Make Your Own Treadle Lathe - Updates and "Lathe-Share"

The earlier edition of my treadle lathe E-book was downloaded a lot and a special thanks to those of you who have sent along a contribution to help with this project or purchased the earlier CD or print versions of the book.

Since publishing this little book I have heard from quite a few folks who have built a treadle lathe. Most have been pretty creative and made some design changes, which is fine with me. The folk process at work!

The information presented here will be included in next edition of *Make Your Own Treadle Lathe* but there is no need to wait to get your copy; it's all here now.

Steve

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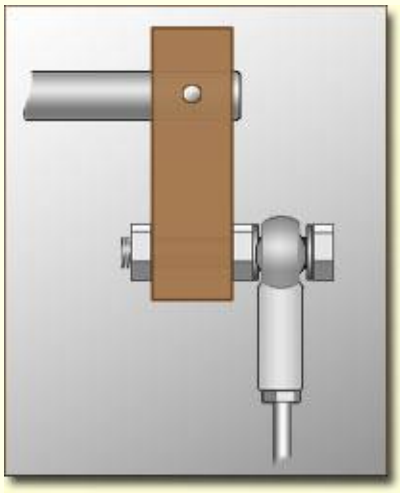
No-bending crank:

One the most intimidating aspects of building this type of lathe is coming up with or making the crank shaft. If you have access to an acetylene torch and stout vice then bending 1/2" steel rod into the proper crank shape would be easier - but by no means easy. So here is an easy-to-construct wood and steel alternative.

As you can see - no bending! Using a drill press or really steady hands, drill two 1/2" holes 1-1/4" apart (or whatever crank length you want). The top rod is the one the flywheel is mounted on and the lower, short rod is where you mount the crank bearing. The rods would be cross-drilled and pinned as shown above. Maple or other similar hardwood would be best for this piece.

One possible option would be to drill the lower hole smaller, say 3/8" or 5/16" in diameter and insert a bolt to match a smaller crank bearing - or perhaps a manufactured rod-end bearing: - like this one at Amazon*. A not-too-tight fit between the bolt and bearing surfaces would be a good idea as well as occasional oiling.

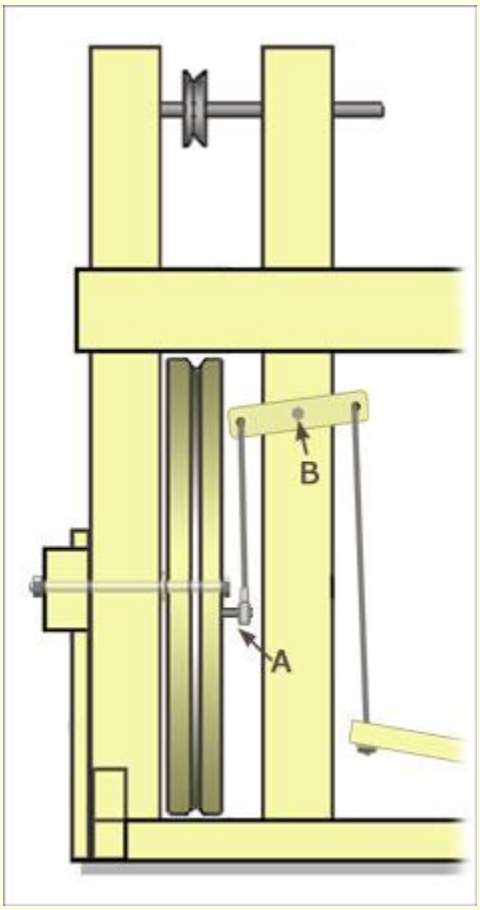
Another view:



Another crank option:
If you look lower on this page you will see some of the many lathes inspired, more or less, by my lathe book. Check out the flywheel drive mechanism on the blue lathe built by Jim Albro. I love that some folks have come up with some very creative solutions when building their lathe.

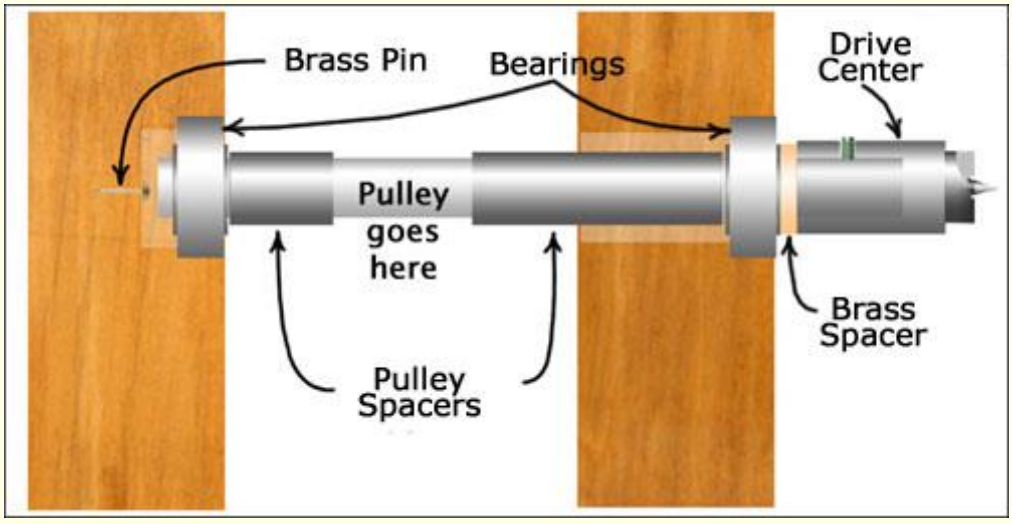
By supporting the flywheel from only the left side (the shaft doesn't go all the way through to the second upright) Jim was able to totally eliminate the need for a regular crank. It would be possible to have several different 'gear ratios', thus be able to change the speed/torque ratio, by changing the distance the bolt at 'A' is from the center of the flywheel. Good bearings at 'B' and in the hub of the flywheel should ensure that the pivot and flywheel worked smoothly.

I have not tried this system but am intrigued by its simplicity and potential for adjustability.



Headstock layout details:

Here is some additional information on how to set up the headstock. My apologies for not having covered this very well in the book. The drawing below shows how I put my lathe's headstock together.



In the book I discuss boring bearing recesses and shaft clearance holes in the headstock uprights prior to assembly. Here you can see the specifics of the layout. I have found the pin on the left to be needed only if there is a lot of end-play in the shaft. The brass bushing used as a spacer between the drive center and the bearing on the right pretty well positions the shaft. I suppose that in heavy use pressure from the tailstock could overpower the bearings a bit (they aren't designed for much lateral loading) in which case the pin, and a dab of grease, would be a good idea.

The pulley spacers are short sections of metal tube sized to position the pulley right above the groove in the flywheel. If your pulley has good set screws these tubes are not necessary.

Here is a photo of my old Shopsmith drive center:

It is held to the drive shaft by that set-screw. You might want to plan ahead and order this part early since I just noticed (March, 2017) that it may be a 'special order' item now. I have not found any source other than Shopsmith* for this type of drive center.

My drive shaft is only 1/2" in diameter and the drive center is designed for a 5/8" shaft so I made up a simple bushing out of a short piece of PVC plastic pipe:

The hole in the side is for the set-screw.

Tail Centers:

I've done a bit of looking for a good tail center since the tailstock center I used is no longer available (My Shopsmith is about 65 years old). If I was to go the simplest route now I'd buy a #2 Morse taper tail center, bore a hole in the tail stock upright the size of the small end of the taper and use a rat-tail rasp or tapered reamer to create an appropriate taper in the hole. This may sound crude but with a little attention and patience you can get a pretty good fit. Shopsmith has a couple tail centers listed on that catalog page (link above) but there are undoubtedly many other sources for both fixed and live tail centers with tapers. Here's one at Amazon*.

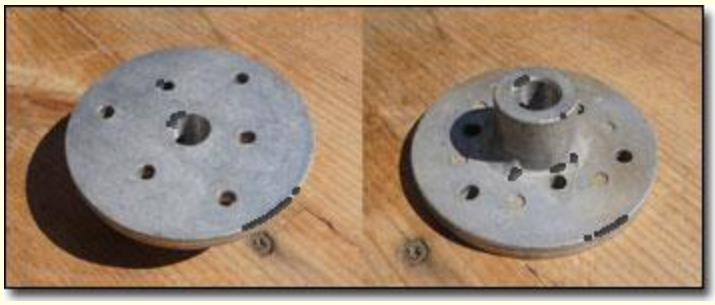
On a spring pole lathe that I built 40 or so years ago I made an adjustable tail center from an old piece of gate/shutter hardware that looked like this:

I bored a slightly undersized hole through the tail stock upright, heated the pintle with a propane torch (holding it in Vice Grips) and quickly screwed it into the hole. This burned some decent threads into the hole. While the screw was still warm I rubbed some bee's wax on it for lubrication. One of the first turning projects on that lathe was to turn a wood handle to slip over the 'handle' end of the pintle. I filed a nice, smooth, bluntish point on the working end of the screw. This setup worked well for a lot of years.

Turning bowls & plates:

I'm occasionally asked if this type of lathe can be used to turn bowls and platters. I have turned simple bowls up to about 5" in diameter and 1-1/2" deep from dried cherry and yellow birch. I roughed out the bowls as close to final size as I could and then, taking very light, slicing cuts, shaped the outside. For the inside I just used light cuts with a sharp 3/8" bowl gouge.

The inside middle worked down quickly but closer to the rim things slowed down quite a bit. The limiting factors were tool pressure and belt slip. At these slower speeds it seems like catches are more frequent. On the other hand, because of the limited torque of the lathe, the catches tended to just stop the piece instantly. Some catches were a bit more violent and damaged the piece or at least gave me rude awakening.



If I was planning on doing much of this kind of work I would definitely invest in a Shopsmith aluminum faceplate* 3-3/4" with 5/8" bore. About $26. I have only used homemade faceplates and paid the price in lack of stability.

Starting with green wood and working quickly one might be able to turn larger pieces but I suspect that there might be more of a catching problem. Using a good faceplate, careful technique and really sharp tools will help.

Lathe drive center speeds for various flywheel speeds:

(Based upon 24” diameter flywheel and 2½” spindle pulley)

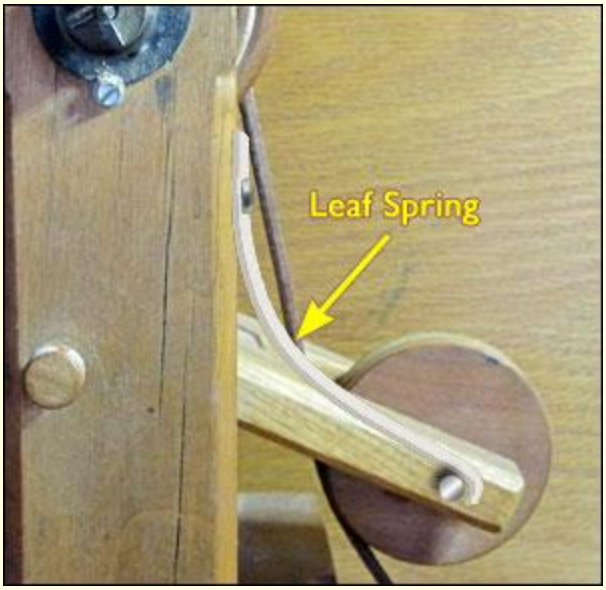
Flywheel Speed (RPM)	Drive Center Speed (RPM)
60	576
70	672
80	768
90	864
100	960
110	1056
120	1152

In normal operation, whether turning or using an accessory such as a sanding disk, I seem to pump the treadle somewhere between 80 & 100 times per minute. For some jobs like sharpening a chisel on a 400-grit hard disk I probably go a little faster as long as the metal isn't heating up too much.

Practical turning speed is governed by the mass and diameter of the piece being turned. You have more latitude with small spindles than with bowls or other larger pieces. When turning larger diameter pieces you need to keep the speed up to prevent stalling; at least when, for instance, working on the rim of a bowl. Pumping at 120 / minute is two per second and though you won't be doing it all day, it is very doable for reasonable periods.

Leaf spring for belt tensioner:

One of the least elegant 'features' of my lathe is the wimpy coil spring I used to keep downward pressure on the belt tensioner. Although I have yet to finish implementing this idea, I have worked it up as a mock-up and it looks like it will work as well as the old coil spring.

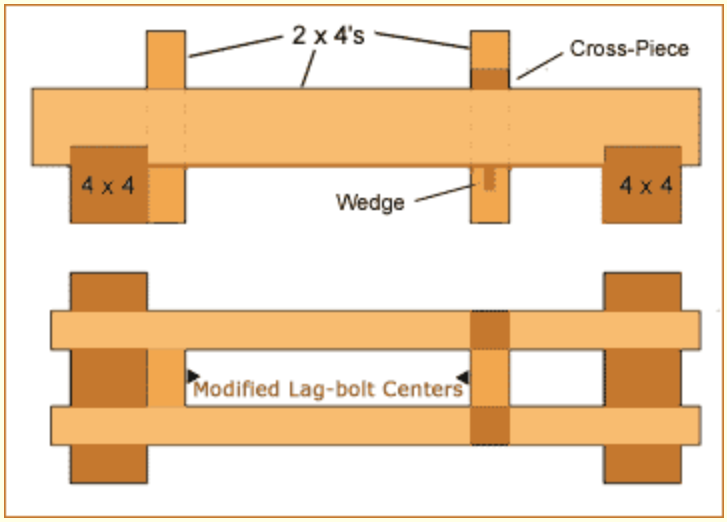


My trial spring was made from a used hacksaw blade with the teeth ground off. I mounted it using the hole at one end of the blade and broke the blade off to the right length. I heated the very end and bent a kind of hook on the end to help keep the spring in place. I ground off all the rough corners and sanded off the paint to make it look a little better. Some rainy day I'll make up an extended axle for the end of the spring to hook over. Should work OK and definitely look better.

Simple Spring-Pole Lathe:

Way back in 1985 Sue and I began attending art fairs selling and demonstrating hand carved spoons and some wooden flutes I was making at the time. We found that demonstrating was not only more fun than just selling, it greatly enhanced our sales.

On the right of the photo above, by my elbow, is the spring pole lathe I used to demonstrate turning cherry flute blanks.



The lathe was pretty crude but so much fun to use that it was sometimes hard to stop and pay attention to our customers**.** To make it I laid out a couple of 4x4's about 16" long for a base and notched them to receive the 2x4 'ways'. They ways were spaced so a headstock (screwed to the left base 4x4) and puppet would just fit between them. The puppet was notched to accept a cross-piece that rode on the top of the ways. This thing was secured to the ways with a mortised, tapered wedge that ran against the underside of the ways. For centers I had best luck with short lag bolts that had their heads cut off and ground to a nice conical point (screwed red hot into a pilot hole with vise grips). Eventually I updated the center on the right as shown above.

The whole outfit was bolted to the bench-top or, when we were demonstrating at art fairs, to the side of our booth. For a pole, at home, I used steel strapping to mount an ironwood pole about 2" in diameter at the big end. and maybe 8' long, to the rafters over and parallel to the bench. In the booth I cheated and used a couple of non-traditional bungee cords. I was fortunate to have an old set of Craftsman lathe tools that worked fine for turning the bored-out flute blanks.

I have made up some pretty simple plans for a spring pole lathe right here! Spring Pole Lathe Plan

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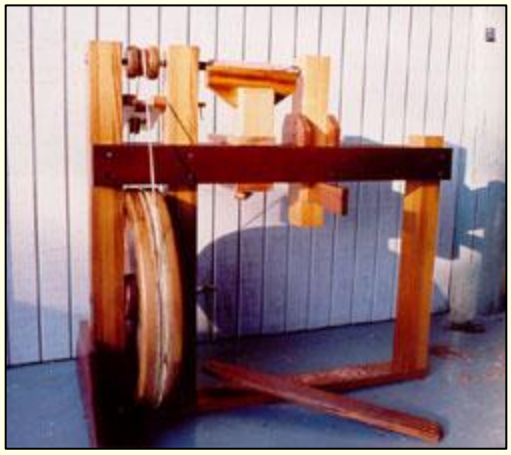
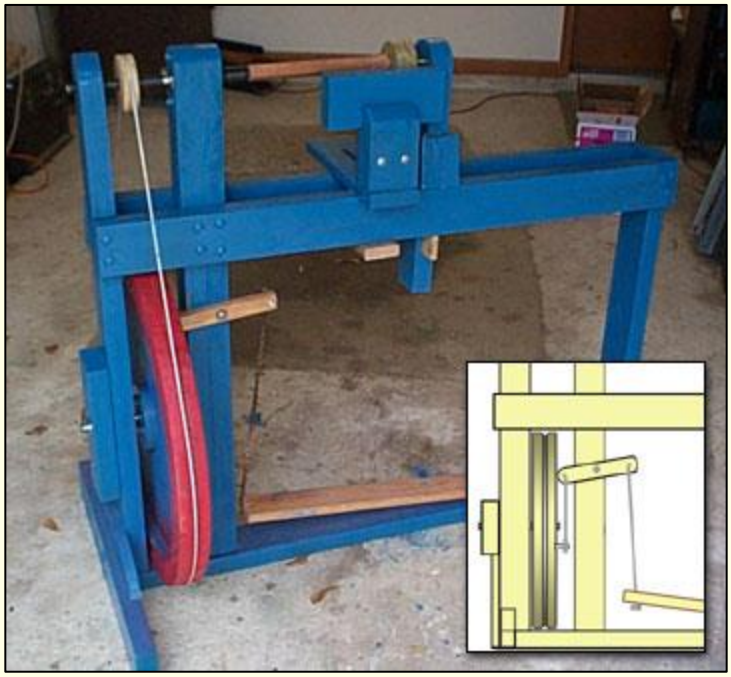
Lathes inspired by *'Build Your Own Treadle Lathe'*...



Bill Yeates used salvaged exotic woods and some nice brass screws to build this lathe (above).



Jim Albro built this cool blue lathe - Note the unique drive system that eliminates the crank shown in the book.

Not quite done when this photo was taken but a great start - by Frank Morrison

Granite flywheel! This lathe is being used in a mission in Cambodia and is designed to be pumped from the back side by a helper.

John Webb built this fine lathe mostly from salvaged materials including some 2-1/2" oak from a wrecking yard.

Lathe made by George King. The uprights and lathe bed are from an old piano and other parts (maple) from old library shelving.

Robbie Power has about 400 hours invested in this spectacular lathe. It is almost completely turned from spalted beech.

Robbie got first prize in the Irish wood turning seminar in Armagh in 2010.

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Make Your Own Treadle Lathe
-- Source Links --

(Links verified: March 3, 2020)

Sources of Lathe Components
If you follow my current recommendation of using a 5/8" spindle shaft, you can get drive centers, tail center, a couple of different size faceplates, and a drill chuck from the Shopsmith web site. I do use and recommend these parts but don't make any money on their purchase.
Until recently Lehman's carried the round leather belting I use on my lathe but appear to have switched to a rubber belt material. That may work fine but there are many sources for leather belting on line; search "round leather sewing machine belt".

Shopsmith:
- Drive & Tail Centers:
  www.shopsmith.com/ownersite/catalog/l_lathecenters.htm
- Faceplates, 3-3/4" & 6"
  http://www.shopsmith.com/ownersite/catalog/l_lathefaceplates.htm
- Accessory (drill) Chuck:
  www.shopsmith.com/ownersite/catalog/dr_chuck.htm

Lehmans:
- Sewing machine belt material (Rubber):
  https://www.lehmans.com/product/sewing-machine-belt/

Amazon:
- Morse taper Tail Center:
  https://smile.amazon.com/DCT-Heavy-Duty-Tailstock-Lathe-Center/dp/B079K6124B

- Rod-end Bearing (for crank):
  https://amazon.com/Rod-End-Economy-Included-Direct/dp/B07HNKVVYG

- Leather Sewing Machine belting:
  https://amazon.com/s?k=leather+sewing+machine+belt&crid=2SV7ACOY1XN93

I hope these ideas help smooth your lathe construction. These 'updates' will be incorporated into the next edition of both the e-book and print versions of the book. Many thanks to those who have written asking for clarification on some of these issues as your questions have helped me with these updates.

Steve

* Note: Although I really do like my ancient Shopsmith and it may seem like I'm pushing their products, I don't have any connection with them. The product links I've included are there to help you find what I consider good lathe parts. I don't make anything from those links.