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E. M. TUCKER ET AL

2,388,022

HOLLOW TAP

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Fig.1

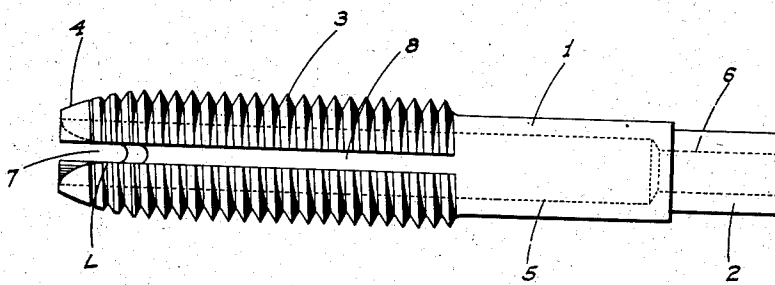


Fig. 4

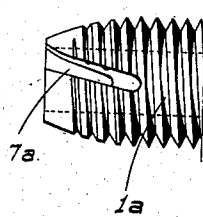


Fig. 2

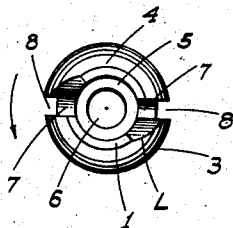


Fig. 3

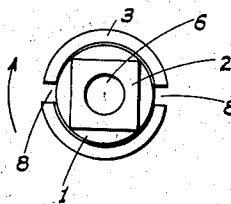


Fig. 5

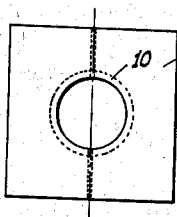


Fig. 6

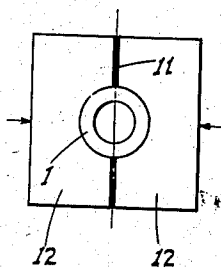


Fig. 7

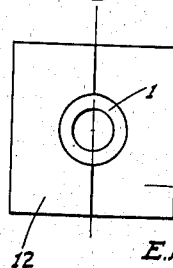
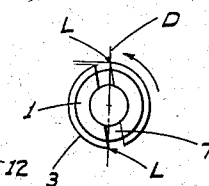


Fig. 8



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UNITED STATES PATENT OFFICE

2,388,022

HOLLOW TAP

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4 Claims. (Cl. 10-141)

This invention relates to thread-cutting taps, one object being to provide a tap so constructed that the shavings as cut by the advance of the tap will be removed from the hole without the need of employing deep and wide full-length flutes such as are found in the conventional tap.

The elimination of such flutes as the sole means of carrying off shavings or chips not only strengthens the tap, but avoids the working of the chips being carried away against the threads as they are cut, and which tends to mutilate the threads.

Another object is to construct the tap so that there is a minimum of friction between the cut threads and the tap when retracting the latter, so that there is no chance of damaging the threads.

This feature is made possible and commercially practicable by the provision of a novel method of making the tap, and which forms still another object of the invention.

A further object of the invention is to provide a simple and inexpensive device, and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects we accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawing, similar characters of reference indicate corresponding parts in the several views:

Figure 1 is a longitudinal view of the improved tap.

Figure 2 is a head end view of the same.

Figure 3 is a butt end view of the tap.

Figure 4 is a fragmentary elevation showing a modified form of flute.

Figures 5 to 8 are diagrams illustrating certain steps in the method of making the tap.

Referring now more particularly to the characters of reference on the drawing, the tap comprises a body 1 having a square shank 2 at its butt end for engagement with a chuck.

The body for the major portion of its length is provided with threads 3 of predetermined size and pitch; a few of the threads at the head end of the tap being intersected as usual by the tapering of the body at that end, as at 4, so that these threads gradually diminish in depth and finally disappear as the taper passes inwardly of the plane of the base of the threads. Thus far, the arrangement is continual and standard.

The tap from end to end is provided with a relatively large bore 5 which is reduced at the

shank as at 6 for strength. Cut in the tap at the head end thereof is a diametral slot 7 which extends from the outer edges of the adjacent threads to the bore 5, and lengthwise of the tap from its outer end to a termination adjacent the first full-depth thread, which is of course the point at which the thread cutting operation of the tap ceases. The leading edges L of this slot are the cutting edges of the tap, and are disposed so as to be radially out from the trailing edges of the slot, this being done by the method described later.

From the rear ends of the slot on opposite sides of the tap, narrow grooves 8 of rectangular form may be cut through the threads to the rear end thereof; the leading edges of these grooves (which replace the usual wide and deep flutes) being also radially out relative to their trailing edges.

The cutting slot 7, as shown in Fig. 1, extends generally in a direction axially of the tap, and the leading edge flares away from the axial line of the tap, as shown.

In Fig. 4, however, the slot 7a cut in the tap 1a is shown as extending diagonally relative to the axis of the tap; the leading and cutting edge sloping in the direction of cutting rotation of the tap. Also in Fig. 4, the longitudinal groove or flute beyond the slot is eliminated. In either case, the chips or shavings cut in the work by the rotation and advance of the tap, fall or are deflected into the central bore, where they are of course kept from possible contact with the finished threads as they are cut. The grooves or flutes 8 if provided merely form clean-cut or finishing elements for the cut threads, and do not carry any shavings or chips to mar or mutilate said threads as is the case with the conventional tap.

The radial difference between the leading and trailing edges of the slots and flutes, and the elimination of material friction when retracting the tap, is obtained by the following manufacturing procedure. A hardened block 9 is tapped as at 10 to the size and length of the tap to be made, after which the block is cut through diametrically of the tapped hole as at 11, for the width of a few thousandths of an inch, and then providing separate block sections 12.

The threaded but unslotted tap 1, prior to tempering, is then placed between the blocks, after which pressure is exerted against the block sections 12 on opposite sides of and at right angles to the cut, to force said sections toward each other and close the gap, as shown in Fig. 7.

This obviously results in deforming the tap so

that it is slightly though symmetrically out of round, with its major diameter D, however, remaining normal. The blocks are then separated and the tap withdrawn. The slot 7 is then cut in the tap on a bias to diametral line D, and so that the leading edges of the slot will lie on said line. Due to the out-of-round form of the tap, the trailing edges of the slot (and flute 8) will be radially inward of the leading edges, as will all of the threads from the trailing to the leading edge.

As a result, the tap when engaging the finished threads, only contacts the same at diametrically opposed points, and hence can be retracted with a minimum of resistance and without possible damage to the threads.

From the foregoing description it will be readily seen that we have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

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

1. A tap comprising a body, threads on the body adjacent its forward end, the body at said end having a diametral slot cut therethrough and through the threads lengthwise of the body and having its leading edge radially out from its trailing edge, and the body having a central bore extending from the outer end of the body to the rear end of and intersecting the slot.

2. A tap as in claim 1, in which the threads adjacent the forward end of the body become increasingly shallow in depth toward said end; the slot extending back to the full-depth threads.

3. A tap as in claim 1, in which the slot is cut on a bias relative to the axis of the tap, with the leading edge of the slot sloping in the direction of cutting rotation of the tap.

4. A tap comprising a threaded body of slightly oval shape in cross section, a diametral slot cut into the working end of the body to form a cutting flute, the leading edge of which lies in a plane along the major diametral axis of the body, and a bore through the body, the inner end of which bore opens into the slot.

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