and provided with oppositely inclined cutting edges effective to chamfer a wall defining a bore at the entrance of the bore and to deburr and chamfer the wall at the exit of the bore upon extraction of the bit.

An object of the invention is to provide a machine tool characterized in that a flexible blade and/or a group of flexible blades mounted in a suitable bit, have upon their free ends, shoulders normally extended beyond the circumference of the bit and equipped with reversely inclined cutting edges.

Another object of the invention is to provide a bit having therein a group of demountable flexible blades provided with reversely inclined cutting edges.

Another object of the invention is to provide a bit having therein a plurality of demountable interlocking flexible blades each provided with reversely inclined cutting edges normally extended beyond the circumference of the bit.

A further object of the invention is to provide a deburring and chamfering tool including a bit having longitudinal diametral slots arranged in transverse relation to one another, and a pair of interlocking bifurcated flexible bits demountably supported in the slots. The bits having on their free ends oppositely disposed shoulders extended beyond the circumference of the bit and equipped with oppositely inclined cutting edges.

Other objects and advantages of the invention will appear from the following description when taken in connection with the drawings forming a part of this specification and in which:

Fig. 1 is a longitudinal view of the bit;

Fig. 2 is a cross sectional view;

Fig. 3 is a longitudinal view partly in section;

Fig. 4 is a side elevational view of one of the blades;

Fig. 5 is a side elevational view of the other blade;

Fig. 6 is a longitudinal view partly in section, illustrating a modification of the invention;

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Fig. 7 is a longitudinal view partly in section, illustrating another modification;

Fig. 8 is a longitudinal view partly in section, illustrating another modification of the invention; and

Fig. 9 is a cross sectional view of Fig. 8.

Referring to the drawings for more specific details of the invention, a machine tool indicated generally at 10 includes a conventional shank 12 and a stem 14 contiguous therewith, having a pilot 16 for directing the tool into a bore in a piece of work, and the stem has elongated diametral slots 18 and 20 transversely disposed in relation to one another with one wall of each slot chamfered as indicated at 22, the purpose of which will hereinafter appear, and the stem has a circumferential groove 24 straddling the slots adjacent the shank 12. The groove is adapted to receive a retaining ring 26 held against displacement by a collar 28 which may be secured as by a set screw 30.

A pair of similar bifurcated blades 32 and 34 are adapted to be fitted into the slots 18 and 20. As shown, each blade has a shank 36 provided with diametrically disposed notches 38 and 40 adapted to register with the circumferential groove 24 in the stem.

The free ends of each of the bifurcated blades have shoulders 42 and 44 which increase the over-all width of the blade and this width is greater than the diameter of the stem 14, and the shoulders have reversely inclined cutting edges 46 and 48. The blade 32 has an axial slot 50 extended from the bifurcation inwardly of the shank 36, and the blade 34 has an axial slot 52 extended from the butt of the shank inwardly toward the blade.

The blade 32 is slipped into the slot 18 and moved to seat on the end wall of the slot adjacent the shank 12 with the notches 38 and 40 therein registering with the groove in the stem. The blade 38 is then slipped into the slot 20 through the bifurcation in the blade 32 and moved to seat on the end wall of the slot 20 adjacent the shank 12 with the slot 50 in the shank of the blade 32 receiving the shank of the blade 34 and the slot 52 in the shank of the blade 34 receiving the shank of the blade 32, and the notches 38 and 40 in the shank registering with the groove in the stem.

The retaining ring 26 is then fitted in the groove 24 of the stem and the notches 38 and 40 of the blades, and the collar 28 is moved over the retaining ring and secured against displacement by the set screw 30. When the tool is thus assembled the spring forked blades are yieldingly

supported on the shoulders 42 and 44 with their reversely inclined cutting edges 46 and 48 extended beyond the circumference of the bit. Under this condition when the bit enters a bore with a rotary motion, the cutting edges 48 slightly chamfer the wall defining the bore at the entrance thereof, and due to the inclination of the cutting edge 48 the bifurcations of the blade are depressed so that the shoulders 42 and 44 ride smoothly through the bore without damage to the wall thereof.

When the working portion of the bit passes through the bore and there is no longer any pressure on the shoulders 42 and 44 of the blades the blades return to static position. Accordingly, when the tool is extracted, the cutting edges 46 of the blade serve to remove the burr inherent in a drilled opening and to slightly chamfer the outlet of the bore.

A modification of the invention is illustrated in Fig. 6 wherein a shank 100 has an integral stem 102 terminating in a pilot 104. The stem has an elongated longitudinal slot 106, a section of which has a uniform depth providing a shoulder 108, and the stem has a circumferential groove 110 for the reception of a retaining ring 112 held against displacement by a collar 114.

A spring blade 116 has a shank 118 provided with a notch 120 adapted to register with the groove in the stem and to receive the retaining ring. The free end of the blade has a shoulder 122 normally extended beyond the circumference of the stem, and the shoulder has reversely inclined cutting edges 124 and 126.

The tool is assembled as shown and its mode of operation is identical to that of the preferred embodiment.

Another modification of the invention is illustrated in Fig. 7 wherein a shank 300 has an integral stem 302 terminating in a pilot 304. The stem has a longitudinal slot 306 and a circumferential groove 308 straddling the slot. The groove is adapted to receive a retaining ring 310 held against displacement by a collar 312.

A bifurcated spring blade 314 has a shank 316 provided with oppositely disposed notches 318 adapted to register with the groove in the stem and the free end of the blade has oppositely disposed shoulders 320 provided with oppositely inclined cutting edges 322 and 324.

The bit is assembled as shown and its mode of operation is the same as that of the preferred embodiment.

A further modification of the invention is illustrated in Figs. 8 and 9, wherein a shank 400 has an integral stem 402 supporting a pilot 406. The stem has a plurality of spaced longitudinal slots 408, sections of which adjacent the shank have uniform depth providing shoulders 410 and one wall of each slot is chamfered as at 412, and the stem has a circumferential groove 414 for the reception of a retaining ring 416 held against displacement by a collar 418, and blades 420 corresponding to the blades of the modification shown in Fig. 6 are fitted on the shoulders 410 and held against displacement as by the retaining ring and collar.

Although this invention has been described in connection with certain specific embodiments, the principles involved are susceptible of numerous other applications that will readily occur to persons skilled in the art. The invention is, therefore, to be limited only as indicated by the scope of the appended claims.

Having thus described the invention, what we desire to claim as new and secure by Letters Patent is:

1. A machine tool comprising a bit having a shank, a pilot and a body between the shank and the pilot provided with diametral transversely disposed slots, a pair of bifurcated flexible blades arranged one in each slot, interlocking shanks on the blades, means for rigidly holding the shanks of the blades in the slots, projections on the bifurcated ends of the blades and reversely inclined cutting edges on each of the projections.

2. A machine tool comprising a bit including a shank, a pilot and a section between the shank and the pilot having diametrically disposed slots with chamfered wall portions, a pair of bifurcated blades arranged one in each slot, interlocking shanks on the blades, projections on the free ends of the bifurcations, reversely inclined cutting edges on each projection and means for rigidly holding the shanks of the blades.

3. A machine tool comprising a bit including a shank, a pilot and a section between the shank and the pilot having diametral transversely disposed elongated slots and a circumferential groove straddling the slots, a pair of flexible bifurcated blades in the slots, interlocking shanks on the blades having notches registering with one another and with circumferential groove, oppositely disposed projections on the free ends of the bifurcations, reversely inclined cutting edges on the projections, and a retaining ring received by the groove in the bit and the notches in the blades.

4. In a machine tool a pair of bifurcated flexible blades, interlocking shanks on the blades, oppositely disposed projections on the bifurcations of the respective blades, reversely inclined and reversely disposed cutting edges on the projections.

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