Rose-Engine Turning

By Jon Magill

Instead of admiring ornamental turning, it's time you give it a try. Here is an easy and inexpensive way to start, including details on how to build your own rose-engine lathe.

Ornamental turning—OT among its fans—is admired by many but practiced by few. One of the obstacles that holds turners back is that this intriguing work requires a rare specialty lathe.

At least it was rare until now. All the projects shown on the following pages were turned on a homemade rose-engine lathe. Not only is it easy to build, it's capable of doing precision OT work.

The four projects that follow provide an introduction to the rose-engine lathe and its capabilities plus an overview of some basic techniques.

Of course, you'll first have to build your lathe, described on *page 52*. A dozen AAW members have already made these lathes, and you can do this too!

Much of what is described in these pages will be obvious the first time you turn the crank on your rose engine. But until you actually see it happen, text descriptions cannot do it justice. The magic of how a rose engine works and what it does is something that has to be experienced.

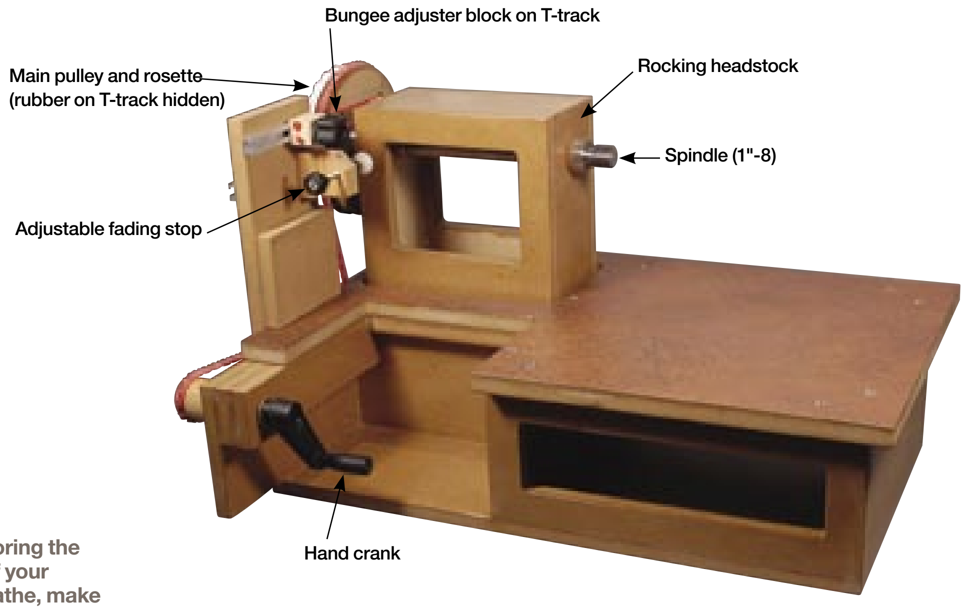
A rose engine differs from other lathes in many ways, but the biggest difference is that the headstock is not stationary. Instead, the headstock is hinged, allowing it to pivot back and forth, called rocking. By controlling this rocking motion with a **rubber** riding against a **rosette**—a cam-like disk—you can cut countless patterns.

Another distinction is that, unlike regular turning, rose-engine turning is usually done with a motor-driven fly cutter, known as a **cutting frame**. By hand-cranking the lathe, the turner rotates the piece slowly past the cutter. The most common cutting frame, a horizontal cutting frame, is a tool supported on some sort of **slide rest**, which has a fly cutter rotating in a horizontal plane. The cutter is spinning at high speeds—similar to router speeds—and taking light cuts on each pass.

For more help with terminology, see the photos opposite *and on page 52. To see a video clip of a rose engine in action and for more OT history, visit the AAW website at woodturner.org.*

Get started

When first becoming familiar with your rose engine, you may want to devise some sort of a paper chuck, as shown in **Photo 1**, which is useful for drawing the patterns and helping understand what the rosette, shown in **Photo 2**, will



All the projects in this article were turned with this homemade rose-engine lathe.

To begin exploring the capabilities of your rose-engine lathe, make sample cuts. These were turned from 3"-diameter maple stock.

produce. Generally speaking, the features or bumps on a rosette produce more pronounced effects as the diameter of the cut or pattern decreases.

Of course the best way to learn what a rose-engine lathe can do is to just start making test cuts, as shown *above*.

A note on safety: Be careful and aware of the fly cutter on any OT cutting frame. The cutter spins so fast that it becomes invisible; you need to consciously resist the temptation to put your fingers anywhere near the cutting frame.

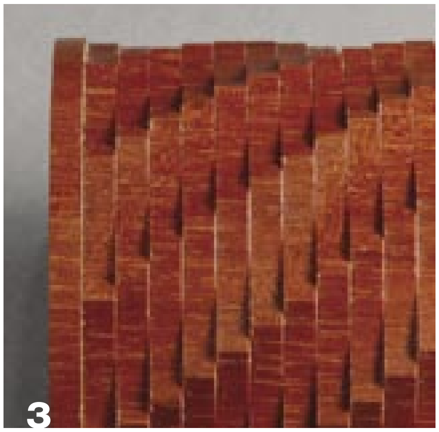
Limitless patterns

All the photos and projects on these pages were made using just two rosettes—one with four bumps and one with 24 bumps. The four-bump rosette looks like a puffy–sided square. The bumps on the other rosette, as shown *below right*, look like a sine wave pattern of 24 bumps around its edge.

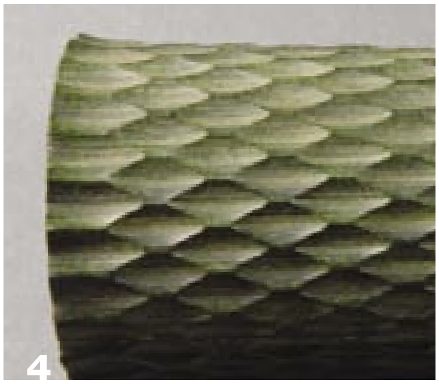
In addition to the patterns on the rosettes themselves, there are two added features that serve to multiply the pattern possibilities—a fading stop and phasing. Used in various combinations it would take a lifetime to exhaust just the possibilities of these two rosettes alone. The **fading stop** works by limiting the headstock travel when it is rocking back toward the operator. The effect of the fading stop is seen as sections of smooth, circular cuts between the portions of cut produced by the bumps on the rosettes. Like much of the rose engine in general, this will be much easier to understand once you have seen it in action.

To explore patterns created by a rosette, hold a sheet of paper on a flat surface mounted to a faceplate on the spindle. Then place a felt-tip marker in the tool holder.

With the brass pin placement, the turner alters the phasing of the rosette, which creates different effects.



A simple spiral pattern emerges by phasing the rosette with each subsequent cut.



This chicken wire pattern is created by alternating the phasing forward and back with each cut. Each row of diamonds represents one revolution of cutting.

Two basic cuts

There are two basic cuts when turning with a rose engine, and the effects are markedly different. Cuts are either made on the face or the side of a workpiece. The differences will come into play when you begin designing your own OT projects.

Face cuts are made with an arcing movement of the headstock. In general, they tend to be shallow with interesting effects at their near and far edges. The arcing movement of the headstock tends to wash away details at the center of most cuts. Face cuts are often done as a series of concentric cuts with some space between them, allowing the edge features to meet at the ridges between each cut in a series. This will make more sense once you actually try it.

In contrast, **side cuts** are plunging cuts. The rosette allows the cutter to plunge into the work and then pull it back out. The depth and effects are quite different from those of cuts on the face. Two techniques are used to progress the side cuts along a piece: Simply move the cutter along, creating straight flutes or grooves, or you can phase the rosette while making a series of cuts. This second technique of phasing can produce effects like spirals and chicken wire, as shown in **Photos 3** and **4**.

Last but not least is the surprising effect of where the cutter is actually positioned. If the cutter is located on the operator-side of center, the pattern produced will mimic the shape of the rosette. By simply moving the cutter to the other side of center, the rose engine will invert the pattern of the rosette, often with surprising and pleasing results. You'll read more about this effect on *page 50* in the square-knob details that follow.

Wood selection

Because OT is less forgiving than plain turning, choosing your turning stock is key. Select hardwoods that are as dense and as close-grained as possible. Sanding is generally not possible after cutting; the finish cut your tool produces is critical.

A wood that is dense enough to show the pattern is important. That said, while you are learning and discovering the endless array of possible patterns, almost any hardwood will work. Eastern maple is a relatively inexpensive wood good for experimentation.

Purse mirror

A purse mirror is a good first project that you can accomplish using mostly face cuts. Mirrors come in various sizes (2" and 3" diameters are popular) and require about a ¼"-deep recess.

Mount a round blank 2½" to 4" in diameter (depending on your mirror) onto your regular lathe and turn a recess to accommodate your mirror. The mirror *at right* was turned with European plum.

Mount a wasteblock slightly larger in diameter than the recess you just turned. Make a jam chuck and reverse the mirror blank onto the jam chuck.

If you haven't already done so, try some sample cuts to get an idea of the basic patterns you like.

Now, move the blank over to the rose engine and cut a pattern based on your plan, as shown in

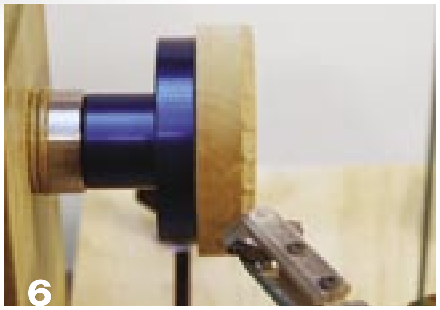
Knobs

Turning knobs for cabinets or drawers is a simple, repetitive project that will require you to keep track of your rose-engine settings to get matching results on duplicate parts.

Start by making the blanks and

A purse mirror will give you your first taste of accomplishment with a rose-engine project.

Cut the pattern for the back of the purse mirror.



Before reversing and jam-chucking, decorate the edge of the mirror case.

Photo 5. After you have made a few mirrors, you might want to try decorating the face and edge of the blank, as shown in **Photo 6**. Decorate the edge using the rose engine after turning the mirror recess but before reversing onto the jam chuck.

Next, reverse and jam-chuck to cut the pattern onto the back.

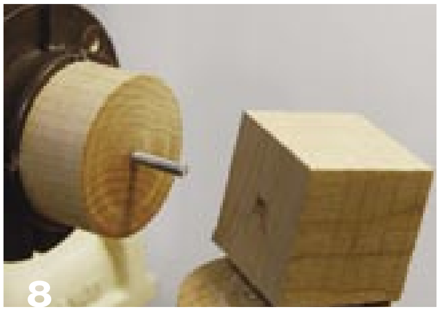
Although a simple project, this should give you a feel for moving back and forth between your regular lathe and the rose engine.

a mounting jig for turning them. For cabinet knobs, 1½"-diameter blanks about 1¼" to 1½" long seem to be about the right size, but your design may dictate other dimensions. Either drill and tap your wood and harden the threads with cyanoacrylate (CA) glue or drill holes in the blanks large enough to install brass threaded inserts. Most cabinet knobs use #8-32 threads for the screws.

Make a wasteblock to accommodate your fastener, as shown in **Photos 7** and **8**.

Mount each knob and turn down the shoulder on each knob as a first step, as shown in **Photo 9**. This is done by centering the rose-engine headstock and backing off

Drill and tap the wasteblock. Secure an #8-32 screw from the backside with CA glue.



Drill the knob blank to mount on the waste-block. Harden the wood threads with CA glue.

Turn down the shoulder of each knob. A belt-driven cutting frame, *left*, does the work.

10
Turn the edges of the knob.

11
Make the decorative cuts on the face of the knob. Notice how phasing was added to position the points of one pattern in the rounded lobes of another.

the rubber so that a round cut is produced. You can make a pair of centering wedges for this purpose; slip one in front of and one behind the headstock.

For the next steps, you need to mount and complete each knob without removing it. Cut the edge of the knob to a depth that pleases your eye or meets your design criteria. Write down the location of your slide rest so that you can return to this depth of cut for each subsequent knob, as shown in **Photo 10**.

Now, move the cutting frame around to the front of the knob and make the face cuts to finish the knob, as shown in **Photo 11**. As before, establish a way to record your slide rest locations so that you can duplicate the pattern later. If your slide rest has a provision for stops, that may make it easier to repeat your cuts up to the stops, maintaining locations and depths.

You should see the effects of the fading stop employed in both knob designs. Without the fading stop, the squarish knob would have been perfectly square around its periphery. Likewise, the round knob would have had a sine wave pattern; instead, the fading stop produced a series of ribs around its edge.

If you have built your rose engine and are experimenting with it, you will recognize the other effect on the face of the square knob—cutting on the near and far sides of center. The four-sided rosette used for the square knob will cut a square or pointed pattern when the cutter is on the operator side of center. When the cutter is on the far side of center, you produce a cloverleaf-like pattern of four rounded lobes. This surprising inversion works with every rosette and often creates very striking contrasts.

The square knob shown in **Photo 11** also incorporates phasing, which allows the points to fall into the middle of the rounded cloverleaves.

Tool handle

A tool handle is a simple project on which to experiment with rose engine turning on the side of a workpiece. This project blends Alan Lacer's tool handle process (Winter 2004 *American Woodturner*) with Bonnie Klein's technique of using a ⅜" brass compression nut for the ferrule and turning off the flats of the nut as a last step. This project has also been adapted to

Setup hints

Here are some hints that will help you get up and running successfully with your rose engine:

- To speed the process, pre-turn waste areas on your regular lathe.
- Adjust the rubber so the headstock oscillates almost vertically in its travel.
- Ensure that there is just enough bungee tension to maintain rubber contact.
- Adjust center height with trial cuts on scrapwood; check the work with a magnifier.
- Adjust the fading stop and check nut to lock in position.
- To minimize dust, set up a vacuum nozzle near your cutting surfaces.
- Before cutting, check that your project is within the travel range of your slide rest.
- Add a drop of oil on the rubber/rosette to help things glide along.
- Before bringing in the cutter, crank the workpiece so that it is moving.
- To reduce burn marks, back off the cutter before stopping.

Check the diameter of each compression nut, then cut the tenon to fit the interior.

With a belt-driven fly cutter, make your ornamental cuts at the headstock end.

Drill the handle to the depth of the tool-holder shank; most shanks are about 1".

You can design and turn the entire handle on the rose-engine lathe.

Insert the tool-holder shank and adhere with CA glue.

work with an interchangeable-tip screwdriver holder (Rockler is one mail-order source). Most interchangeable-tip screwdriver holders have ¼" hex shanks, which can be driven into a ¼" diameter hole. Eastern maple is a good choice of wood; it is hard enough to stand up to use and it takes the ornamentation well.

Mount a blank between centers and turn a tenon and shoulder to mount in your chuck. Mount the blank into your chuck and put it back between centers.

Cut a tenon on the tailstock end of the blank to accommodate the interior dimensions of the ⅜" brass compression nut, as shown in **Photo 12**. Thread on the nut tightly against the shoulder, then trim any excess wood. Match a bit for the tool-holder shank, then drill as deep as the length of the shank, as shown in **Photo 13**.

Drive the screwdriver shank partially into the blank and add a dab of thick CA glue to the shank's groove. Finish driving the shank until it bottoms out on the compression nut, as shown in **Photo 14**.

Secure the screwdriver holder in a chuck and mount it on the rose engine. To prevent the chuck jaws from marring the surface, wrap the holder with a layer of aluminum foil. Start cutting your pattern at the headstock end, as shown in **Photo 15**. Cut to your desired diameter.

With your slide rest set at an angle you like, work your way out along the handle at an appropriate taper, as shown in **Photo 16**. Unlike plain turning, the rose engine takes such light cuts that you can usually get away with cutting techniques like cutting away from an already thinned section, which wouldn't work on a regular lathe. (For longer work, some of the antique rose engines included a rocking tailstock to help support the piece.)

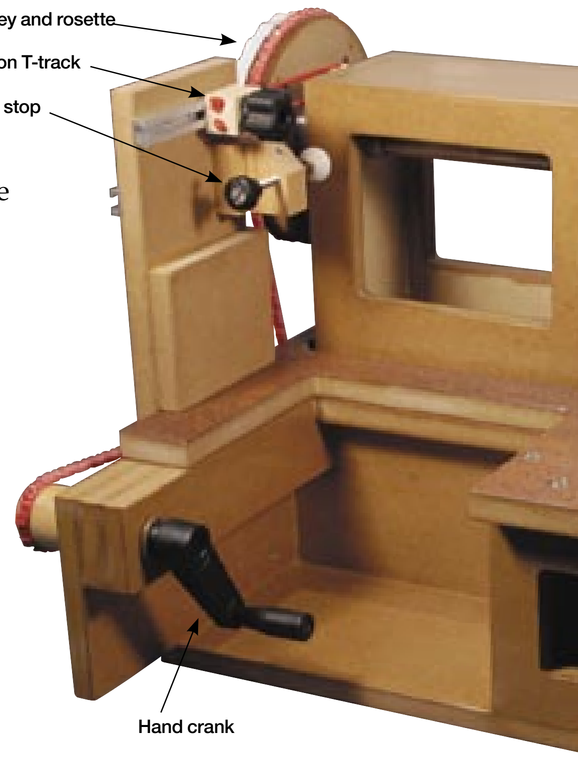
Continue to work your way out slowly to avoid leaving visible ridges between your successive cuts. The fading stop creates ribs instead of the sine wave that the rosette would have created if left unaltered. Work your way around the butt end of the handle and cut a decorative pattern on the end.

Square-lidded box

Perhaps the most intriguing quality of the rose engine is its ability to produce work on a lathe that is not round. Instructions for making a box like this would require an entire article, as well as a few tools you might not have when just getting started with your rose engine. But rest assured—this box was made entirely on the homemade rose-engine lathe described *at right*.

Jon Magill (jon@magill.com) is an ornamental turner who lives in Clinton, Washington. Jon is a member of the Seattle Chapter AAW and Ornamental Turners International, an AAW chapter dedicated to ornamental turning. Jon will present sessions on building and using the rose-engine lathe at the AAW symposium in Portland.

Build Your Own



Ready to dive into ornamental turning? Before you can begin, you'll need a rose-engine lathe.

Get started on building your own rose-engine lathe with a plan modified from a design by Paul Fletcher, an accomplished and ingenious ornamental turner from the United Kingdom. Paul's original design was based on cutting all the pieces from a half-sheet of ¾" medium-density fiberboard (MDF). With Paul's permission to publish his ideas, the design has been updated to streamline the construction and to incorporate as many standard parts as possible.

This simple plan for a rose-engine lathe is capable of doing precision work, yet it is easy to build in a home workshop. A number of machines have been built, and feedback has continued to improve the design. More are being built every month. A kit, including machine parts (see *opposite*), makes it easier for anyone to build their own.

Bonnie Klein and her husband, Robert Purdy, built one from these plans. "We've been experimenting with rose-engine work for nearly 10 years," Bonnie said. "We are amazed at the capabilities and potential of this fascinating machine. This homemade lathe offers exciting new opportunities for creative and artistic expression.

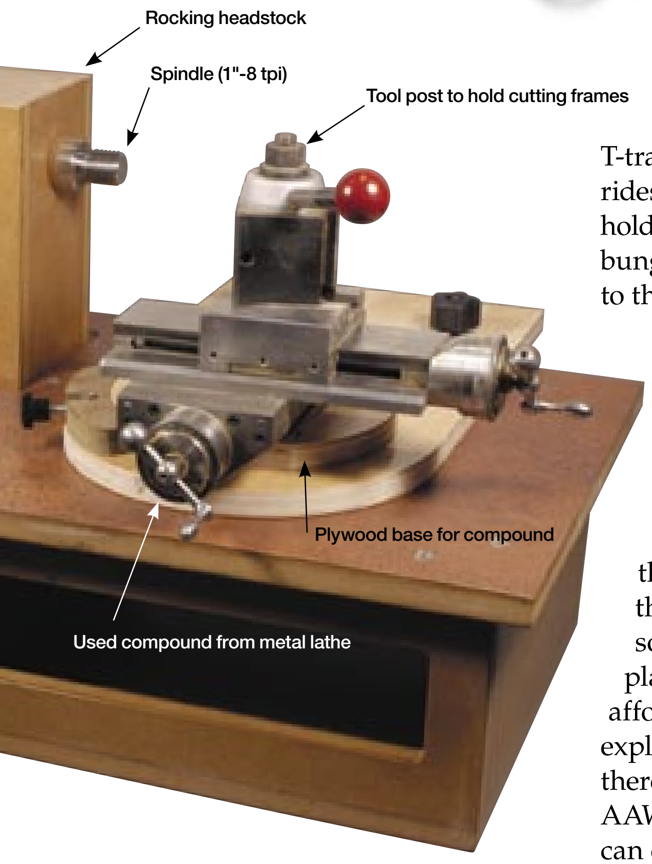
"It will be interesting to see rose-engine turned pieces in future AAW Instant Galleries."

What's involved

The basic rose-engine lathe will get you started on the journey to enjoying ornamental turning for an investment of $250 to $300 in materials and machined parts.

The rose engine consists of a **base** and a **rocking headstock**. The headstock is hinged on a set of simple, adjustable pivots below the table surface. A spindle passes through the headstock and runs in bronze bushings. The outboard end of the spindle has a flange to mount a turned pulley, which in turn holds a rosette. Another step-up pulley carries the belts that go from the spindle pulley to the hand-crank pulley. An upright supports two pieces of T-track. One

Rose-Engine Lathe



T-track holds the rubber, which rides against the rosette; another holds the block that adjusts the bungee cord that supplies tension to the headstock.

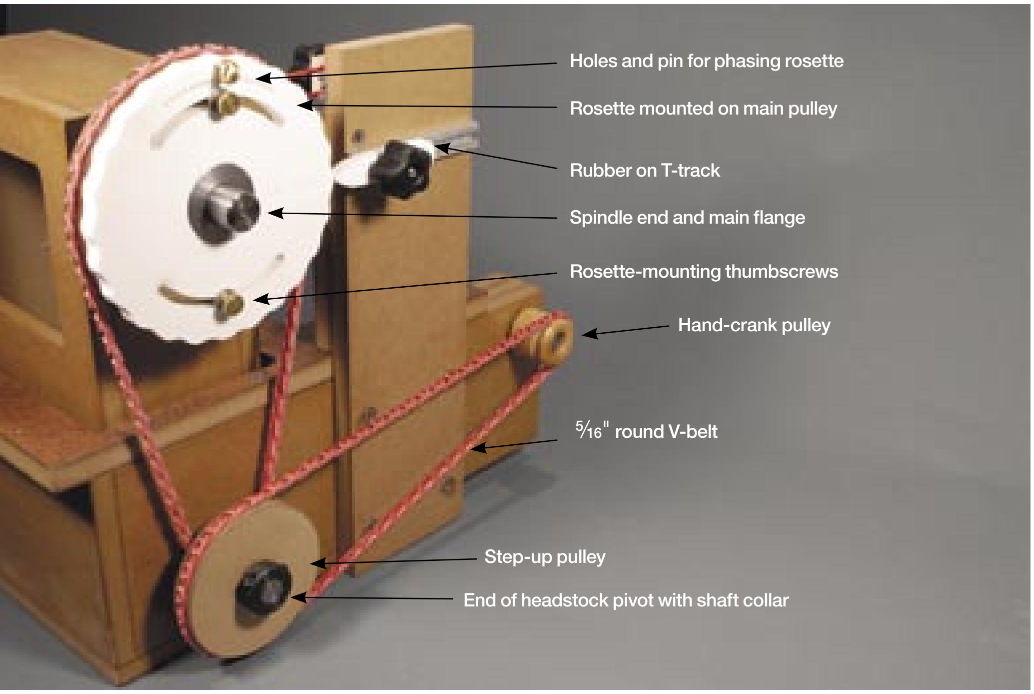
Once you have all the parts, it should take about two days to cut, glue, and assemble the entire lathe. If you or a friend has a metal lathe and mill, you should be able to easily make the seven machined parts for the rose engine. Or, use our kit source (supplied with website plans). Consider this lathe an affordable platform to begin exploring ornamental turning. If there is sufficient interest from AAW members, follow-up articles can describe advanced capabilities already designed to be added onto this rose-engine lathe.

There are few critical dimensions in the design of this homemade version. However, before you start experimenting, you should consider building one as close to these plans as possible: Many subtle aspects are not obvious until you have used a rose engine. Once you have used the lathe and understand how it works, modify the design to suit your needs.

The plans for the lathe (see below) include details to allow phasing of each rosette, as well as the adjustable fading stop for the rosettes. These two simple features open up the pattern options that you can produce on your rose-engine lathe.

In addition to building the basic lathe, you will need to build or buy some type of slide rest to manipulate the cutting tools around your work. And finally, you will also need at least one cutting frame to do the work. The plans include some options for both of these.

—*Jon Magill*



AAWWEB

Free plans on AAW website *The complete step-by-step plans, construction drawings, parts list, sources, and details about a parts kit for the rose-engine lathe are available free to AAW members at* ***woodturner.org***