**Spiral Wire Ornament**

**Introduction**

I seem to spend a lot of time and mental energy chasing ideas to try to avoid hollowing Christmas Ornaments thru a small hole. They have a way of turning out to be just as time consuming as hollowing. This Ornament doesn’t even really have a globe, instead the globe is visually suggested by bent wire. While I haven’t done time and motion studies it does seem simpler to make. More to the point, I really like the Spiral Wire Ornament. It’s different, it’s striking, easy to make, and doesn’t require much in the way of materials. Taking the time to spiral the two contrasting wires is worth it, because not only does it add a visual flash, but is easier to bend without kinking.

This article first describes a simple drilling jig for drilling holes to mount the wires. It’s easier to drill 24 holes off the lathe, particularly if you want to make a batch of these ornaments. The next section describes a quick PVC trick that lets you use #1 jaws on a 4-jaw chuck without marking already finished parts if you don’t have a collet chuck. Next sections tell how to twist and bend the wire to suggest a globe, and make a pattern. Following sections are the three turning mountings, and the final assembly.

**Preliminaries**

**Drill Jig**

It takes 12 wires to make the faux globe. With a hole drilled for each end of each wire that’s 24 times to lock and lock the lathe index if you do the drilling on the lathe (unless you make a two headed drill guide (which I admit I thought about)). Especially since I plan to make a batch of these ornaments, the next section describes a quick PVC trick that lets you use #1 jaws on a 4-jaw chuck without marking already finished parts if you don’t have a collet chuck. Next sections tell how to twist and bend the wire to suggest a globe, and make a pattern. Following sections are the three turning mountings, and the final assembly.

Start by copying the Drill Jig pattern. Spray the back of the copy with spray adhesive, and then stick it to a scrap of ¾” plywood. Clamp the Jig to your drill press and drill a ¼” hole thru the center. Select steel rod to use as a registration pin (I used a piece of 16d finishing nail), measure the diameter of the pin, and select a drill bit slightly larger. Drill a hole at one of the 12 marked locations near the rim and check the fit with your pin. It should slide on easily, not snugly. The 5X greater diameter of the jig makes up for small errors in the fit. If the fit is easy enough that you won’t mind moving it 24 times, then drill the rest of the holes on the rim.

Next find or make a V-Block which is at least 6” long. If you’re going to clamp it to your drill press table the V-Block must be thick enough that the Drill Jig won’t hit the table. 2x4 construction lumber would work fine and be cheap besides. If you have a table saw, set the tilt of the blade to 45° and the height to ½”, set the rip fence so that the top of the blade is centered in the block, and run the block thru the blade twice. You could also stand the block on end and use a band saw, or use a V-cutter in a router table or guide.

To locate the registration pin, turn a scrap piece of wood to ¾” diameter, with a ¼” tenon on one end (or more sensibly wait until you have turned the first Ornament Blank). Insert the tenon into the Drill Jig. Place the turned piece into the V-Block and clamp in a vise. Select a drill bit that will give a tight fit for the registration pin. Drill into the V-Block thru one of the holes in the Drill Jig. Remove the assembly from the vise and insert the registration pin into the drilled hole. Cut the pin about ¼” long, and round over the end with a file.
Drilling to locate the Registration Pin. The Drill Jig is mounted on an Ornament Blank, which is held in the V-Block with a vise.

This jig will only work properly if you turn the Ornament Blanks to a consistent 7/8” diameter. If you feel like being sloppy at that step, then plan on using a loose nail to register on the top surface of the V-Block instead of using a captive pin.

**Jaw Pad**

Since the faux globe is see thru, there are no hidden ends on the two turned pieces—they have to be finished at both ends. To do this on the lathe means that an already finished end has to be held in a chuck. The collet chuck is ideal for this as it won’t mar already finished surfaces. It also is small and hand friendly when working close at small diameters. If you don’t have a collet chuck (Beall makes a nice one, and the UPS man will come right to your house) you can use #1 jaws on a regular 4-jaw chuck if you pad the jaws.

To make a Jaw Pad, cut a piece of ¾” PVC pipe about 1” long and hold it in your chuck so that about ½” sticks past the end of the chuck. Turn the end of the pipe true. Next turn a tenon about half of the wall thickness deep, and ¼” long. Reverse the pipe so that the tenon is held in the chuck. Form a flange by cutting off the pipe about 1/16” from the tenon and true up the end. Remove the Jaw Pad from the chuck and hold end to end in a vise. Cut a lengthwise slot with a saw.

A tenon has been turned on the PVC pipe. The diameter has to be large enough that the flange will register on the tops of the jaws, but not so deep that the pad will collapse.
Fig09: The Jaw Pad has been clamped end to end in a vise so that a slot can be cut with a hacksaw.

To use the Jaw Pad, snap it around the finished end of a piece so that the flange goes on first. Insert into your chuck and rotate it so that the slot is between the jaws and the flange registers on the tops of the jaws, then tighten the chuck and turn as usual.

Fig10: An Icicle has been mounted with the Jaw Pad in a 4-Jaw chuck. Note that the slot is between the jaws.

Wire

Twisting wire into a spiral makes it much friendlier for use by non-metalsmiths (okay, and metal-hackers). I don’t know whether it doesn’t kink or the kinks don’t show, but it’s a whole lot easier to bend and form smoothly. Using contrasting wire also makes it look more interesting. I used 0.04” black oxide steel wire and aluminum wire (www.McMaster.com, ¼ lb, 8870K13 @ $2.62 and 8904K71 @ $6.77 as of 5/23/07).

Start by making a measuring/bending form. Mount some wood between centers (I used a dogwood tree branch from the firewood pile). Turn it round, then turn a 2-1/4” tenon on one end. Stop the lathe and use your index head and tool rest to draw two lines 180° apart on the tenon. This end will pre-bend and measure the wire. Then turn a smaller tenon, 1-3/4”, on the other end. This end will finish the bend, allowing for spring back to about a 2-1/4” diameter.

Fig11: The Wire Measuring/Bending Form. One of the two measuring lines is visible.

Make a twisting hook by bending some stiff wire, such as galvanized steel, into a rough hook or loop. Chuck the twisting hook into your electric drill.

Fig12: The Spiraling Hook mounted in an electric drill.

Plan how much wire to twist. 6 times 2-1/4” times π is about 42”. Allow about 6 inches for twisting loss, and 2 inches for a hanger, for a total of 52”. Cut 52” of both kinds of wire. Clamp one end of the wires in a vise and loop the other end around the twisting hook. Hold the electric drill so that the wire is moderately taut and turn on the drill until you have the amount of twist you like. Remove the wire from the vise and hook and trim the ends.

Fig13: Twisting wire.

Wrap the spiral 6 times around the 2-1/4” tenon of the measuring/bending form, starting near one of the marked lines. Secure the ends temporarily with masking tape. Use a marker to mark the wire for cutting along both marked lines. Remove the wire from the form and cut the wires on the marks with diagonal cutting pliers. Now bend each wire segment around the 1-3/4” tenon for final forming.

Fig14: The spiral wire has been wrapped around the larger end of the Measuring/Bending Form so that a marker can be used to mark the wire for cutting to length.
Use a left-over piece of wire to form a hanger. I bent the end around my Sharpie marker and formed the rest of the hanger with my fingers.

You could consider using different wire. Brass and aluminum would provide a less striking contrast. You could pick a couple of colors of anodized aluminum wire, even red and green if you picked a neutral color wood. If you wanted something more elegant you could twist measured segments of a single square silver wire.

Pattern

Make two copies of the pattern. Use Figure 17 as a guide to trim the first copy so that only the .875 and .75 diameters are visible and cut it off about the top of the last segment. This will be the pattern for drilling and for turning the bottoms of the Finial and Icicle. Trim the other copy so that the other diameters are visible. Cut it into two pieces between the Icicle and Finial, then trim the bases of the Icicle and Finial so that they won’t foul on the collet chuck in use.

Apply spray adhesive to the backs of the patterns, then adhere them to a backing. You could use thin cardboard, thin plastic, aluminum flashing, etc. Then trim the backing to the patterns.

Preliminary Turn

Tenon

Mount a 1”x1”x6-3/4” turning square of your choice between centers. Use a spindle roughing gouge to round the entire piece. Use a parting tool and calipers to reduce the diameter in a couple of places to 7/8”, then return to the spindle roughing gouge to reduce the whole piece to 7/8”. Then use the parting tool and calipers to measure a ¾” tenon about ¾” long on the tailstock end. Complete the tenon with spindle roughing gouge or skew.
Mark for Drilling

Remove the Ornament Blank from between centers and mount the tenon in your collet chuck or directly in the jaws of your 4-jaw chuck— you don’t need the pad for this mounting. Bring up the tailstock to steady the blank. Use the first pattern piece to mark the locations for drilling the holes (in the middle of both ¾” tenons). Use a mini-cove tool to cut a 1/16” guide cove at both marks (see the Fall 2005 issue of WTD or the articles page of www.DavidReedSmith.com for plans to make a mini-cove tool) or alternatively use a skew to cut 1/16” wide V-grooves. These will help locate the drill bit so the holes will be more consistent.

Drilling

Remove the Ornament Blank from the lathe. Insert the tenon into the ¾” hole in the Drilling Jig. The fit must be snug to avoid slipping. If your tenon is oversize, remount and trim it. If the tenon is undersize (if you forgot to re-zero your calipers, for instance <ahem>) wrap some masking tape around the tenon.

Find the size drill bit that the twisted wire will fit nicely in. You want it to be snug enough to glue in securely, but loose enough that you don’t have to struggle to push the wire to the bottom of the hole. Mount the drill bit in your drill press.

Place the blank on to the V-Block and engage the registration pin in a hole in the Drilling Jig. Clamp the V-Block to your drill press table so that the drill lines up in the center of the V-Block and that the drill bit lines up with one of the guide coves.

Set the drill depth for a little less than 3/8”. Drill at each of the 12 settings on the Drill Jig, holding the blank down in the V and against the end of the V to maintain registration. Then move the V-Block so that the other guide cove lines up with the drill bit and drill at each of the 12 settings.
Fig25: Drilling the second of 24 holes.

**Turn ends**

Remount the Ornament Blank in the chuck and bring up the tailstock for support. Use the first pattern to mark the extents of the ¾” Finial tenon and the bottom of the first half bead. Use calipers and parting tool to measure the ¾” diameter of the tenon. Then use a skew to complete the tenon. Redefine the mini-bead or V-cut that marked the drilling location. Cut a V-groove with the skew at the mark for the bottom of the half bead and then round the bead with skew or detail gouge. Start trimming the bottom of the Finial tenon with the skew, but leave a nub for tailstock support.

Use a mini-parting tool to start the cutting off cut of the Finial. Allow some extra for trimming the base of the Icicle. Parting tool cuts have a way of knocking the blank loose in the chuck, starting the cut now will avoid this. Return with the skew to the bottom of the Finial tenon and finish trimming it. Sand the Finial tenon and half-bead with progressively finer grits of sandpaper, starting with a grit appropriate for your finish off the tool. Then apply a friction polish of your choice. Steady the Finial blank with one hand and use a thin parting tool to finish parting off the Finial.

Fig26: The tenon and half-bead for the Finial have been formed on the end of the Ornament Blank.

Fig27: The cut-off cut has been started while there is still tailstock support.

Fig28: The tailstock nub has been cut off the Finial.

Fig29: The tenon and half-bead of the Finial has been sanded and finished.

Fig30: Cutting off the Finial.

Use the point of your skew to form a small dimple for the tailstock, and bring up the tailstock for support again. Use the same sequence of steps to turn, sand, and finish the tenon and half-bead of the Icicle.
Turn Finial

Mount the Finial tenon in the collet chuck or use the pad in the 4-jaw chuck. Use the long point of a skew to form a dimple in the end of the Finial. Mount the same drill you use for drilling the wire holes in a drill chuck or pin chuck and drill about ½” deep in the top of the Finial. (To do this using a pin chuck, back off the tailstock so that the pin chuck will fit in between the Finial and tailstock. Insert the tailstock center into the base of the pin chuck. Hold the pin chuck with one hand so that it lines up with the dimple, and turn the tailstock ram with the other hand. You can use the extension of the drill in the pin chuck as a depth stop.) Bring up the tailstock to support the Finial. Use a spindle roughing gouge to reduce the Finial diameter, the use a parting tool and calipers to measure the diameter of the funnel and end. Use the pattern to mark the locations of the bead, funnel and end. Then use the long point of a skew to make V-cuts on both sides of the bead. You can continue with the skew to round the base of the funnel, but lack of access requires switching to a detail gouge or very small skew to turn the bead. Use a detail gouge to turn the funnel. Treat this like a long half cove, which is of course, just what it is. Don’t start near base of the funnel and end up burying the gouge in too deep a cut. Instead start at the tailstock end and make a series of even cuts. Then retract the tailstock and round over the end. Sand the Finial and apply a friction polish of your choice.
Fig 37: The diameter of the Finial end has been cut with parting tool and calipers.

Fig 38: The bead in the Finial has been turned with skew and detail gouge.

Fig 39: The Finial funnel has been turned with a detail gouge.

Fig 40: The tailstock has been removed and the end rounded over.

Fig 41: The Finial has been sanded and finished.

Turn Icicle

Mount the Icicle blank in the collet chuck or padded 4-jaw chuck. Bring up the tailstock for support. This is a relatively short Icicle so while it still makes sense to leave as much stock on the headstock end as long as possible, it’s not necessary to sand and finish each feature as you go. You can, of course, use any cutting sequence you like.

Use the pattern to mark the location of the first (counting from the tailstock) segment and then cut to the diameters of the segment and end with parting tool and calipers. Reduce the entire segment to the major diameter with a spindle roughing gouge. Then make a V-cut at the top of the segment with the long point of a skew and round over the top of the segment with a skew or detail gouge. Use a series progressive detail gouge cuts to cut the lower part of the segment as you would a long cove. Cut a mini-cove in the end. Leave a nub at the end for tailstock support.

Fig 42: The Icicle blank has been mounted in the collet chuck.
Mark, measure, and turn the second and third segments in a similar manner.

Measure the cove with parting tool and calipers. Then cut the cove using a detail gouge. Go deep.

Sand the Icicle and apply friction polish. Then cut off the tailstock nub, and blend into the finished area with sandpaper and more friction polish.
Assemble

Set up an assembly station by gathering together all the wire segments, the Finial and the Icicle. Use thick CA glue to glue the wires in so you’ll have time to readjust the position of the wires once all are inserted if necessary. Put a short strip of masking tape on your work surface and squeeze out a dollop of CA glue in the middle of the tape.

Dip both ends of a wire segment into the dollop of CA glue and then insert the wire ends into the Finial and Icicle. Dip both ends of another wire segment and insert it into the Finial and Icicle 180° from the first. Then dip and insert the rest of the wire segments. Lastly glue the hanger into the end of the Finial, and you’re ready to enjoy the finished Spiral Wire Ornament.

Tools and Materials

Wire
Turning Square, 1"x1"x6-3/4"
Fig56: The Visual Tool List. From left to right: spindle roughing gouge, detail gouge, parting tool, ½" skew, mini-cove tool, narrow parting tool, pin chuck, spiraling hook, 180 and 320 grit abrasive, and 3M 7448 non-woven pad.

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