

Spiral Staircase from two Wooden Fans

List of Supplies Needed

Two wooden fans, see pictures below.

10mm Round wood discs (one for each step)

6" Round disc – for base

1/8" dowel x 12" long

2 lengths - 1/2" x 1/16" basswood strips to make risers

1/4"sq Stripwood for newel posts (2 pieces 3" high) (optional, you can shape the plastic tubing for a more decorative end).

Decorative toothpicks (one for each step) for spindles (or you can use your own miniature spindles)

1/4" dia plastic waterline tubing (Abt 18" per staircase)

Small pieces of sponge for sponge painting (grout sponge works best) and torn into small pieces (NOT CUT)

Elmer's Glue-All (Not Student Glue) or Gorilla Wood Glue

Paints: Flat black, gold, metallic bronze, metallic gold

Mod Podge or other primer

Matt finish top coat

Paint brushes

Dremel or Drill with Drill bit or Pen Vise with 1/8" or 3/16" drill bit

Small wood clamps or alligator clips or clothes pins

Utility knife, **with multiple new blades.**

Small 90 degree square, or something that can be used as a square.

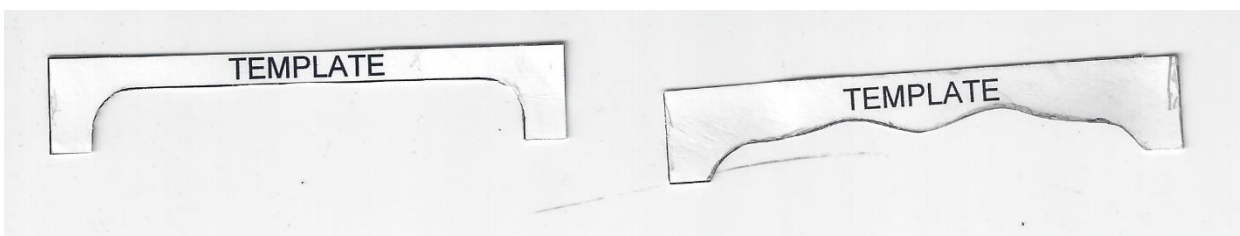
Sandpaper in multiple grits

Small length of 1/4" dowel to wrap sandpaper around

Heavy duty wire cutters to remove the brad holding the fan together.

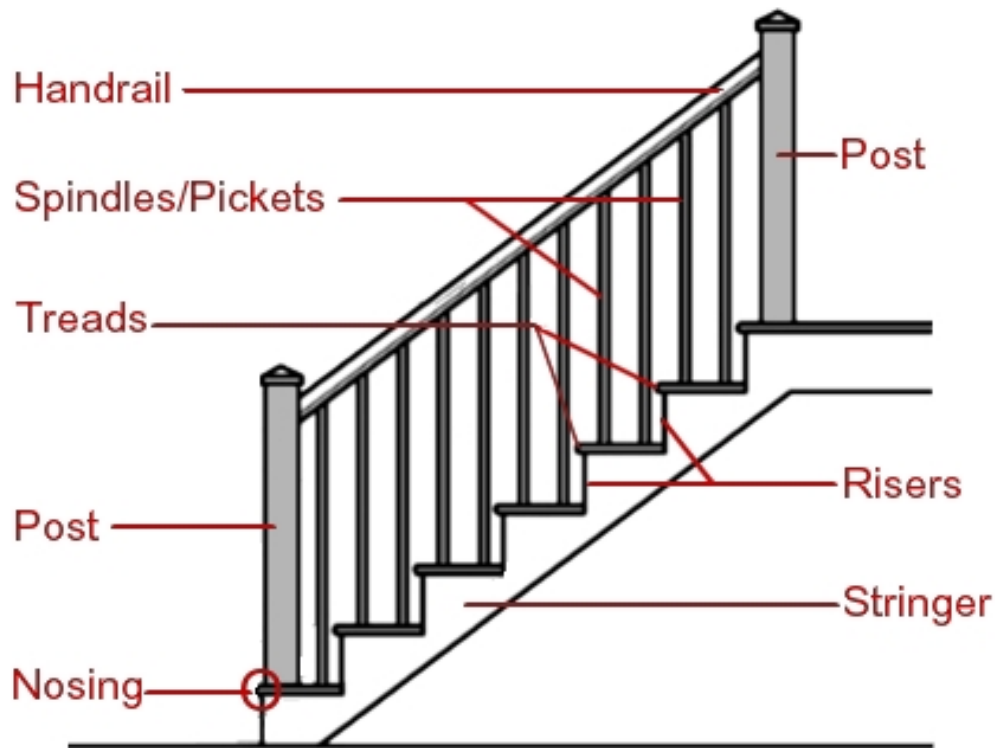
If using the staircase on it's own and not in a room setting you will need a small wooden bead about 1/2" high by 3/8" in diameter with a large enough hole for the 1/8" dowel to fit in. Or your wooden base needs to be about 1/2" thick or raised up to allow the dowel to go further into the base for more support. A combination of both is even better.

Template for risers:- Ensure each one prints at 3" wide each. You have a choice of using either riser style.



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Understanding the component names of a staircase:-



Staircase Parts

Fan pattern is important for this project. We will be using this fan pattern here:-

Determine the number of steps you need to build the overall staircase. Each step will be about 7" in height in real life, but in 1/12th scale that will be a little over 1/2". Using a 1/2" piece of wood for the riser, plus the thickness of the tread.

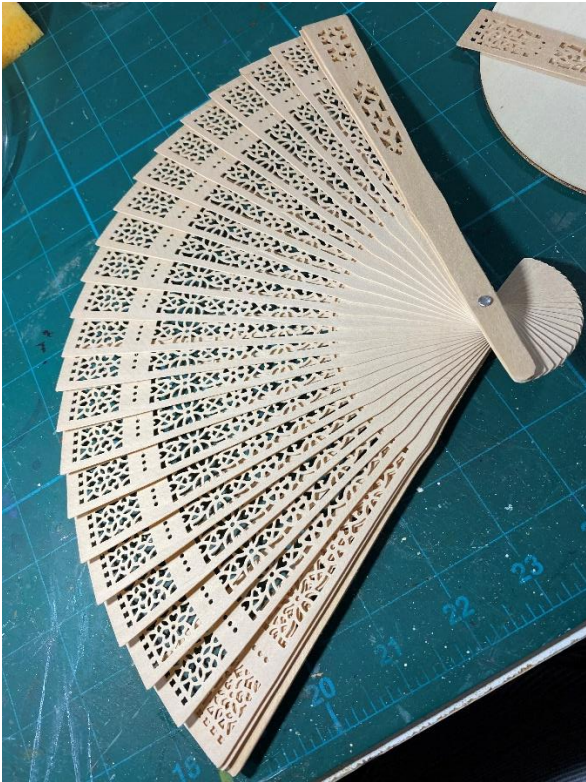


In your room setting measure the height of your ceiling and add the floor thickness of the floor on top and divide this measurement by 1/2". This will be the number of steps you'll need to make.

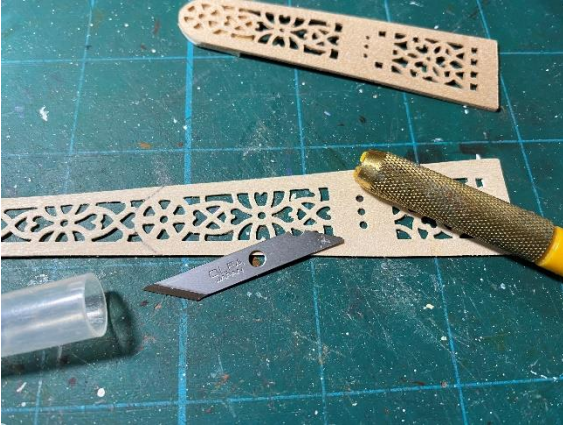
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Next we need to dismantle the fan. Using a pair of heavy duty wire cutters, slice off the brad. If you don't have the cutters, you can use your knife and slice of each blade close to the brad.

There's a fine plastic thread holding the fan blades together. You will also need to trim and remove all of this thread. It's knotted to every vane so the knotted section will need to be removed.



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Ensure you have a fresh new blade in your knife. A dull blade will splinter the delicate blades.

Each step is made from two vanes glued together to get the right tread thickness and to give the vanes some rigidity.

For a 1/12" scale tread that is a 3 ft wide tread in real life the vanes will be cut here as shown:-

If you provided your own fans you may have had this fan in your stash. It can still be used, but you'll need to trim this fan to this shape:-

Don't worry if the cut is not perfectly circular, it will be sanded **LATER** to give a more rounded profile. Don't sand now until we glue two layers together and they have completely dried.



Cut out two times the number of steps you need. So, if you're doing 12 steps, cut 24 vanes.

If you want to make a more narrow staircase, you can cut your fan blade in this pattern.



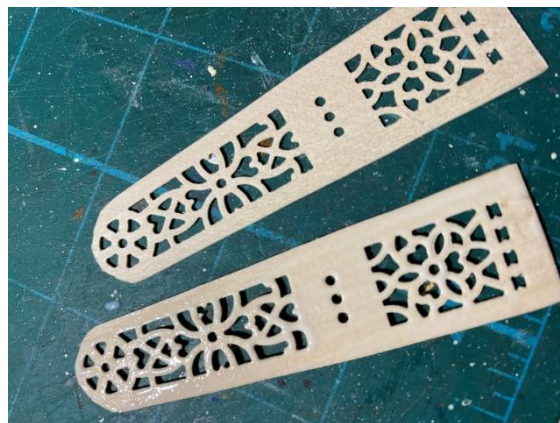
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If doing a half scale staircase, cut the fan blade at this point shown. You can also shave off some of the wood to the top and bottom of this blade shown as well. Be careful of splitting the wood. Sharp blade is necessary.



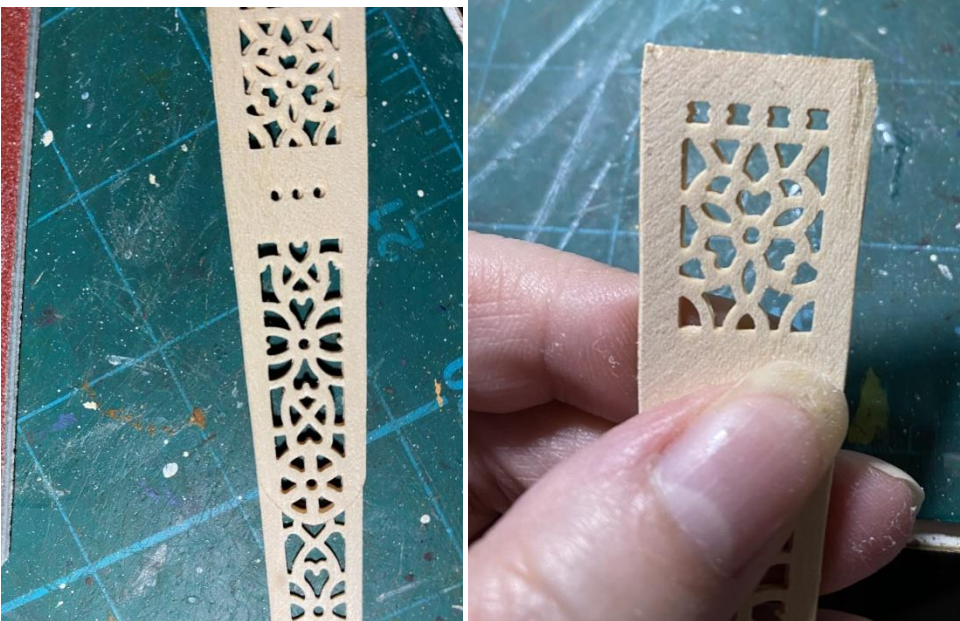
Don't worry if there are small cracks in the blades. The glue technique used in the painting finish will fill this in. You can add some glue now to keep the piece from cracking off though.

Take two vanes and glue them together. Ensure the glue is spread all over the entire vane, do not leave any area out. You can spread in larger wood areas first this using a glue spreader or old brush, spread the glue over the entire vane



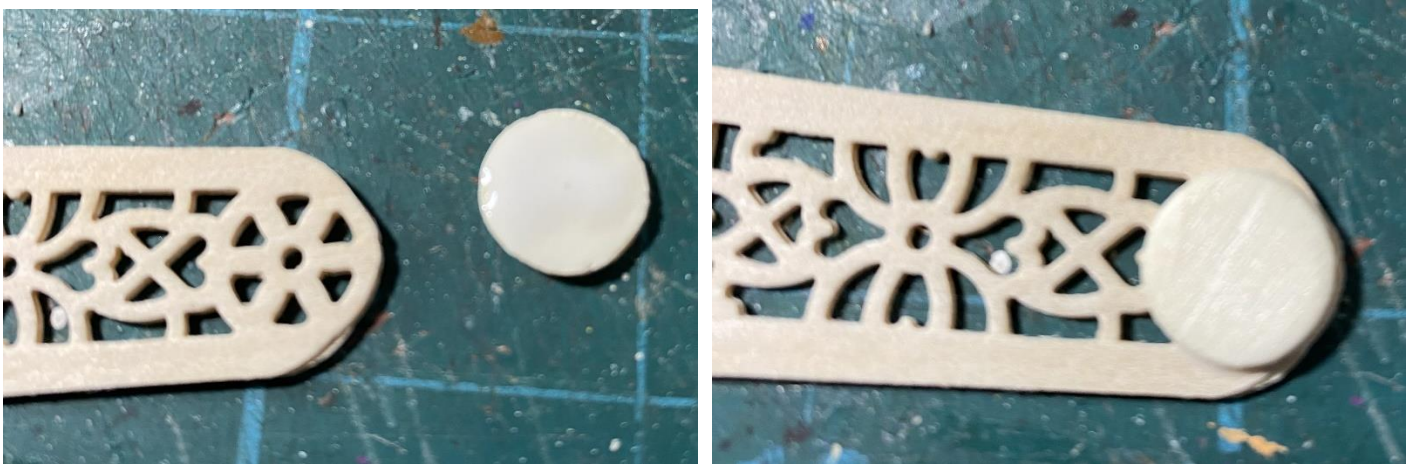
Ensure your interior pattern is lining up. If the outside edges aren't completely inline, no worries, we can sand the edges LATER. Here's an example of where the pattern is NOT lining up on the vane and one where it is lined up.

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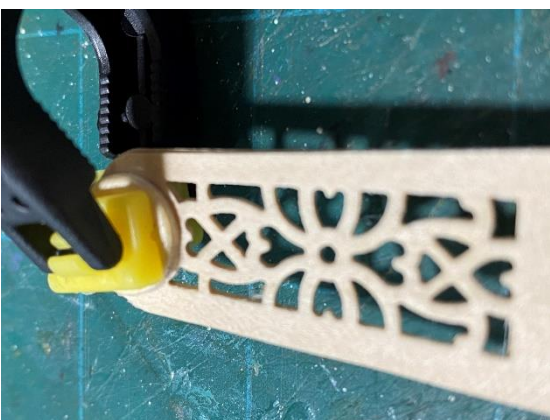


The vanes may be bowing a lot at this point, so you need to work fast. Size up with side of the vane looks “best” and on the worst side, glue one of the small wood disc over the round flower pattern that you just cut around.

Next we have to attach the disc and clamp the tread. Working quickly is important here.



Clamp everything together using alligator clips or other types of clamps. Clamp every possible edge.



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While your glue is drying, let's start on the risers. Cut your 1/16" x 1/2" stripwood into 3" lengths. You can use one of the riser patterns shown earlier, or design your own pattern. It's important however that the sides of the riser that taper down not be too wide, or it will overlap the treads too much. For this demonstration, I've used the simpler pattern because I am cutting these with the utility knife. Again ensure you are working with a sharp fresh blade.



If your wood is slightly less than 1/2", line up the wood with the TOP straight length versus the bottom smaller edges.



If using the narrower tread, you will have to adjust the template to fit the narrower width. My suggestion would be to use the plainer riser template.



Sand the edge of the riser that will be sitting alongside the wood disc for a better fit once attached.



In addition to sanding the edge, cut a small sliver off the top edge for the riser to fit closely around the wooden disc on the underside of the tread.



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Next we will cut the stringer bracket portion. From the scrap pieces of blade we need to identify this section of the design and carefully cut out one piece for each stair step in your staircase.



If you're worried about cracking pieces in these thin brackets, here's a later image showing where a piece had broken off and disappeared and I filled the section with glue. The glue technique we will be using in the third workshop, leaves the entire assembly with a rounded look, so this repair will go unnoticed when we get to the final finishing steps.

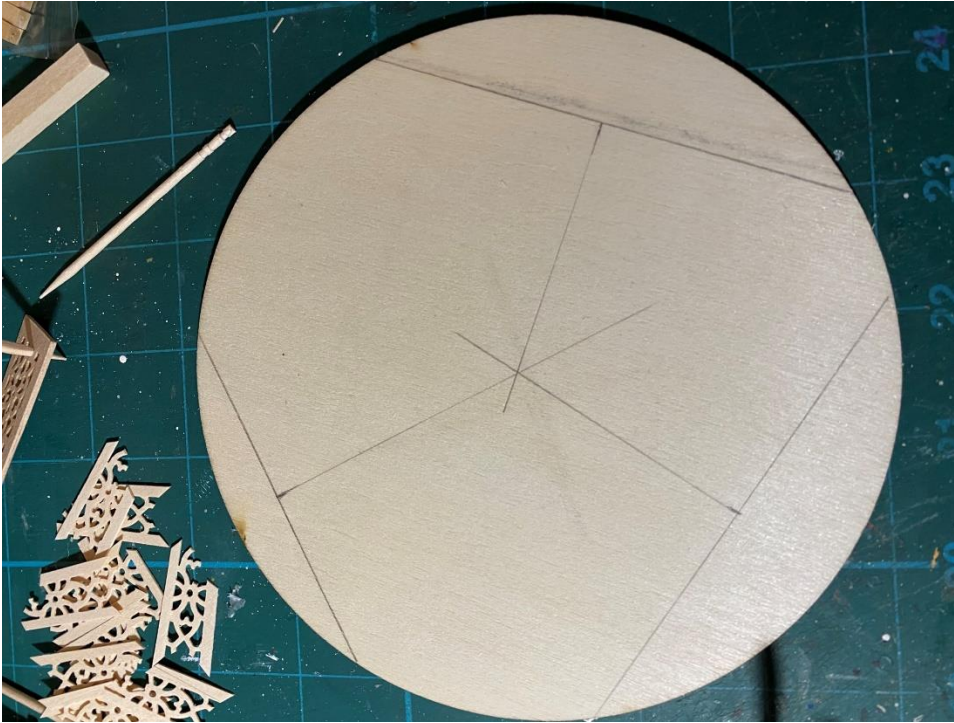
If making Half scale staircase, cut the side bracket using this cut pattern:-

[Add picture here](#)

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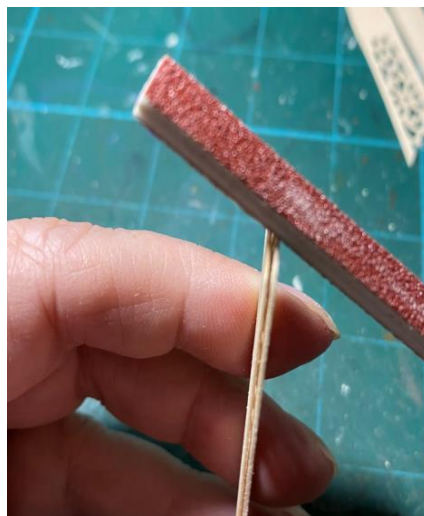
For those using an independent display for your staircase, while waiting for the treads to dry, we will locate the center of the round disc in your kit.

Draw three lines around the circumference of the disc. Then using a 90 degree square, draw three perpendicular lines from those original three lines. They will meet at one point, this is the center of the circle. Drill a hole large enough to fit your long dowel provided in your kit.



add picture of disc with hole drilled.

Once the tread is dried, sand around the edge of your cut to give a more rounded appearance.



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Next we must drill a hole large enough to accommodate the dowel directly through the current circle that is in the middle of the circular pattern on the rounded side of your tread. It's easier to start with a smaller drill bit and gradually move up to a larger drill bit until you get to a size that fits the dowel. Drill from the tread down into the round disc.

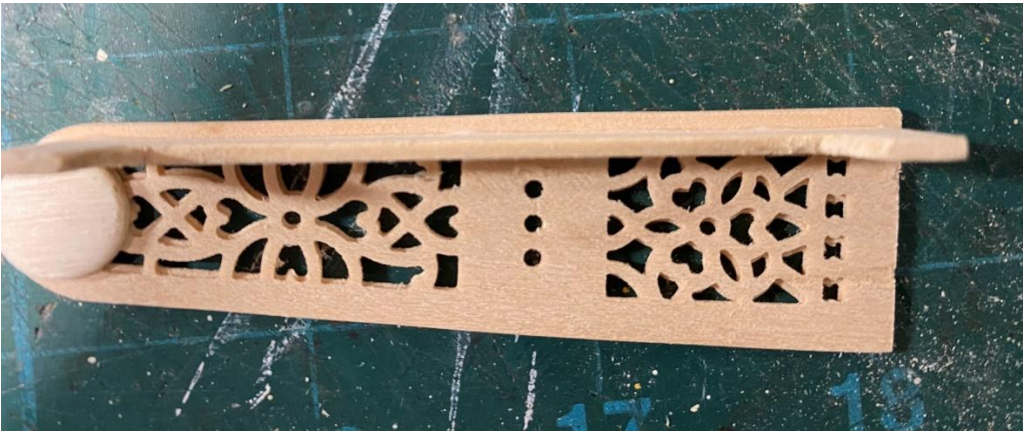
I had originally done this step after I had attached the riser and stringer, but it's easier to do before you attach the riser and stringer. You'll see that the remaining assembly pictures do not show the hole drilled, but I do recommend doing it BEFORE you assemble the stair step.

You may get some splintering around the tread. Use some glue and push these pieces back down. The glue/paint technique we will do in the third session will hide a lot of this imperfection.



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Next we will assemble the step. With the tread facing down (disc facing up). Attach the rise with the sanded and shaved edge touching the disc. Ensure there is no overlap pass the tread on the opposite side.

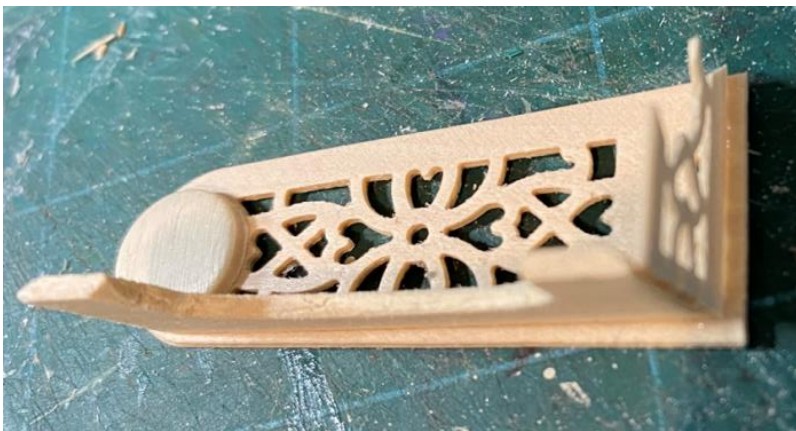


Ensure it's a few mm's inside the tread is best. (1/32" to 1/16") If necessary shave a little off the width of each side of the riser.

Next attach the stringer piece, right angles to the riser. Ensure it doesn't sit anywhere on the cut pattern, but just outside of the cut pattern, but inside of the riser section.



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If using a smaller tread, the stringer is attached as shown.

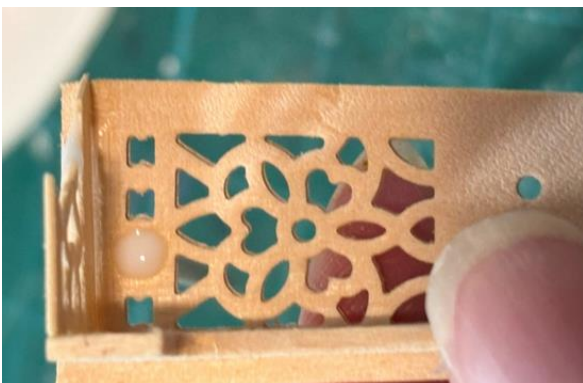
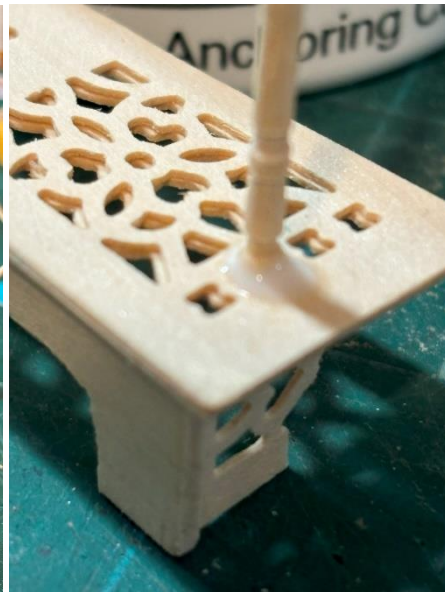
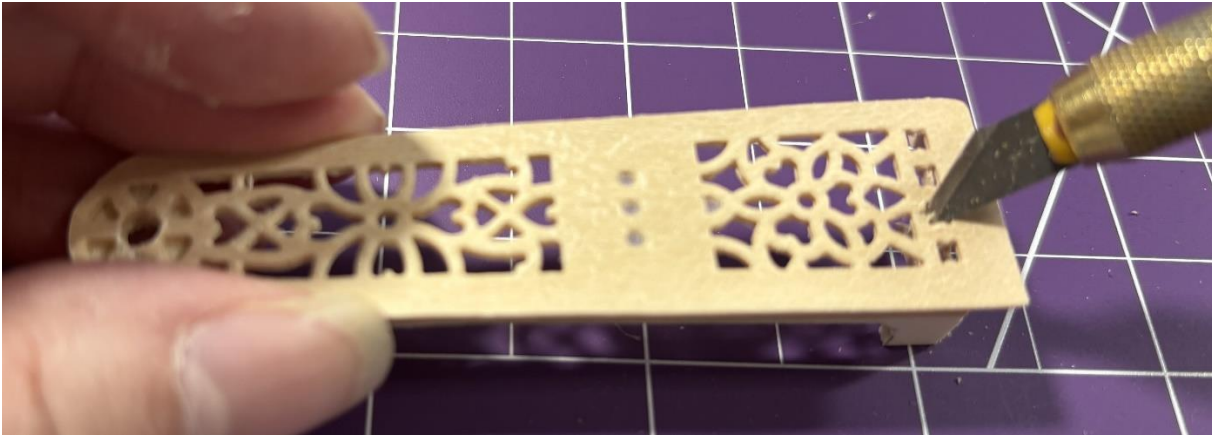


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Next step is to assemble the staircase. If using the round disc, you can glue the dowel to the disc, or you can glue the entire assembly once the stairs are attached (that's what I did).

Glue a decorative toothpick, pointed end facing up into each tread.

You may need to use the tip of your knife blade to slightly enlarge the hold to insert the toothpick into the second hole on the edge of the blade.



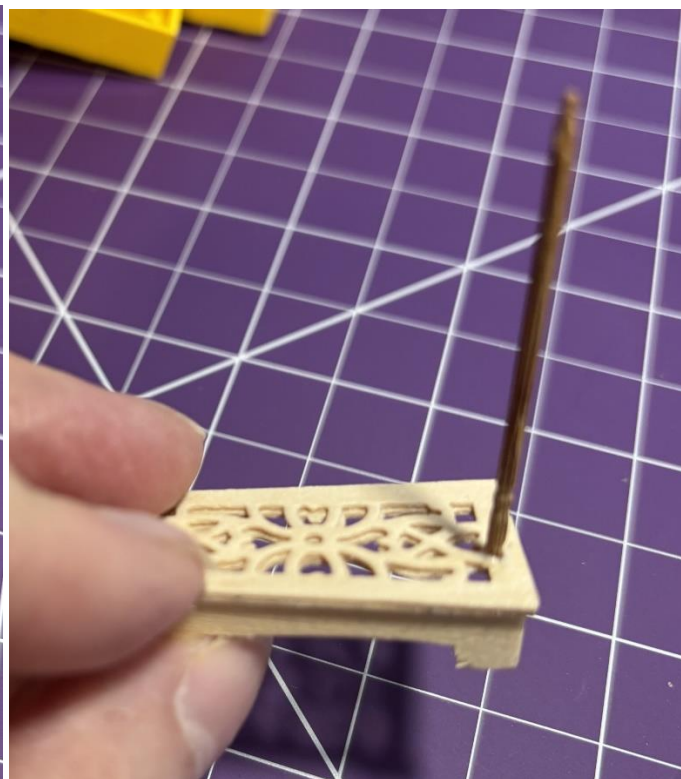
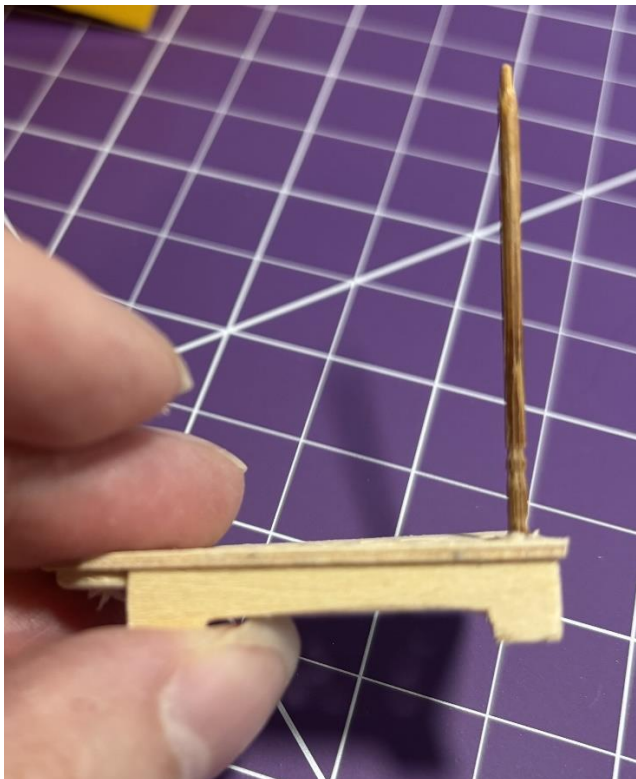
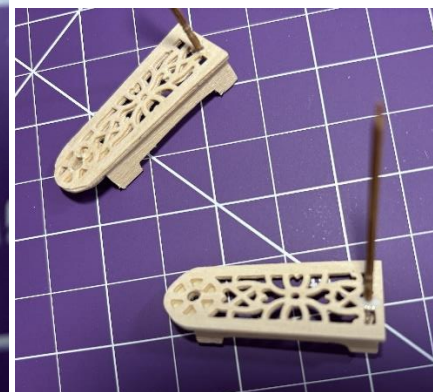
Don't worry about blobs of glue. This will be hidden by the painting technique we will be doing in the third workshop. Apply lots of glue to ensure the toothpick is well adhered.

Repeat this process for each stair step in your staircase.

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If building a half scale staircase, cut the toothpicks down to 1-5/8" long. Since you are cutting off the tapered end, shave the cut end to a tapered edge again.

I tried two methods to attach the toothpick spindle. I tried drilling a small hole and inserting it in and then I tried gluing the toothpick into the heart shaped cut out in the blade pattern. Either option will work, but you will need to hold the toothpick in place for a period of time if using the second option.



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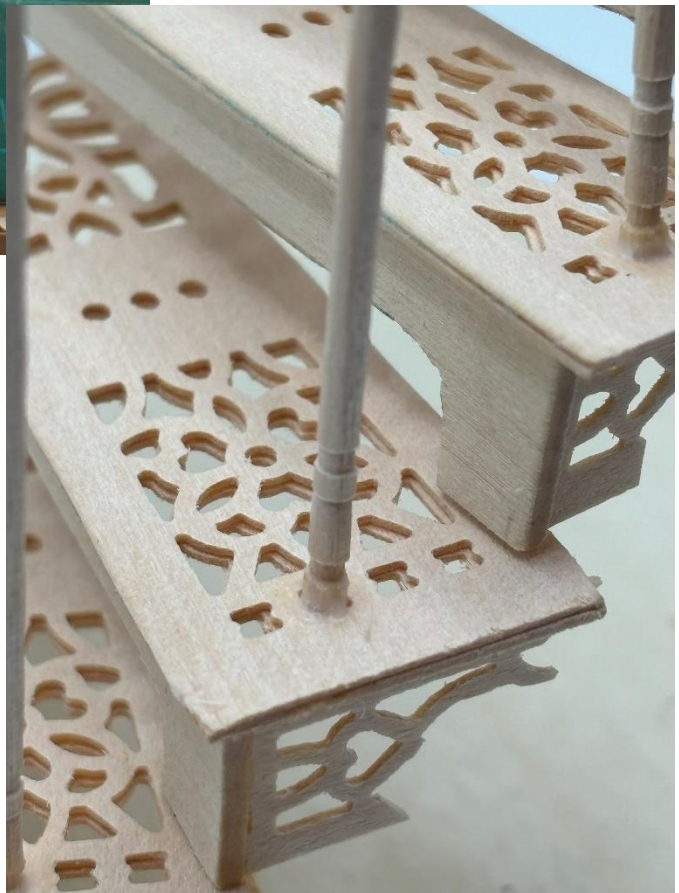


Slide each step down over the dowel. (In this shot I hadn't installed the toothpick spindles, you can either install them before or after this step).

If your dowel is not glued into the wooden disc, ensure you allow lots of dowel protruding past the lower step. You can cut off any extra later, but you can't add more!!!

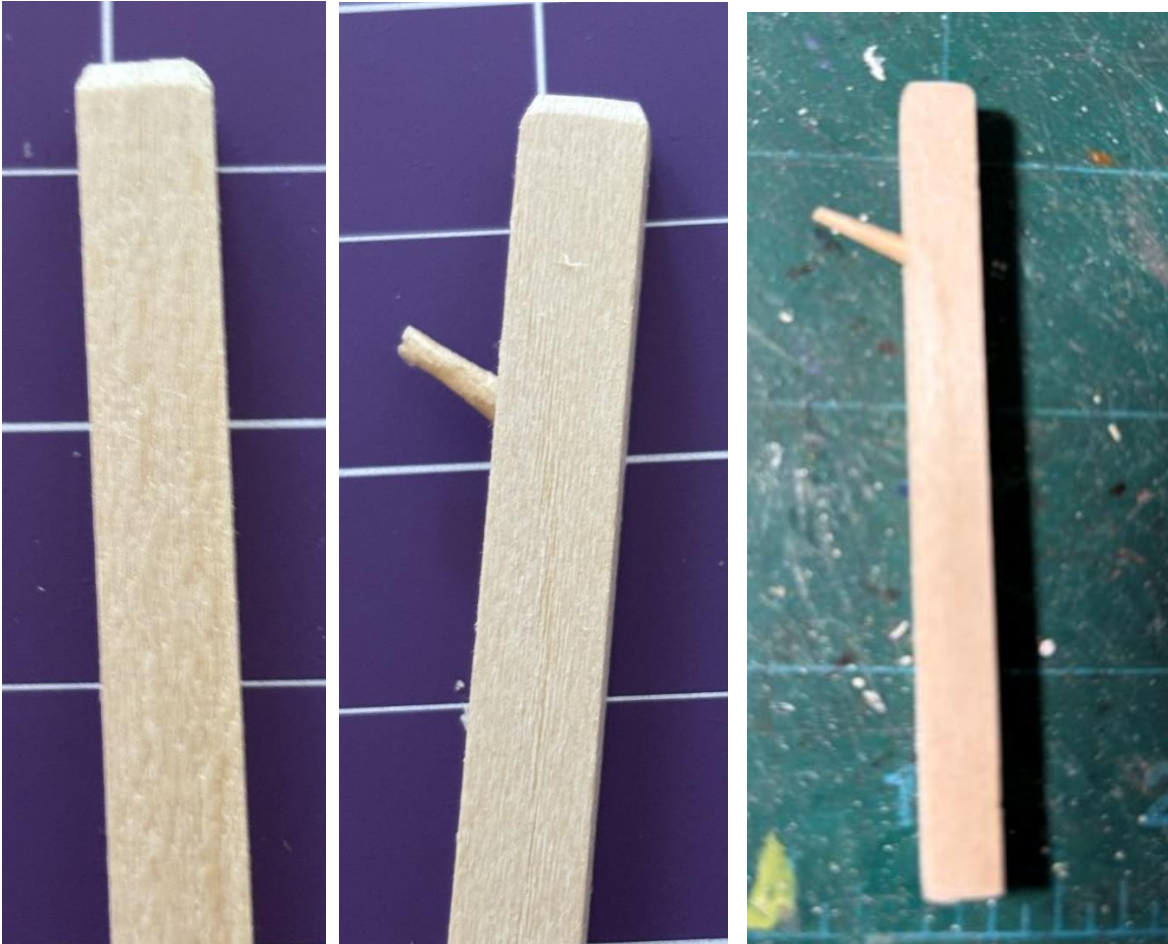
Line up the step above so that the riser is sitting just at the back of each lower tread. Glue the assembly where the riser touches the tread beneath. Also glue the underneath of the tread where the dowel protrudes through the small round disc.

Ensure that the risers are straight (unlike some in my picture!!)



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Next step is to build the newel posts from the $\frac{1}{4}$ " square wood strips that are in your kit. I shaped the top of the wood. I also drilled another hole at a small angle where the handrail will be attached to the newel posts and inserted about $\frac{1}{2}$ " of the tapered end of a toothpick.



If installing the dowel in the disc first, allow to dry thoroughly and add the first stair step by sliding it down the dowel. It helps to taper the top of the dowel to ease in adding each tread to the dowel. I added some lego blocks underneath this assembly so that I could push more dowel through the round disc to keep things secure while assembling the staircase. This can be trimmed off later.

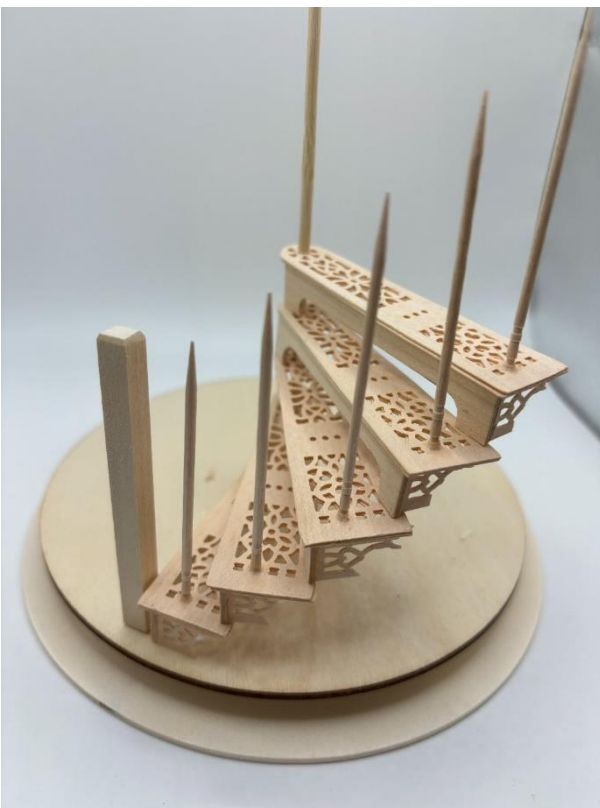


I also found it helped to add a small bead at the base of the dowel to stabilize the staircase on the base.

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If using the staircase in the dome, add the newell post at this time and ensure the newell post glue is dried before adding the handrail.

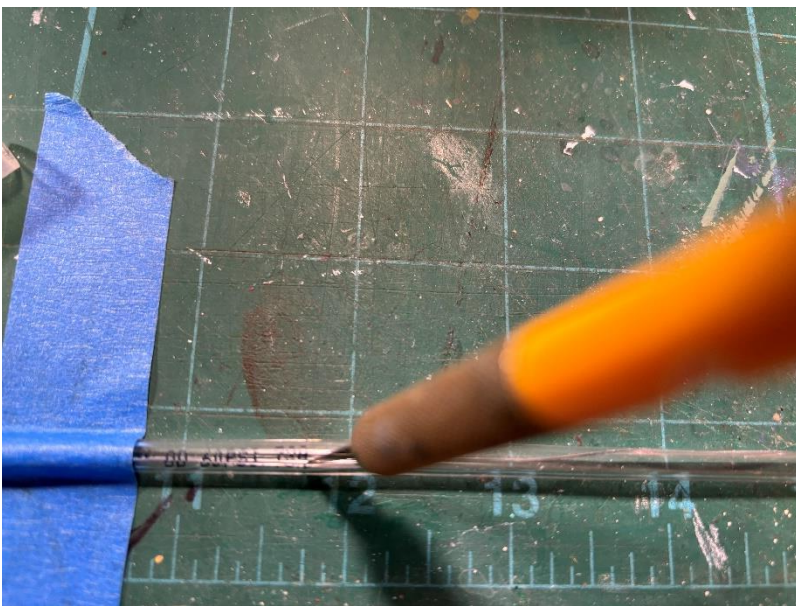
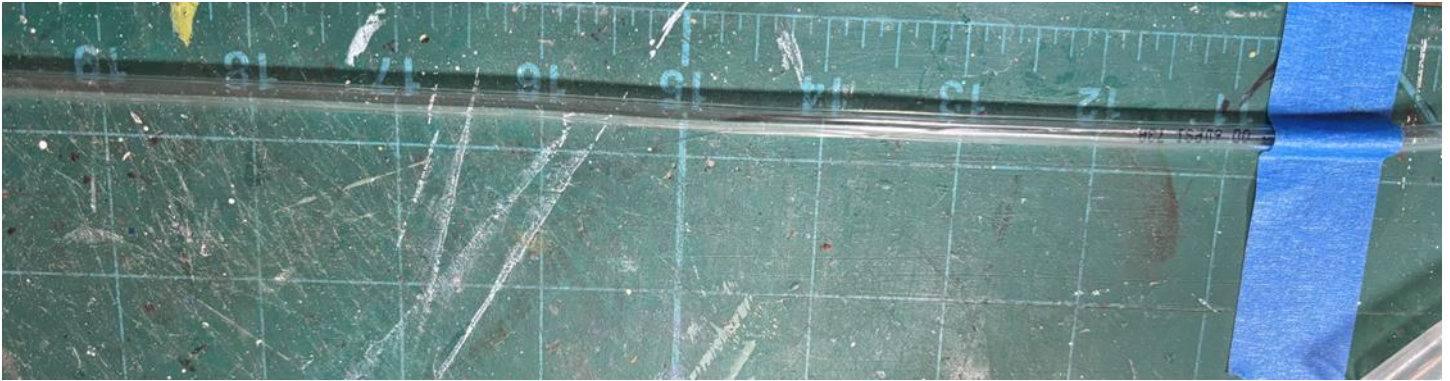


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Next we have to prepare the handrail to attach to the assembly.

Tape the waterhose down onto your cutting mat lining it up with a straight line on your mat to ensure everything is flying flat and straight. Using a sharp blade, make a slit down one side of the hose. **Ensure you do not cut into the second side of the hose, essentially cutting the tube into!!!**

Cut an angle at one edge of the hose where it will attach to the newell post.

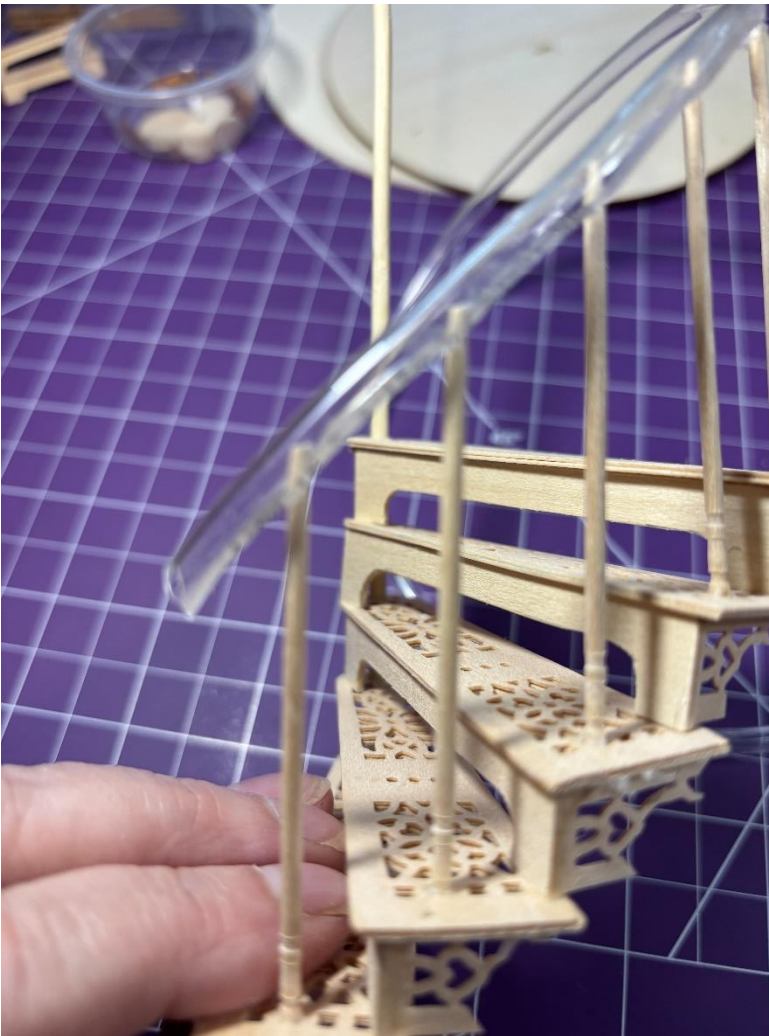


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Cut off about 1/8" off the tops of each toothpick then add a dot of glue to the top of each toothpick and slide each toothpick spindle into the slit in the plastic tubing. Ensure that each toothpick is standing straight and is evenly spaced along the tubing.

Add a small clamp to the spot where the toothpicks are inserted into the tubing until the glue is dry.

Don't worry about bending the tubing. Once the clamps are removed the tubing will restore its shape.



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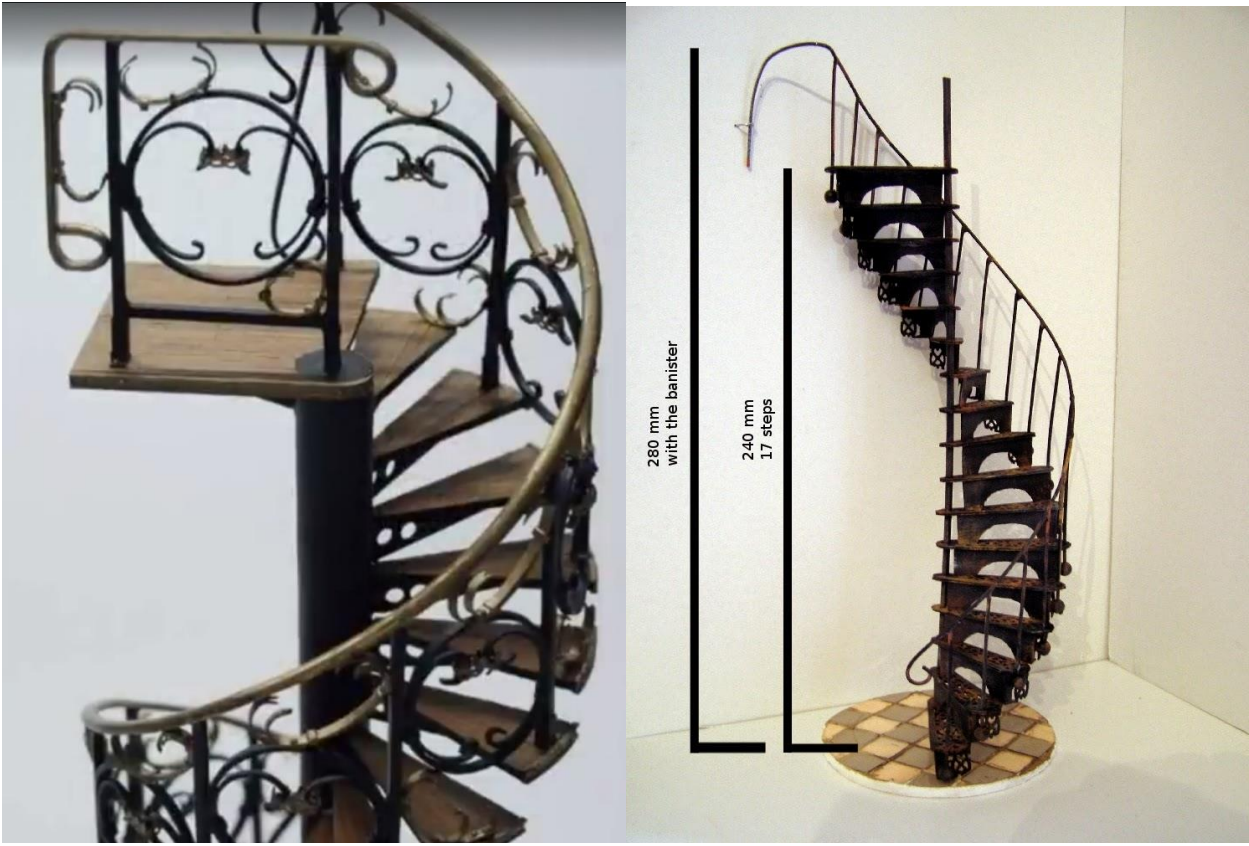
Once the assembly is dry, add a thick layer of Matte Modpodge to the entire plastic tubing railing. Ensure you get the Modpodge on the underside of the tubing between the toothpicks and over the cut slit. The Modpodge which is a mixture of glue and sealer will also help to adhere the toothpicks to the tubing and seal the slit in the tubing.

The Modpodge will dry clear.

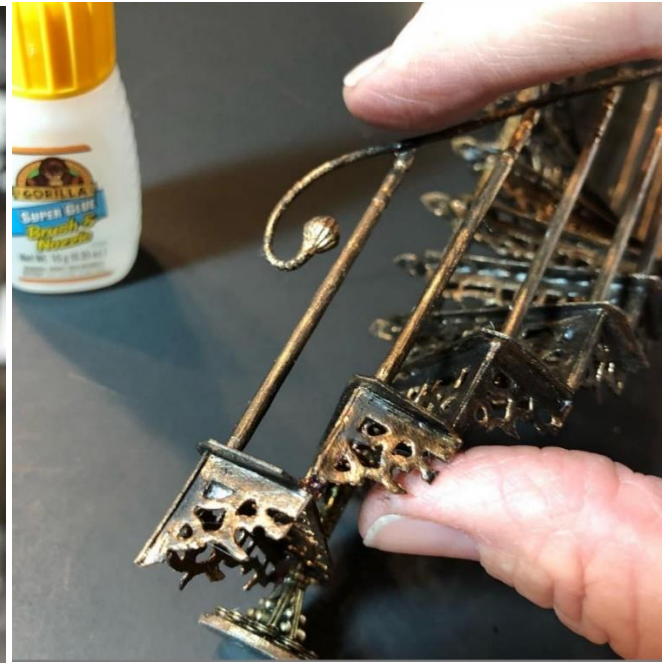


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Examples of other spiral staircases created by other miniaturist that I found online.



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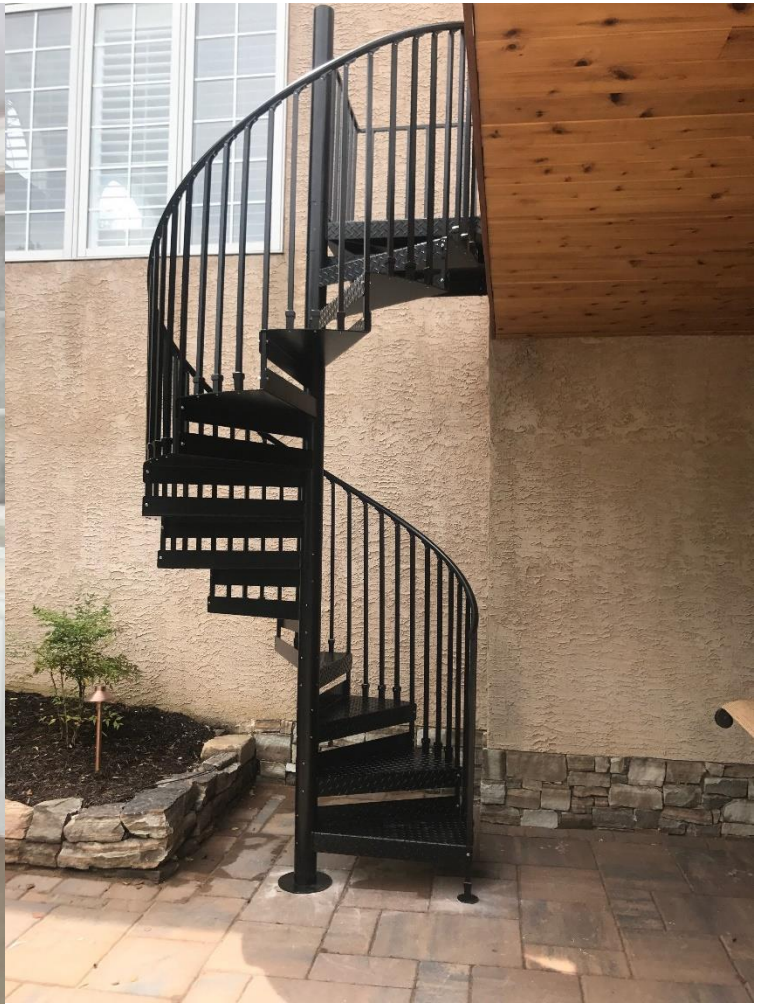


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Images of real life circular staircases for inspiration



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