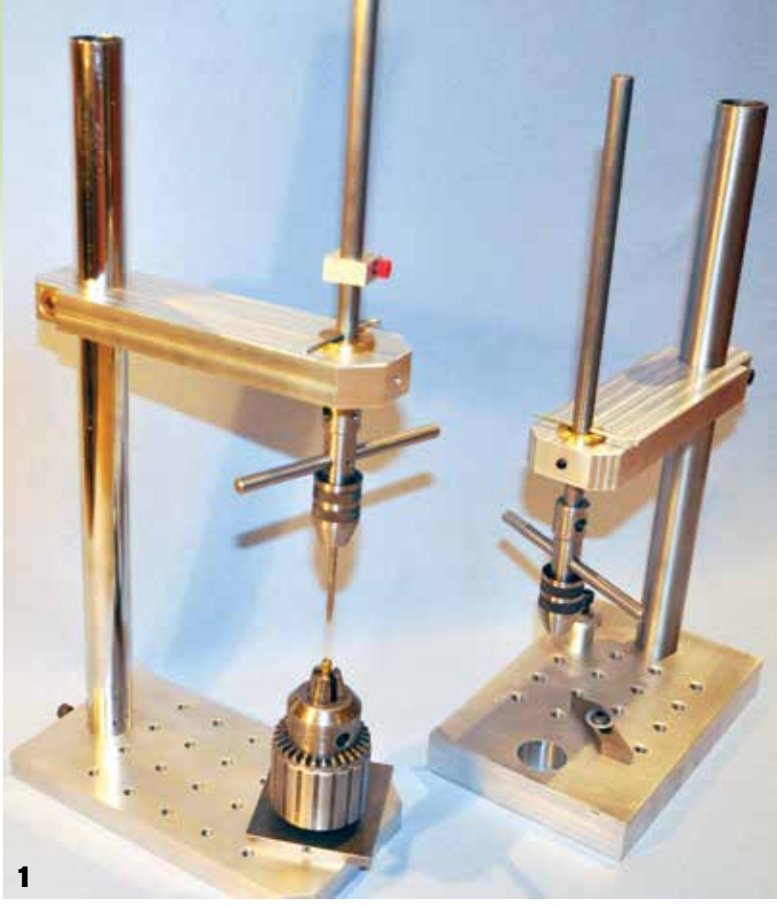
Homemade Hand Tapper

by PETE SORENSON

The following is a discussion of building a "hand tapper," as well as some attachments to use with the finished device. My immediate need was to tap 4-40 threads in both ends of some 3/16" brass tubing. The finished parts are to be used in building a number of fly fishing reels. As the reels are part of a group build, there are a large number of threads to tap. In the end, I built two tappers, with the difference being related to what was in the scrap box.

My goal was to build a very sturdy device, using as much material from the scrap bin as possible. You will notice I do not give any dimensions, as the sizes were determined by the available material. The only items purchased were the tap wrenches and some threaded fasteners. The two tappers I made are shown in ***Photo 1***. The column of one happens to be a piece of 1" diameter chromed closet rod, which has proven to be rigid enough for the task. The second unit uses a piece of 1" steel tube of unknown heritage.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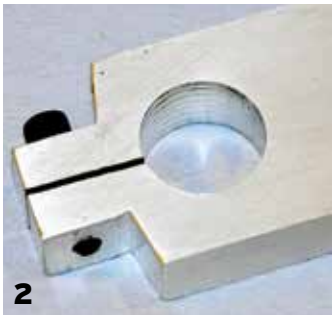
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An earlier build used a pinch bolt to clamp the upper arm in position (***Photo 2***). This was only marginally workable and took a substantial force to clamp the arm in place. Reading Guy Lautard's *The Machinist's Bedside Reader* introduced me to the cotter, which turns out to be an excellent clamping device as well as an enjoyable project to machine.

Photo 3 is a disassembled view showing all the parts needed to build a hand tapper, including the optional depth stop. The following is a technique for machining


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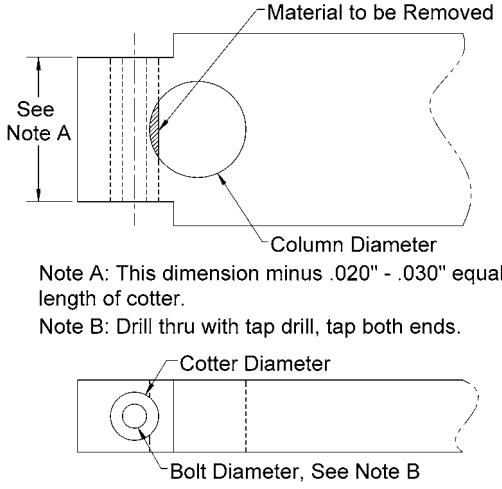

Figure 1

the brass cotters with contours that match the tube diameter. The matching radius produced allows the cotter to clamp tightly without denting the column.

The first step is to make a drawing of the portion of the arm where it intersects the column; this includes the cotter and the clamping bolt. The goal is to have the bolt just clear the column, giving the largest possible clamping surface (***Figure 1***). Drill and bore or ream the cotter bore to a nice finish and a close fit to the brass that will become the cotter.

The cotter stock should be a sliding fit in the bore and .020"-.030" shorter than the distance through the arm. Tap each end of the brass with the same threads as the draw-bolt that will be used. With cap screws and washers, fasten the brass into the bore, making sure to tighten securely (***Photos 4*** and ***5***).

Carefully locate the column bore on the arm and machine to size. The closer to a sliding fit the better, as this will help to maintain parallelism between the base and the arm. This should produce a brass cotter with surfaces that match the column as closely as the arm fits the column (***Photo 6***).

At this time, remove the cotter from the arm and cut it into two parts, with the cut at the deepest portion of the arc. Carefully file the

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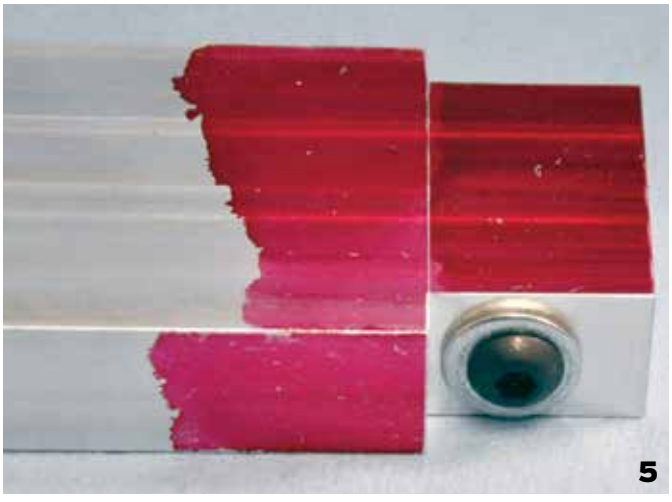

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cut ends smooth and remove any burrs. Drill through one half of the cotter with a clearance drill for the cap screw that will be used. The other half of the cotter should be tapped completely through (***Photo 7***). This will give you a very rigid clamp for your arm and column interface.

The example is a 1/2" diameter brass cotter with a 1/4-20 draw-bolt. Because a depth stop was needed, I used the same sequence to build a smaller cotter using a 4-40 screw and 3/16" brass rod.

With the large number of matching parts to be tapped, I modified a drill chuck as a means to hold the parts. While the chuck holds the piece adequately, tapping to a uniform depth takes some additional setting tools. For a large quantity of parts it is easier and faster to use a collet fixture with a collet stop. With the collet block and the adjustable stop, tapping to a desired depth is easy (***Photo 8***).

The hand tapper works well with larger parts by using a stop block or fouling bar to keep the parts from spinning (***Photo 9***). For the small parts it is better to use a vise or clamping setup even if it is a one off part.

All the rules for using taps still apply, but the use of the hand tapper and fixtures allows you to cut the threads where you want them and in alignment with the drilled hole. When using the tool I prefer to either hold it in a vise or clamp it to the workbench.


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Photos and drawing by Author

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