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# EDWARDS MOUNTAIN WOODWORKS, LLC

*fine handtool woodworking: creating and teaching in wood*

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Bill Anderson  
Woodside Trail  
Chapel Hill, NC  
27517-6077  
919.932.6050

[bill@edwardsmountainwoodworks.com](mailto:bill@edwardsmountainwoodworks.com)

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## Why Tapered Bowsaw Pins?

When I acquired access to the Howarth bowsaw for study, I noticed that the business ends of both handles were tapered a bit. I also wondered how the pins were seated into the handle. A local veterinarian consented to do an x-ray of the handles. From these results I could see that the pins were tapered into the handles as well; as well as being pinned and peened through the narrow diameter of the handle to keep the wood in place. I had a small collection of bowsaws and was able to get a couple more from the Woodwright's School and from Ed Lebetkin's Tool Store and had these x-rayed as well. What I found was that all of the obviously antique saws had tapered pins, while the modern Marples saw that I owned (c1950s) had straight sided pins.

One of the problems I had with using the Marples saw (and other modern saws) was that I could not keep the saw tight enough to keep the frame from rotating around the axis of the pin as I was sawing. I was required to hook my right index finger around the near arm of the saw to keep it stable. The problem clearly was that the straight sided holes through the arms had worn a bit over the years. The only way to try to solve this issue was to tighten the saw whorl enough so that there was friction on the vertical surface of the pin that meets the outside face of the arm. Not very effective and the risk of snapping the frame is too high.

I looked at modern bowsaws (Continental saws offered on the current market, saws made by other custom makers, etc.). The usual solution is to include a "lock washer" between the pin and arm, or serrate the vertical face of the pin, or to even have a series of notches in the arm and handle face. These will all work, but clearly do not replicate the style or functionality of the antique saws.

None of the antique saws that I had x-rayed had exactly the same taper. The degree of taper was easy to calculate from the x-rays as the images of the metal parts were extremely sharp. The tapers did hover in the range of 0.5 inch per foot although they were different enough to clearly indicate that there was not a standard taper in the small sample set that I looked at. According to a metalsmithing expert that I consulted, these tapered pins could have either been cast from molds, then trued up, or they could have been turned on a metal lathe. It is likely that there was a historical transition from casting to turning. The taper reamers to suit the individual pins could have been hand-forged and the specific taper achieved could have been used to model the taper for the castings. This would explain why there was variation from company to company.

I decided to look for a commercial hand tapering tool, then have pins matched to that taper. It turns out that tapering is a very big subject in the metal world with lots of different standards for specific jobs. Brown & Sharpe offer a series of tapers from 1-18, all at 0.5 in/ft., and differing only by the large diameter. Tapers No.1 and No.2 are of a size useful to ream holes about 1/4" in diameter or less.

The concept of the tapered pin is that two wedging actions in opposition will work together to lock an item in place. One wedge is the pin itself, the other wedge is the taper of the hole (mirror image of a wedge). This is the same concept that operates to keep the quill in a drill press in place. This is an elegant yet extremely effective force. To make this work, you must leave a space between the pin flange and the bowsaw arm to accommodate wear and make sure that it is the taper doing the holding, not the face of the pin. Over the years, as the tapered hole is worn open through repeated use, it is simply necessary to plane off a small amount of the outside face of the arm around the hole to restore the wedging action.