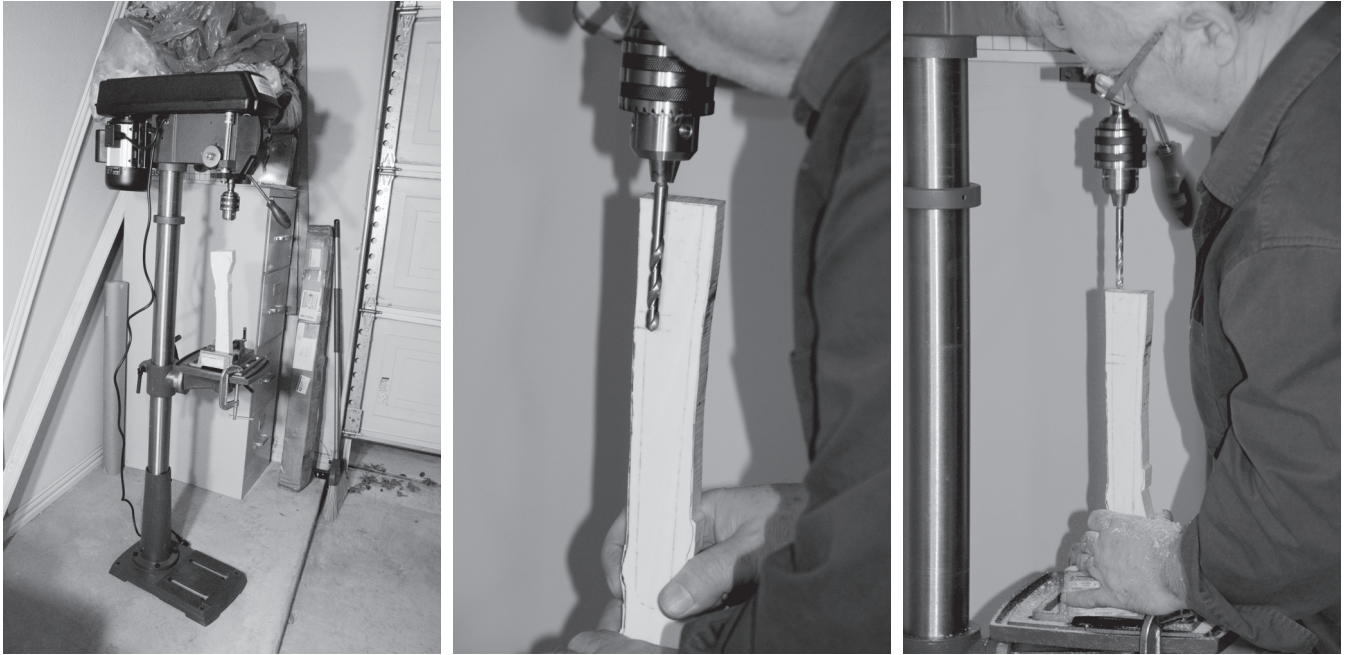


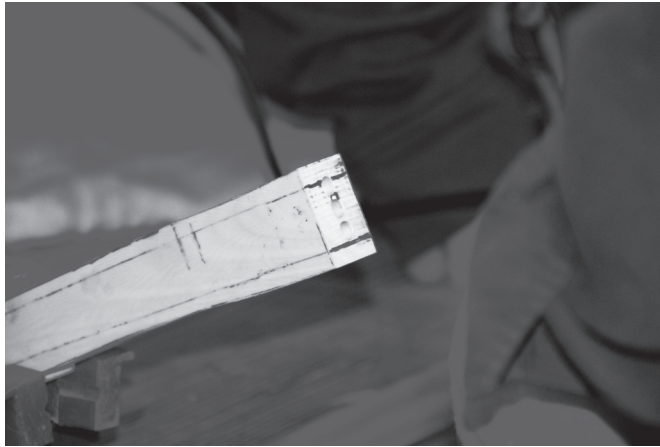
## 2.2 Drilling A Hole For The Tang

The first stage of drilling was creating three pilot holes. These holes set the boundaries of the hole and were just deep enough to establish the direction of the hole (about 3 to 4 inches). The goal was to have one hole follow each edge of the tang and one hole run down the middle. Because the tang tapers, the three holes would meet at the bottom.



Aligning the handle in the drill press.

The handle was clamped in a vise attached to a drill press. The vise was adjusted until the drill bit lined up with one of the edges of the tang. Drilling was done in short bursts of a couple seconds, with the bit being raised completely out of the handle between bursts. This served two functions. First, it avoided excessive heat buildup that would result if a hole were bored in a single pass. The heat would add stress to the ivory and could lead to cracking. Second, lifting the bit allowed the ivory dust to escape. When drilling a shallow hole, the dust moves along the flutes of the drill bit and exits the hole. But flutes are not a perfect evacuation system, and as the hole gets deeper, the dust tends to clog at the tip of the drill bit. Cutting is impeded and the friction generates unwanted heat. By frequently lifting the bit completely out of the hole the flutes were kept clean.



The three completed pilot holes.



Using a drill to open up the tang hole.

Jose selected a drill long enough to reach the bottom of the tang and clamped the handle in a bench vise. Again, the hole was drilled in short bursts. A hand drill was used to deepen the three holes because our drill press did not have enough travel to lift the long bit completely out of the hole for cleaning the flutes. The pilot holes, being about four inches deep, provided enough of a guide that the imprecision associated with hand drills was not a problem. The two outer holes were drilled first. And as planned, the third hole connected with the other two as the holes converged at the bottom. [Note: A larger vise on a sturdier bench would have been easier to use. Visiting friend and artist, Michael De la Vega (visible in the photos), was not relaxing - he was stabilizing the bench.]