

CONSTRUCTING A JAPANESE FOOT-BEATER

By Nakos Theodorosides

For more information on history, equipment, etc. please refer to the living document at:

<https://drive.google.com/open?id=0B0UwTqdbbHW3RWIHZDBBQzh4SHc>

You can also find information at my blog, Kute-Uchi Revival,

<https://greeknakos.wixsite.com/kuteuchirevival>

Or at my Youtube channel, Kute-Uchi Revival,

<https://www.youtube.com/@kute-uchirevival4052/featured>

Illustration 1: Image from Jacqui Carey's Samurai Undressed.

Illustration 2: Image from Jinrin Kinmo Zui Vol. 6. The only image I have that has the stopper drawn in.

Illustration 4: Image from Kumihimo no Sekai. Image showing cutouts on the uprights. The author states that this image is from Seventy-First Craftsmen's Poetry Contest from the Muromachi period.



Illustration 3: Image from A Study of Archaic Braiding Techniques in Japan. A seventeenth century copy of Poetry Match of Seventy-One Pairs of Artisans. Original illustration by

Mitsunobu Tosa, 1434-1525.

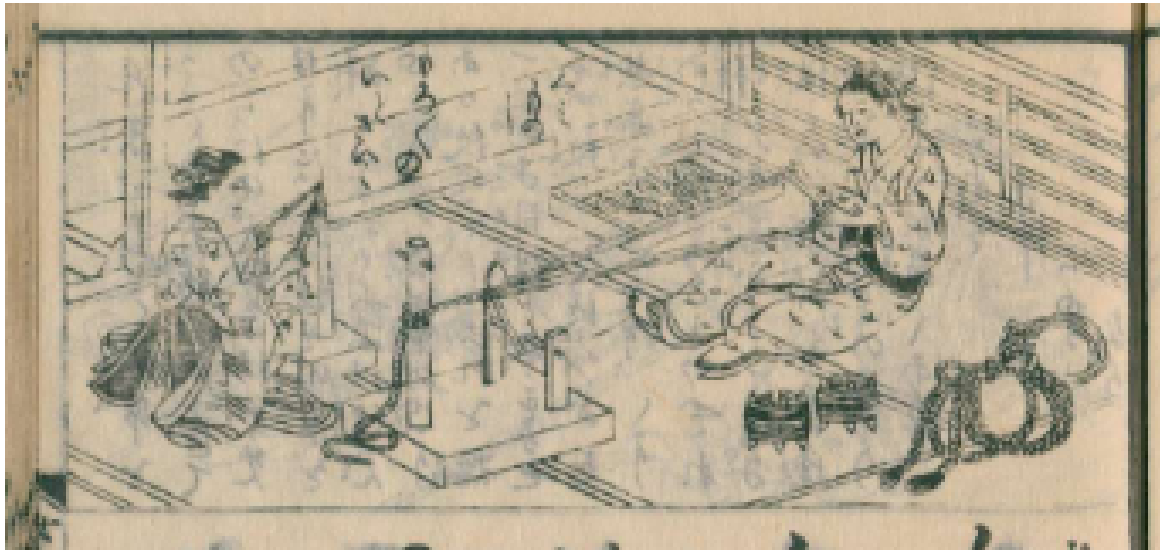


Illustration 5 Kaibara, Ekiken, Treasure Chest of Women's know-how, 1716.

Traditional Japanese tools that would have been used in the construction of the foot-beater include: dozuki, ryoba, yokobiki, and tatebiki saws; chisels; yarigana (spear) planes were used; a marking gauge; awl or gimlet; and hammers. Traditional Japanese joinery is divided into three categories, housing architecture, temple architecture, and “cabinetry”: each with their own specialized joints. Today, without the ability to read family manuals or enter a formal apprenticeship, it is difficult to discern those joints that were used exclusively for each category. Most of the joints known appear to have been common universal joints. Another unique feature of Japanese joinery is the absence of fasteners and glues. For joints that were intended to be permanent and immobile, often pieces were over-dried to shrink the wood once they were close to final size. After the pieces were over-dried, they received a final shaving for a tight fit and joined. When the final object returned to normal moisture content the joint

swelled tight. In many aspects, Japanese carpentry was more advanced than European carpentry. Much of this could be that Japan had very little stone resources for building construction and relied on woodworking for their construction needs. I have not found any reports of an extent foot-beater of any style being found, so exact construction methods are unknown and can only be suspected from known techniques and illustrations.



Figure 1 Where Safety is
#1

On my first two-piece foot beater I did not take progress photos so when I made my second one, I made sure to stop, as often as I remembered, to take progress photos. If you looked around the internet for working foot beaters, you'll find many varieties and styles that work but none of them look like the ones in Japanese scrolls and illustrations. My entire goal while making these was to make it look exactly like the scrolls and illustrations first then make the design work. My first foot beater didn't perform as I expected but it gave me valuable insight. I learned that the heavier the sled the better and that less contact with the base was counterproductive. I learned that with small drawing omissions many things can be made inoperable. Were the omissions like many European omissions, simply artistic license or assumption that it was commonly understood or were they deliberately demanded by braiding studios and masters? Either way, the omissions made for some interesting assumptions and

discoveries in recreating this device. There are two major pieces to the foot beater, the base and the sled. The base serves two functions, to guide the sled back in a straight line and to provide a portable anchor for the braid itself. The base is not completely necessary but until enough skill is developed to pull the sled straight it provides a significant amount of stress prevention. The sled holds the beater mechanism. While simple in nature, the sled held the most secrets in making a functioning foot beater, for example requiring significantly more mass than appearances say.



Figure 2 My first foot beater.



Figure 3 Where I initially put the rotation point for the beater.



Figure 4 Where the rotation point is supposed to be for the beater. The cutouts are for a stopper to send the beater back down. The biggest omission from almost all drawings.



Figure 5 On the left my first sled. Notice the concave shape of the bottom. This design was very detrimental in making a working foot beater.



Figure 6 My second sled. It's harder to see here but the sled is also thicker to add more mass for better movement.

For this project it's recommended to use

hardwood to provide the necessary mass and strength for the foot beater. Boards in the 1-1 1/4" thickness is preferred but recommend no thinner than 3/4". The base has a total length of 36", 10" wide, and just under 2" in thickness. The sled is just under 1" in thickness and is about 8" square. Feel free to experiment with these dimensions to find the right ones for you. Some things to remember, the shorter the base and the longer the sled the more frequently you or someone must wind the braid.



Some of the major pieces of the base and beater mechanism above, the sled itself will be Purple heart, and the rails of the base will be Ailanthus. For this project I cut my base to 36" and used a board that was $\frac{3}{4}$ " thick and 12" wide. The riser is 12" square and 1" thick. The purpose



Figure 7 Where the riser and anchor will be placed. Note, the rails are missing from this picture and will be added later.

of the riser is to provide additional stability to the anchor and a starting point for the sled. Missing from this photo are the rails, the rails keep the sled moving straight back. They take up the remainder of the base length on either side and are $\frac{1}{4}$ " square. There are two ways to attach the riser to the base, simply glue it on

(weakest joint and will breakdown quickly) or use a socket style mortise or tongue and groove. I chose to use a socket style mortise. This requires that I cut a recessed groove around the base edges and across where the riser ends creating a large plug. To fit into the recessed groove, the bottom of the riser needs hollowing out leaving a matching sized tongue around the edge of the riser. Traditionally a Japanese craftsman would cut the two pieces so that they were too large to fit together. Then he would take them to a kiln and over dry them until they shrank to just barely not fit. Finally, the craftsman carefully shaves the edges until they fit snugly together. Once the

moisture of the two returned to normal the wood swells together, locking them in place without glue. You could follow this process but may find it easier to cut to a tight fit and apply glue before putting together.

The sled and the beater mechanism will require a bit more work. The sled will need two mortises to secure the uprights. While the uprights and the holes for them could be round, drilling the hole for the rotating bar and to secure the stopper will present other challenges. Cut the mortises about 1" from the end of the sled and about $\frac{3}{4}$ " from both sides. Measure the total width between the outside edges of the uprights as the rotating rod needs to be slightly longer. The uprights need to fit as tightly as possible into the mortises to prevent them from coming out.



Figure 8 My first sled showing where the upright mortise placements.



The uprights themselves need to be about 8" long and between $\frac{3}{4}$ -1" square. About five and seven inches from one end drill a hole $\frac{1}{4}$ "- $\frac{5}{8}$ " for the rotating rod and the stopper. The upper hole is for the stopper. Angled cuts to open the upper hole can be made so that the stopper can be removed easily.

The beater should be about 8" long and 2-2 $\frac{1}{2}$ " wide, the final cross section shape will resemble a teardrop. This will require careful bandsaw or table saw cuts, a belt sander, or hand planing to get the right shape. The rotating rod should be about the same thickness as the uprights and slightly longer than the width of the uprights from outside edge to outside edge. About three inches from the bottom of the beater cut a square hole the size of your rotating rod. On the rotating rod, cut the ends round so that they fit in and spin easily in the holes cut in the uprights.

To assemble the beater mechanism, fit the rotating rod into the beater and try to center it as close as possible. Take the beater and rotating rod and fit into the holes of both uprights. Then place both uprights into their mortises.



Figure 9 The beater shape with the rotating rod in place.



Figure 10 The beater placed where their supposed to be. This is from my first foot beater and the uprights are swelled into place so I can't remove them to put the beater in the correct place.

For the anchor, the pillar seen in Figure 8, use a rod about 2-2 1/2" in diameter and about 10-11" long. In the figure above I hand planned the anchor round. A round anchor is desirable, as the braid is wound onto the anchor the braid is not being stressed and possibly worn over corners. Drill a hole in the anchor about eight inches from the squared end to secure the braids leader cord. To prevent the anchor from spinning in the base, a square mortise and tenon is used and because the anchor needs to be pulled frequently the joint should be fitted but not be loose or tight. This allows for small adjustments in winding to find the optimal braiding point and keeps the anchor secure. I highly recommend using or finding a friend with a mortise cutter to cut this and the other square holes in this project.



Figure 11 The anchor with a square tenon.



Figure 12 The square mortise for the anchor.

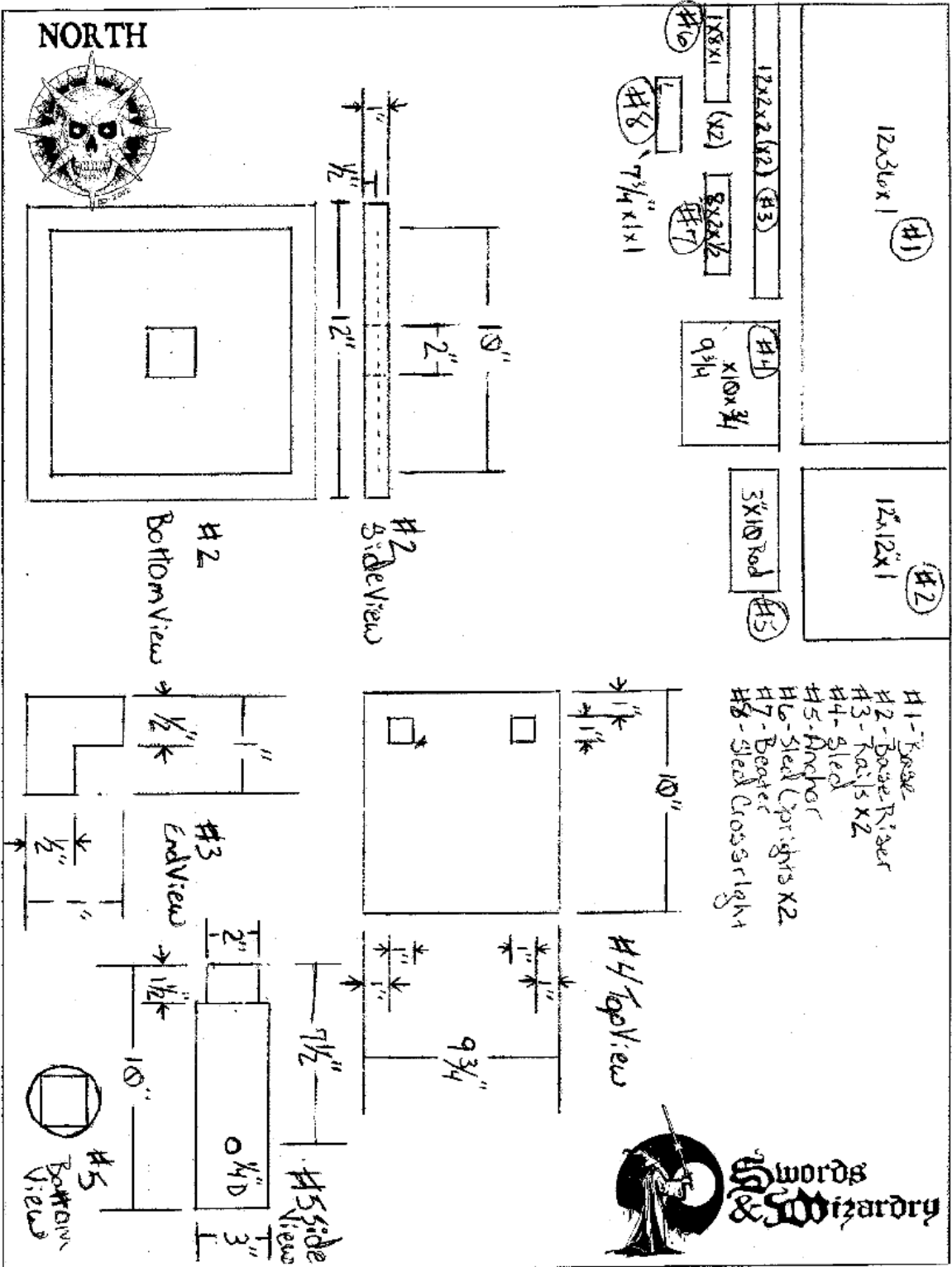
The rails are cut with a simple tongue and groove. Cut grooves in the base about a 1/4"

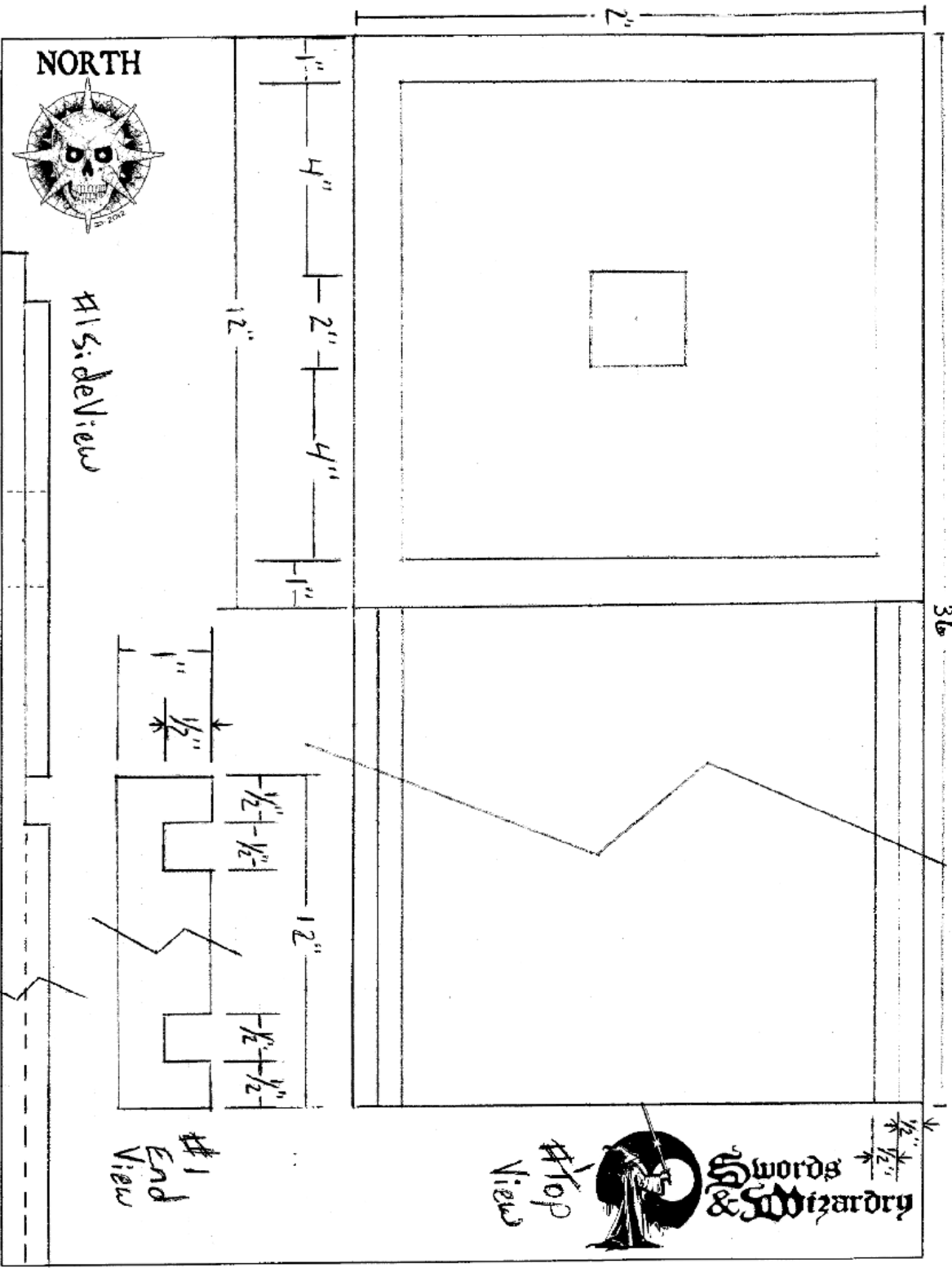
from the edge on both sides from where the riser ends to the edge of the base. The rails will need a $\frac{1}{4}$ " wide tongue to fit into the groove, this tongue can be placed on the edge or in the middle.



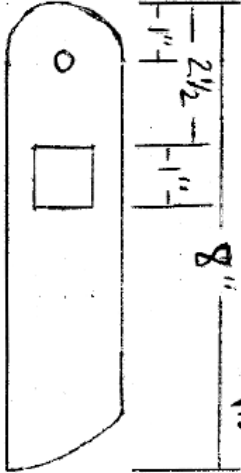
Figure 13 The base after assembly of the riser and rails.

Below are plans to guide you in making your own foot beater. Some notes, the width and length of the base and sled are adjustable to your preference or material availability. If the width is changed on the base the sled and crosspiece need to be changed as well, if made narrower it would be best to adjust the width of the rails and their slots to $\frac{1}{2}$ " wide with $\frac{1}{4}$ " rabbits. The thickness of the anchor can also be adjusted as well as the front to back width of the sword beater. When shaping the sword beater, the more weight on the back of the beater the easier it is for the sword beater to reset. If the tie-down hole on the anchor is adjusted up or down, adjust the stopper cutouts the same. A tight fit of the base riser and the rails is important if you wish to avoid nails or screws. Because of the nature of construction and the grain direction, a sealing finish is necessary to prevent major movements if the foot beater is transported to different locations. Final note on the material dimensions, these are the final dimensions after cutting and sanding so please take them into account should significant sanding be required.

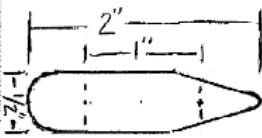




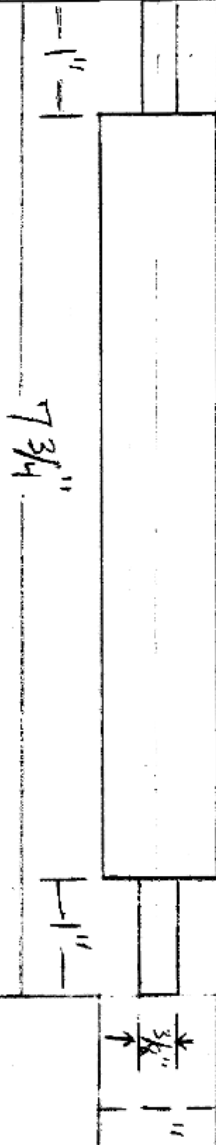
NORTH



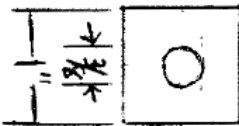
#7 side view



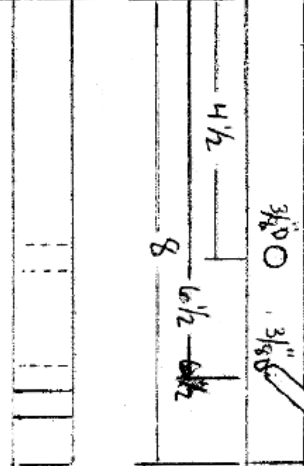
#7 end view



#8 side view



#8 end view



#6 side view

#6 side view



Swords & Wizardry

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