

Miniature Bow making Jig Design Process



Early versions and discovery

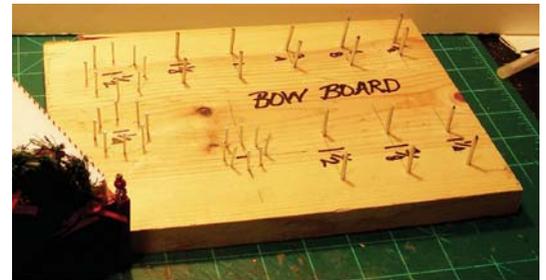
The ideation of design solutions using common hardware.

Miniature Bow-making design solution using standard tools in completely unexpected ways.

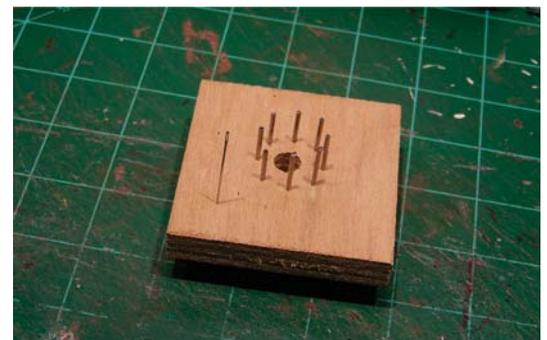
Recently I've been working on a design problem with making miniature bows for some paper model Christmas presents I have been working on. These will be for a Model Christmas House holiday decoration I am re-making. It is a newer version after the old one became too dirty to use anymore.

The bows are for the presents, Wreaths, windows and door. Part of the problem that I ran into was passing a needle through 8 to 10 and up to 12 layers of ribbon. What I needed to do was create a way of piercing each individual layer of ribbon one at a time while assembling the bow.

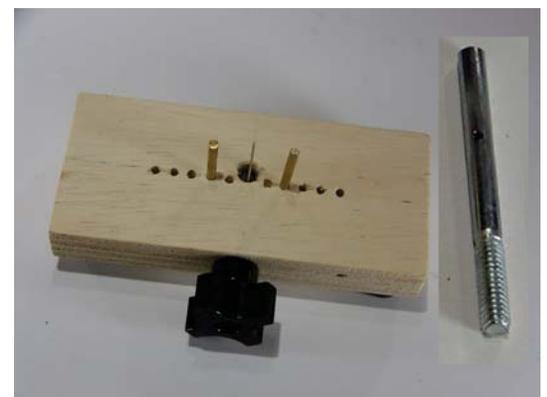
The first proof of concept version is a simple bow making jig with nails equal spaced around different diameters. It was easy to make the loops and they stayed in position until you tried to remove them from the jig. The nails were too rough and would hang up on the ribbon. It was also a challenge of getting the needle through the center because it required force to push through multiple layers of ribbon. This was difficult to do and keep everything in position. It met the requirements of making loops but it was missing easy size adjustment, there are too many pins in the way, it needs to be easy to make 4 loop or 6 or even 8 loop bows. Also the center of the ribbon was not locked making for some control issues when assembling the bows. Ideally a pin or needle that would pierce the ribbon and function as a pivot point to rotate the loops around the center.



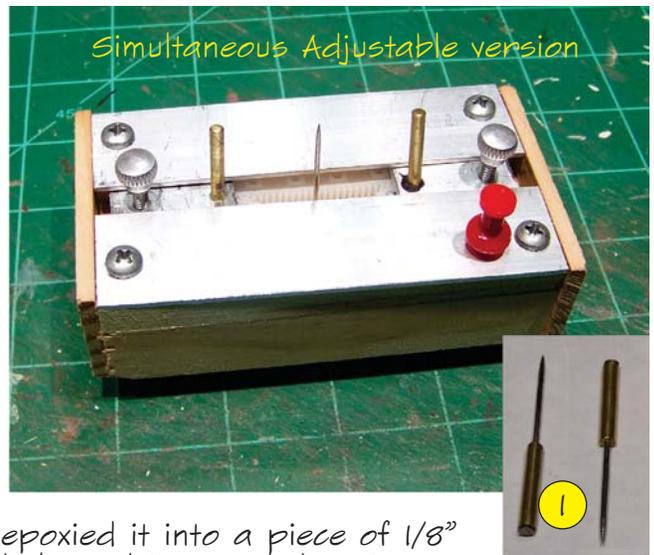
The second one I created a way out pass a needle through the center of it. However we still had the problem of all the multiple layers of ribbon. Pushing the needle through was difficult as each layer would separate and move. For positioning locking the center into position had to be a high priority. Version 2 solved a way to get a sewing needle through the center. It also had too many pins and no size adjustment. One would be required for each size bow. Using nails again was an issue due to their rough sides. Better that there sides are very smooth to reduce hang-up. I am looking at using round brass rod at 1/8" in diameter and chamfer the top. This should allow for smooth making and removing from the jig.



The third design included clamping the needle in the center of the jig. It was placed into a small screw I had modified with a 1/16 inch cross hole in its center. This allowed you to pass the needle through that 1/16 cross-hole. Use a 1/4-20 hand knob to tighten it up. This works fairly well however after while the needle started to get bent. It became clear there was not enough support to keep the needle from bending at the point it is being clamped. So I decided I needed to take a real hard look at how I was going to resolve this problem.



There are 2 solutions for the for the 4th version. N-center pin is height adjustable. The first version is the Simultaneous Adjustable version and starts with 1/8 inch brass solid round rod and drilling a 1/16 hole through the center. You can also buy 1/8" od x 1/16" id brass tube then cut and file it to size. The challenge was supporting the needle/pin at the same time holding it into position without bending it. Clamping a needle, with a cross lock, this small was no longer an option, they bend. I was concerned about using a 2" Steel Dressmaker straight pin as they tend to be fairly large as compared to a sewing needle. You have to make a knot big enough not to pull through the larger hole left by the pin. This is solved with a cardstock backer. However the pin works great, I epoxied it into a piece of 1/8" dia x 7/8" long brass rod. I drilled a 1/16" center hole and inserted the pin covered with epoxy. This design works great, it holds the pin securely, it penetrates the ribbon easily so no cross locking screw is needed. Push this into a 1/8" hole in the center, it should be a snug fit. There is plenty of resistance for the pin to support piercing the ribbon that cross locking was not necessary. This eliminated the bending needle issue.



The second solution for part N, the one I believe will work best for most everyone uses a Steel Dressmaker T-pins that is 1-1/2" long. This is best suited for the fixed size version. Drill a 1/16" hole through the center of the block K. Epoxy the T-pin into a 1/16 hole drilled through the center of block. The ideal pin length would is 1-1/2" long with 3/4" sticking above the block. The pin should be the same height as the D-Loop Posts which are 1/8" brass round bar 7/8" long with a 6-32 threaded end at 1/8" long for the adjustable version. For the fixed size version they should be 1-1/2" long with 3/4" buried into the base block. Use heavy duty staple to hold the pin into position straddling the T on each side. Use 2 staples, one for each leg of the T.



I also needed a way to clamp the bow around the needle, so the loops can be radially position around the center of the bow. was considering a wide variety of solutions that were based around a way to clamp the bow top and bottom while the needle was still passed through the center and while in the jig. It started to look like a custom job which would be very time-consuming. I thought there had to be something out there that I might be able to adapt for this use that others are using currently using but for a different solution.



It's important here to realize that you cannot thread the bow until after the bow has been lifted off the pins. These forceps work great because they clamp the loops into position and hold them there. The hole left by the pin locates true center and easy to see. The threads knot will have to be larger than the center of the piercing needle. The hole is large enough that pushing the needle through on the first pass was very easy. However the knot