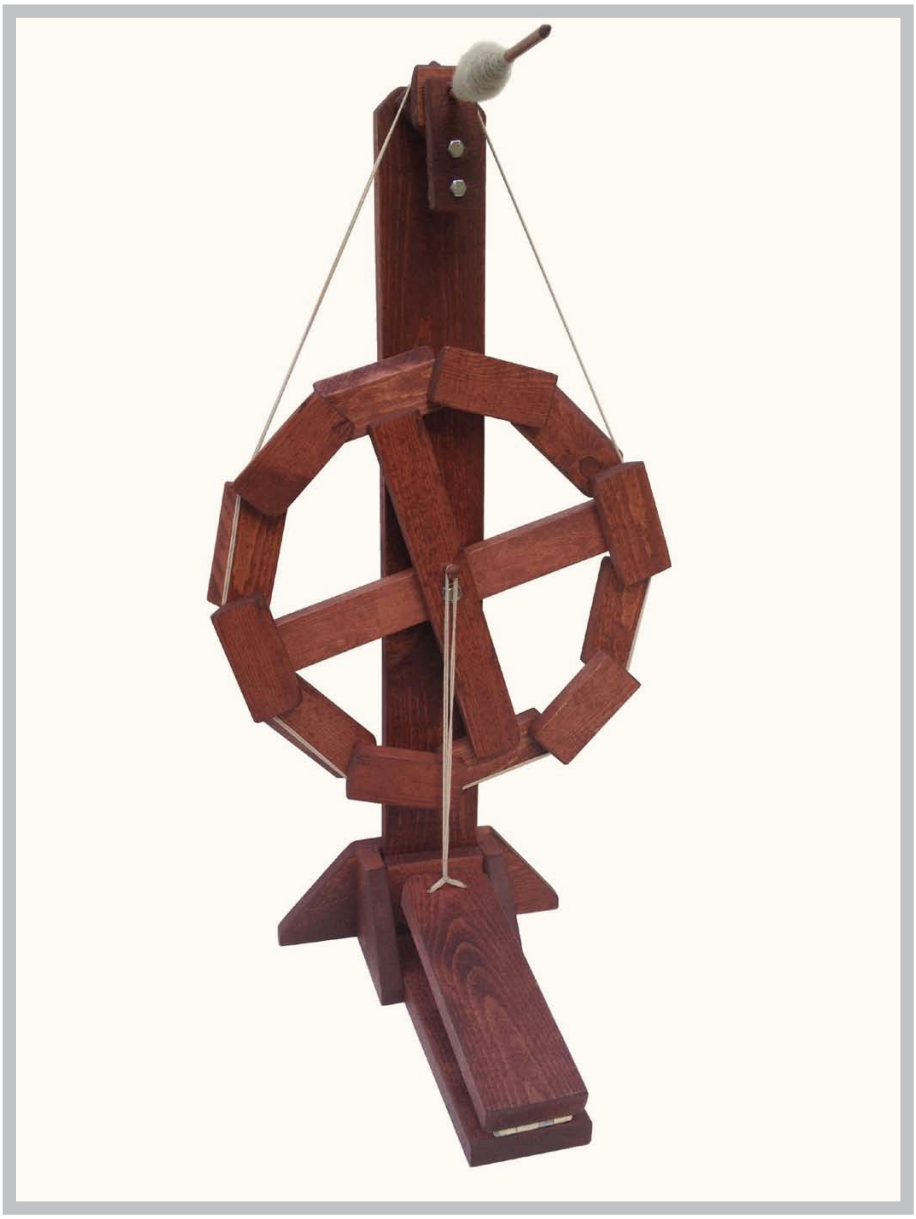
The Dodec Spinning Wheel



www.porterthreads.com

Materials:

(2) ¼-20UNC x 3½ full thread, hex-head bolts

(1) ¼-20UNC x 3" full thread, hex-head bolt

(2) 1" x ¼" fender washers

(3) ½" x ¼" washers

(1) 3/8" nut

(6) ¼-20UNC nuts

(2) ¼-20UNC lock nuts

(1) dowel ¼" x 12"

(1) shaker pegs (½" x 17/32" tenon)

(1) 1" x 4" x 10' pine board

(1) hinge

(1) ball of butcher's twine

(1) box of 18 gauge 1¼" brads

Paraffin wax (not grease or oil)

Wood glue

Tools:

Circular saw (possible with hand saw, but not preferable)

Hand drill

Drill bits in sizes 17/64" and 9/32" (Most people will have to buy these; common bit sets only go up to ¼")

Hammer

Sandpaper (This wheel will work rough cut, but most people will want to sand it)

Optional:

Nice weather

Gumption (if you don't have this you can usually get some from an "old timer")

Onlookers

Notes:

- When picking up your 1" x 4" x 10' pine board, have an employee cut it in half.
- Mark your first piece and cut it before marking your second piece off and so on. You lose about ⅛" depending on the width of your saw blade, so if you cut a board 4 times you'll find you're a ½" short over all. Allowances have been made in the plans and the last piece to be cut out of each 5' board isn't affected by the loss in length.

Safety First:

Working with tools can be dangerous. Please be careful and follow tool specific safety instructions.

DODEC
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Porter Threads

Base

With 5' piece of 1 x 4, start by marking and cutting the Left Side Base in Fig. 1. Note: You do not have to know the angle in this piece. You only have to mark off the 4½" on the top, the 1½" on the bottom and cut diagonally between them.

Continue by marking and cutting Back Side Base, Right Side Base, Front Base, Bottom Base in Fig. 1.

Continue by marking and cutting the Upper Receiver in Fig 2. Note: If you'd like to drill the holes at this point, the 2 lower holes are 17⁄64", but the upper hole is 9⁄32". The placement of these holes can be seen on the Stem in Fig. 2 (both sets of holes have a 9⁄32" hole ½" from the end, then a 17⁄64" hole 2" from the end, and the last hole is 3" from the end).

You should be left with about 28" of 1 x 4 (it's okay if it's a little shy). This piece is known as the Stem. This piece needs a 17⁄64" hole drilled at 11" from the bottom (for the Axel). Then you need to drill a set of holes at the top of this piece that exactly match the holes drilled in the Upper Receiver. Note: It doesn't matter how accurate the holes were on the Upper Receiver as long as they exactly match the holes drilled at the top of the Stem (to be sure drill through the holes in the Upper Receiver into the Stem). Also, be sure to keep this in mind when you are making extra Upper Receivers later. For aesthetic value you can saw a ¼" off of the 2 upper corners as pictured in Fig 2.

Figure 1

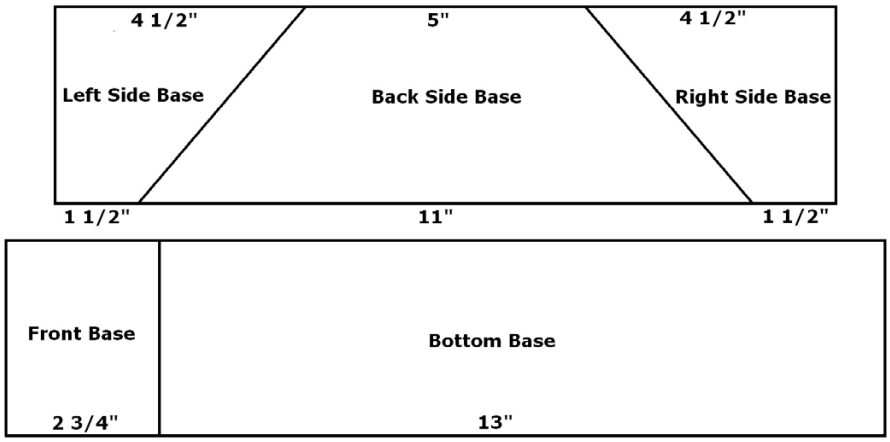


Figure 2

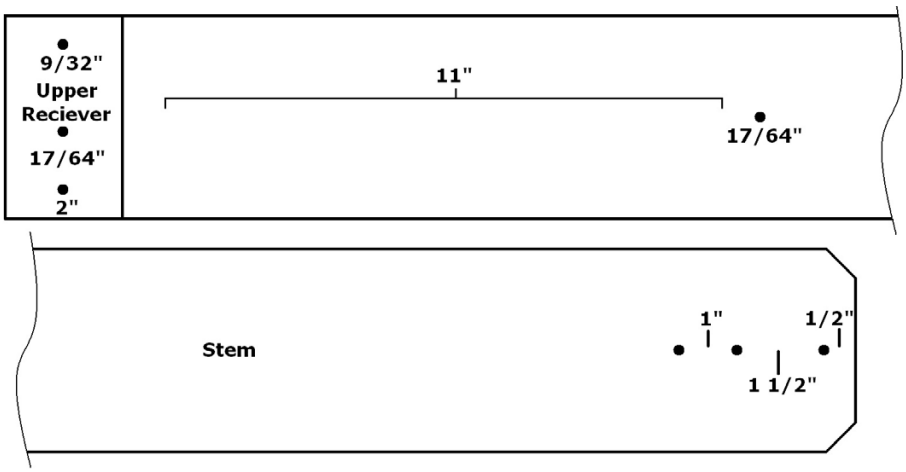


Figure 3

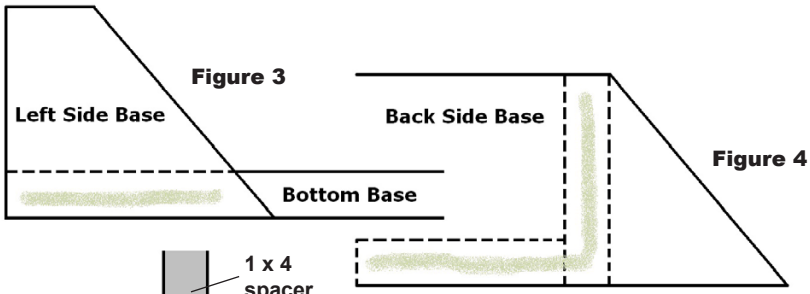


Figure 4

Figure 5

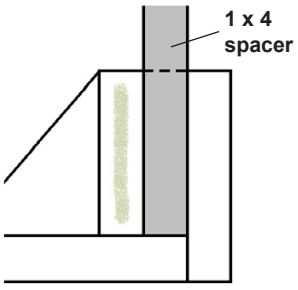
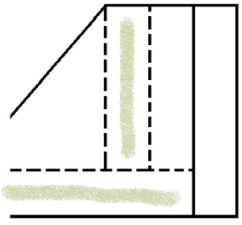
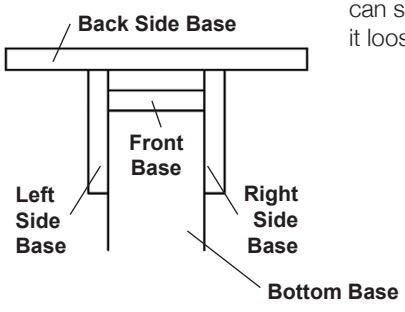


Figure 6



Assembled Base from Above



Base assembly:

Glue the Left Side Base to the back left of the Bottom Base, and hammer it together with a couple of brads (Fig. 3).

Glue the Back Side Base to the Left Side Base and Bottom Base, securing it with brads (Fig. 4).

Glue/brad the Front Side Base in place using a 1 x 4 spacer to make sure the space is as snug as can be (Fig. 5).

Finally glue/brad the Right Side Base in place to finish the base module (Fig. 6). Note: At this point the Stem should fit in the base very snugly. If it's too tight, you can sand it down a bit but you don't want it loose.

Drive Wheel:

The first two feet of the second board will be used to make the blocks used to construct the drive wheel. Begin by ripping a two foot piece of board at 20º. Note: If you are using a circular saw, it is be best to make this cut while the two-foot section is still attached to the rest of the 1 x 4. This allows you to clamp the board down so the cut can be made more safely. It is also okay to over shoot the end of the two-foot section, it is allowed for in the plans.

After ripping the angle, you'll need to make cross cuts every 4" this will give you twelve blocks that are 4" long and 1⅝" tall on the inner side and 1⅞" on the outer side (Figs. 7–8).

The next piece to come out of your 1 x 4 is a jig to line up the wheel blocks to get the desired angle while hammering them together. Note: More than likely you overshot your last cut as to make sure your blocks would be cut through. The jig works just as well with a saw cut in it.

You can cut the jig from whichever side has the most room. Its measurements are based on the final dimensions of the wheel blocks you just cut. For the top width you need ⅛" less than the wheel block. Then take a 30 degree cut off of both sides 1⅝" down. If your blocks were 4" long your final jig measurements will be 1⅝" tall, 3⅞" wide at the top and 2" wide at the bottom (Fig. 9).

The next 10" of the 1 x 4 will be your treadle. Not only does it need cut to a length of 10", but it also needs trimmed to 3" wide which means you'll have to take ½" off of one side. You'll also want to drill a couple of 17/64" holes ¾" from the ends (Fig. 9) to fasten the footmen. At this point you can also cut ¼" corners off of the end of the treadle for aesthetics.

Figure 7

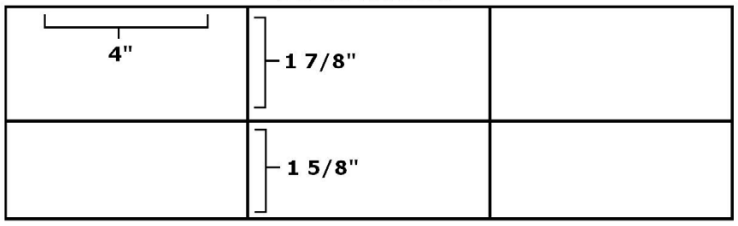


Figure 8

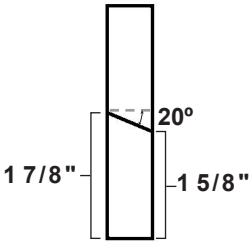


Figure 9

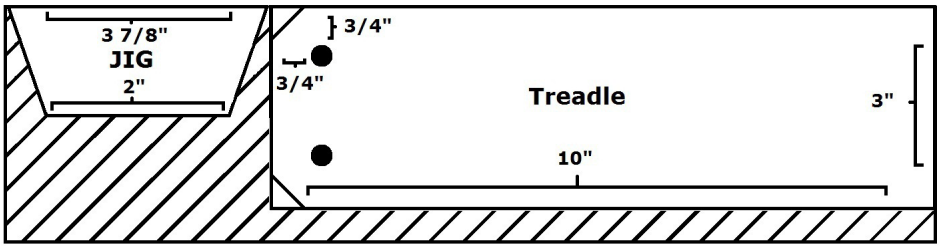


Figure 10

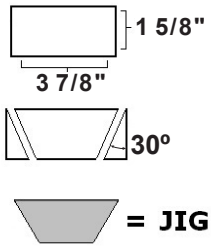


Figure 11

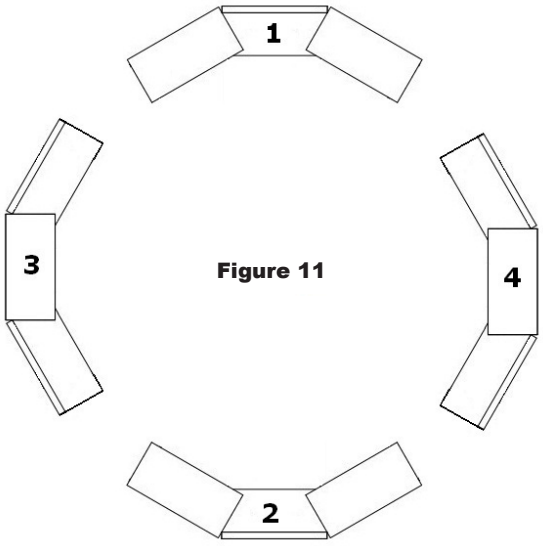
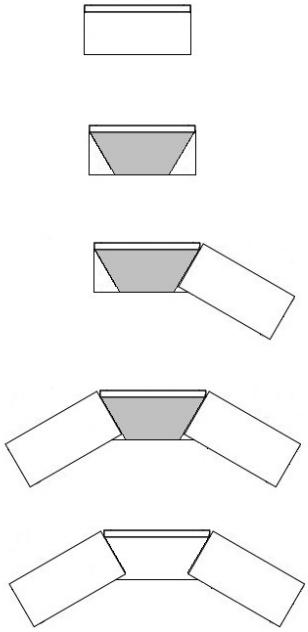


Figure 12



Drive Wheel Assembly:

To begin assembly, you will need to make a cardboard jig (Fig. 10). You've already made a jig out of the 1 x 4, but a cardboard jig can be taped to your pieces. It should be ⅛" shorter than the length of your wheel blocks and the same height as the short side of the wheel block. Once you have this rectangle you should take a 30° angle off of both sides making a trapezoid that is wider at the top. This will make the jig 1⅝" tall, 3⅞" wide at the top, and 2" wide at the bottom.

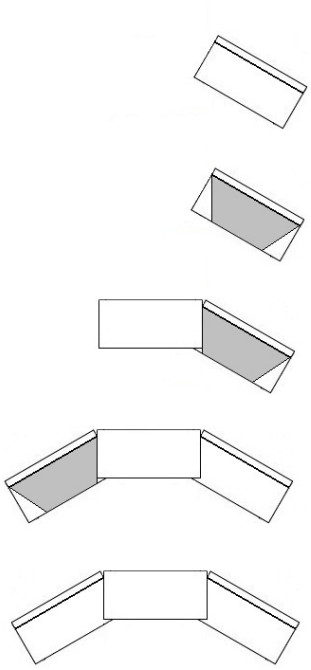
The wheel is constructed in quarters made of 3 wheel blocks a piece (Fig. 11).

The first quarter is constructed by taping the jig to your center block, butting your side pieces against the jig and nailing the blocks together (Fig. 12). Note: Reinforce the brads by placing a daub of glue between blocks before hammering them together, and to make sure that all of your brads are hidden, drive them from the back.

The second set of blocks is assembled the same way.

The next two sets have to be assembled inverse. Start by taping the jig to a block, butting another block against the jig and

Figure 13



nailing them together as before. Then remove the jig and tape it to your third block to help you line up the last joint before hammering together (Fig. 13). The last quarter is assembled in this manner.

There are a variety of ways to assemble the wheel ring from the four sets you now have. At this point it is more important to make sure that your four sides are square with each other than to match your joints based on angles. Don't nail anything until you've placed the pieces together and lined them up. This way, if you were off on your angles while assembling the quarters, you'll still be symmetrical over all.

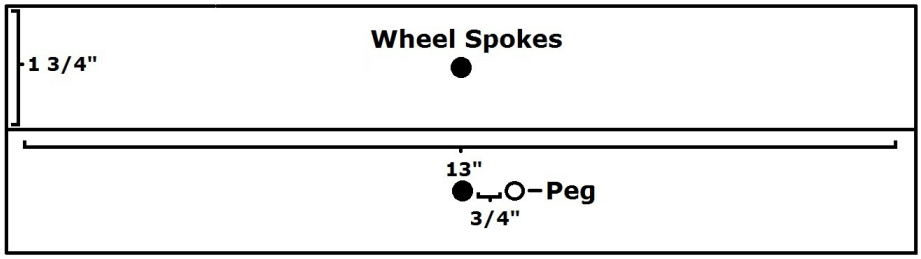
With your wheel ring complete you'll need to install the cross braces that are cut to length once you've measured your distance across. A ¼" or ½" overlap is recommended. The braces are usually about 12", but check to be sure. Note: If your wheel still seems a bit uneven this is your last chance to affect the shape. The wheel ring still has a bit of give. Push or pull it whichever way you need and nail it tight. Keep in mind if it's even enough to please the eye it's more than even enough to function.

The next length of 1 x 4 will be the cross braces for the drive wheel. Like the jig it is based on dimensions from your work, you'll need to leave this cut until after you have constructed your wheel ring. You need to rip the 1 x 4 in half to make two cross braces 1¾" x ¾" each and only long enough to glue/brad it to the wheel blocks on both sides (Fig. 14).

Drill a 9/32" hole in the cross braces (Fig. 14). Take care as this is the hole that allows it to spin on the axel and it needs to be as square and as centered as you can get it. Note: Don't drill the axel hole in the center of where the braces cross, make sure to drill the axel hole in the center of the wheel. Having said that the drilling of this hole is like everything else in this project, poor craftsmanship won't keep the wheel from working.

Drill a 17/64" hole in the front cross brace. Make sure the center of the hole is ¾" from the center of the axel hole (Fig. 14). This is for the shaker peg. The tenon on the shaker peg is not long, so you should drill the hole only long enough to make room for the length of the tenon.

Figure 14



Spindle:

The spindle is made of the dowel you will spin yarn on as well as the pulley that's being driven by the wheel. Begin by cutting a 1¾" length off of your 1 x 4 and ripping it in half. This will give you two identical squares of wood to create the pulley (Fig. 15). Sand the corners back at an angle on both of these squares you need to. As you see in Figure 16, this gives you an octagon on the face of the block.

Glue the blocks together, with sanded corners facing, at a quarter turn so that from the front you can see all eight corners (Fig. 17). After the glue has dried, drill a 17/64" hole in the center of both blocks (Fig. 18).

Slightly sharpen one end of your dowel and insert it through your pulley to glue in place (Fig. 19). Leave 1" of the dowel behind the back of your pulley. Once your glue is dry you have a completed spindle.

Figure 15

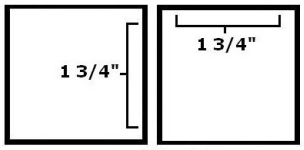


Figure 16

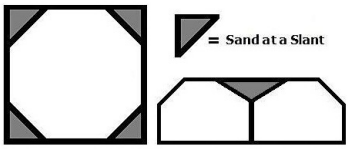


Figure 17

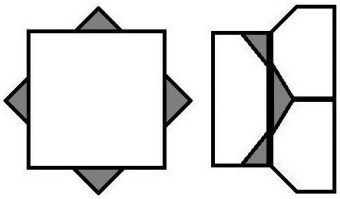


Figure 18

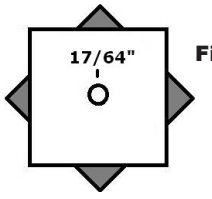
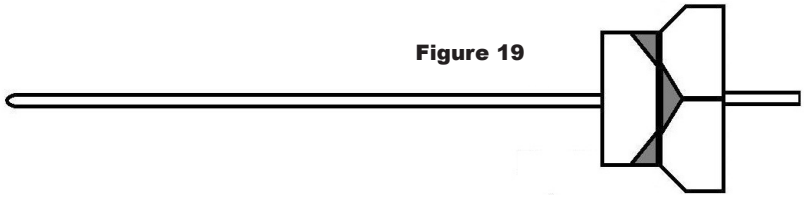
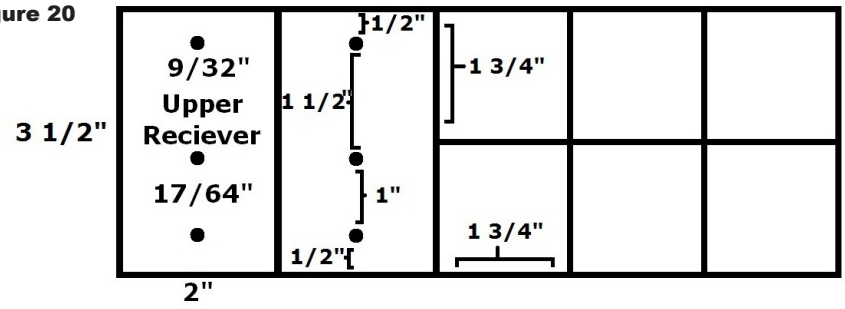


Figure 19



Make the remaining lumber into several spindles and upper receivers. Figure 20 shows an example of how to break the remaining lumber up. You will be able to swap out receiver/spindle assemblies for ease of plying without having to put your yarn onto holders. You'll need three to do a two ply yarn and there should be enough extra of the 1 x 4 to make them all.

Figure 20



Finishing:

Before starting your final assembly of the wheel you need to make sure you've finished constructing the base and drive wheel.

As long as the base is glued/bradded together and has had time to dry all you need to do is install your treadle by using a hinge (any hinge will do).

By this point you should have glued/bradded your wheel blocks together in a ring as well as cut and installed your cross braces, and drilled a 9/32" hole in the middle of the wheel and a 17/64" hole in the front cross brace for the shaker peg. Insert the shaker peg by applying glue to the back as well as the sides of the peg. Note: The shaker peg will have a good amount of force applied to it and it's only held by glue so be sure to give it plenty of time to dry. Leave it someplace warm while the glue is drying to help the curing process.

Final Assembly:

The first thing you need to do is install the axel. Having the axel waxed thoroughly will ensure worry free movement. First wax 1½" of the bolt thread starting at the head, then slide a waxed washer on to the axel followed by the wheel itself, next is another waxed washer then a lock nut followed by a fender washer (Fig. 21). Neither the lock nut, fender washer, nor axel need wax here (it's ok if there's a little) the wax is just for the two washers and the part of the bolt that come in contact with the wheel. Install the wheel and axel on to the stem making sure to secure it with your last fender washer and another lock nut (Fig. 22). It helps to hold up on the front of the axel while you tighten the lock nut behind the stem to ensure the wheel doesn't pull down the axel and rub itself on the stem.

Figure 21

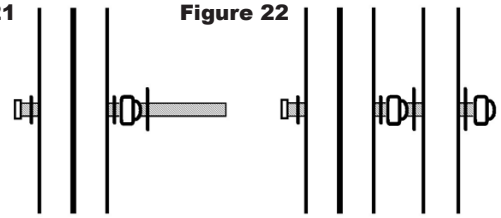
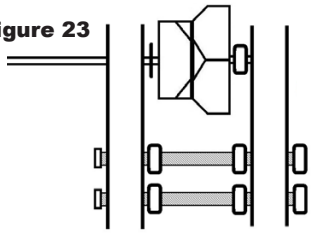


Figure 22

Figure 23



Assemble the upper receiver by sliding both bolts through their holes and running a nut down on them tight. Next run another couple of nuts down on the bolts and slide the spindle through the hole at the top with a washer placed just in front of the pulley and a ⅜" nut placed just behind the pulley. You should now be able to insert this whole set up in the corresponding holes on the stem, and tighten your final two nuts down on the back of the bolts (Fig. 23). Any adjustment in tension for the spindle assembly can be accomplished by adjusting the two bolts against the front of the stem. This pair of bolts is the upper adjustment nut and the lower adjustment nut. Of course you might have to loosen the nut behind the Stem in order to tighten or loosen the adjustment nuts. Not only can they adjust tension, they also can adjust pitch (if for some reason you need to have the spindle point further up or down). It's important to remember that the adjustment nuts control pitch, because you can unintentionally put a bind on the dowel without realizing it. The proper position of these nuts are to allow free movement of the pulley without a lot of additional space, keeping in mind that you want proper alignment of the spindle as well as freedom of movement.

After completing the installation of both the wheel/axel and upper receiver/spindle you can slide the stem into the base (Fig. 24) and spin away—just as soon as you cut, tie, and attach both the drive band and footmen.