

TABLE SAWS TOP TO BOTTOM: WHAT YOU NEED TO KNOW

WOODWORKER'S JOURNAL

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INSIDE!

- 5 Sharpening Tips
- Basic Bike Rack
- Colonial Chair

June 2018

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Page 58



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WOODWORKER'S JOURNAL

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JUNE 2018

VOLUME 42, NUMBER 3

PROJECTS



Tabletop Fire Pit

By Chris Marshall

Our weekend project will light your way to outdoor enjoyment. Brighten your backyard or patio with this fun-to-build project.

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Folding Bike Rack

By Larry Okrend

This freestanding, foldable rack is easy to build and makes it easy to grab your bike and go for a ride.

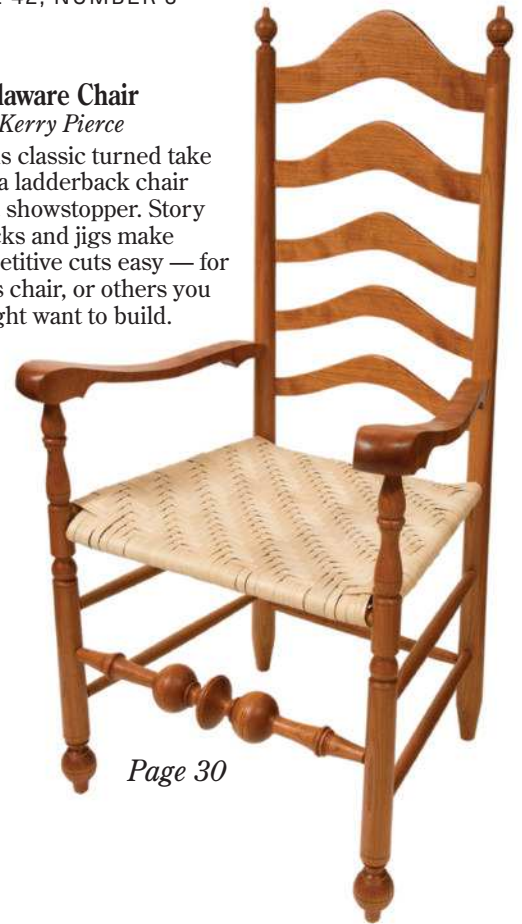


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Delaware Chair

By Kerry Pierce

This classic turned take on a ladderback chair is a showstopper. Story sticks and jigs make repetitive cuts easy — for this chair, or others you might want to build.



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Installing a Router Lift

By Rob Robillard

The Concord Carpenter uses shop-made templates and scrap shims to install a router lift into his table saw's extension table.



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George Vondriska

WoodWorkers Guild of America
Vondriska Woodworks



See George discuss gluing tips and woodworking techniques at wwgoa.com.

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woodworkersjournal.com



I love seeing your projects! One of my favorite places to visit on woodworkersjournal.com is the Reader's Project Gallery. It features hundreds of project photos, and new ones are constantly being added. Plus, we publish and share as many of them as we can in the *Weekly* newsletter, on our social media channels, and in the magazine. Check out this issue's Reader Projects on page 10.

Whether you're an experienced woodworker or new to woodworking, we'd love to see more of your work. The best way to share your project pictures and descriptions with us is to use the upload tool on the Reader's Project Gallery page at www.woodworkersjournal.com/readers-project-gallery. Or, you can click on the Reader's Project Gallery listing in the drop-down menu under the *Weekly* heading on our home page. To open the project upload tool, click on the teal-colored words "Submit Your Project" at the top of the page.

I can't wait to see what you build next!

— Dan Cary



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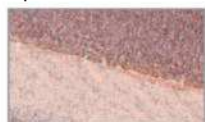


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LETTERS

Staying Sharp and Other Agonies



FUN WITH GRINDING AND HONING ...

Sharpening woodworking tools is a topic that can get folks on edge. Many of us avoid the task to our detriment. Others look at it as a necessary evil, and still others actually enjoy the process. I have to say that I have taken all three of those positions over the years, but now I find myself enjoying the task. The breakthrough came when I finally decided to learn how to sharpen my turning tools. Those curved edges had bothered

me for years. But once I took the time to pick a sharpening technique and learned to execute it well, all my concerns fell away.

Now, I am not going to tell you my personal sharpening system. But I am interested in yours. How do you approach putting an edge on your irons, chisels and gouges? What jigs or fixtures do you recommend, if any? Few topics spark controversy in our craft like sharpening ... so, let's get the discussion started!

— Rob Johnstone

Getting Squared Up

I recently acquired an astronomical photograph of the Milky Way that is 15½" x 47". I went to my local super lumberyard and bought 2½" molding for the frame. With such a large frame, any inaccuracies in cutting the corners would show up.

I have two engineer's machined right angles, 3" and 7", to get precise measurements. I used one to check my right-angle instruments to make sure that the end cuts were exactly 45 degrees. I found that all of them were not exact and, if I had made my cuts using them, there would be gaps in the long, wide frame.

I adjusted my Craftsman miter saw to give me the exact 45

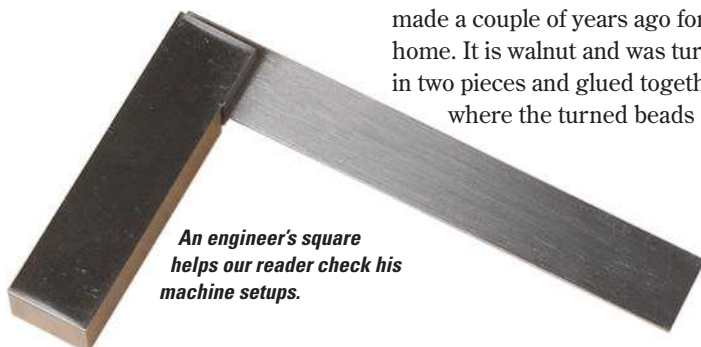
degree cut and carefully cut the long, wide moldings. Now I had a frame that was tight, no gaps, and a perfect fit. A black frame sets off the photo.

My advice is to buy an engineer's right angle. They are relatively inexpensive, and check your instruments to make sure they are true 90°. Hold them up to the light and you will probably see a slight gap at the outer edge of the instrument.

Bill Taylor
Seaford, Virginia

Coat Tree Correspondence

My February issue just arrived, and there is an article on building a coat tree ["Classic Coatrack"]. Attached is a picture of one I made a couple of years ago for our home. It is walnut and was turned in two pieces and glued together where the turned beads are



An engineer's square helps our reader check his machine setups.

Continues on page 10 ...

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THE VOICE OF THE WOODWORKING COMMUNITY

JUNE 2018

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MORE ON THE WEB

Check online for more content covering the articles below:

Woodturning (page 26):
Drying bowl blanks with desiccant (video)

Delaware Chair (page 30):
Weaving a splint seat (PDF);
instructions and sketches (PDF)

Installing a Router Lift (page 44):
Project build (video)

Tool Tutorial (page 50):
Cutting coves on a table saw (video);
table saw tune-up tips (PDF)

Weekend Projects (page 58):
Routing aluminum; preparing
project for use (videos)

What's in Store (page 64):
Featured tools in action



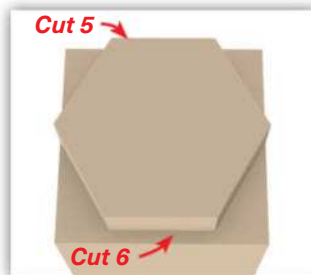
in the center.
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might be
interested.

James
Yarbrough
Winston-Salem,
North Carolina

WJ Re- sponds:

Thanks for
sharing your
coatrack,
James. For
those who are
building ours,
and having a
bit of trouble

visualizing how the cuts are
made for all six facets of the
hexagon, here's an illustration
that might help.



**The illustration above clarifies
where the six cuts of the hexagon
come out of the laminated column
in February 2018's "Classic
Coatrack."**

Cypress Knees?

Quote: "No one really
knows..." A rather flippant
answer as to why the cypress
tree has knees. [Hey Did You
Know, February 2018] A little
explanation, such as the need
of oxygen by the tree, or



trees need support in the wet
environment where the cy-
press tree grows, or to catch
sediment, or a combination
of all these. Just Google it to
get the facts.

Richard Wheaton
via Internet

READER PROJECTS

Totally Tubular Table

Thanks for the August 2017 article on the "Surfboard Coffee Table" with the tubular aluminum legs. The article appealed to me not only because I live in Hawaii but also because I had been thinking of using aluminum legs for a natural-edge table. I followed the directions in the article but found the legs to be somewhat unstable under the weight of a 40" x 20" x 2" koa slab, due to the lack of purchase where the leg frame attaches to the top through the stretcher. This was solved by a wood insert in the stretcher that allowed for the leg frame to be epoxied to the stretcher. (Ignore the two holes in the stretcher; I mis-drilled on that particular one.)

The wood insert
also provides a nice
end cap for the
stretcher. Aloha.

Robin Clark
Kalaheo, Hawaii



Deacon's Bench

I built this deacon's bench as a Christmas present for my son Seth. The woods are butternut and pine. It's finished with water-based polyurethane.

Gary Kieffer
Moravia, New York



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CYBER MAKERS SPOTLIGHT

Rob Robillard, Carl Jacobson and Bob Clagett

These three online woodworkers are worth taking note of, and watching!

Rob Robillard - AConcordCarpenter.com

Rob is a general contractor who publishes videos and articles about carpentry techniques, remodeling projects and tool reviews. He has extensive knowledge of tools and a lot of real-world experience that adds a lot of credibility to his reviews. In addition to tool reviews and techniques, Rob also features step-by-step instructions for some of his projects, such as the outdoor shower enclosure pictured. You can check out one of his latest articles, about installing the new Rockler Pro Lift Router Lift in a table saw extension wing, on page 44 in this issue. You'll find his work on his website, aconcordcarpenter.com, and on toolboxbuzz.com, a tool review site that features content provided by a group of regular contributors.



Carl Jacobson - thewoodshop.tv

If you're interested in woodturning, then Carl Jacobson should be on your list of resources. Carl shares an interesting mix of woodturning technique lessons, reviews of woodturning tools and a wide range of projects. He demonstrates everything from basic bowl turning to advanced turning techniques, such as the offset winged bowl pictured. He also throws in the occasional furniture project and even has made a fun series of wood models of spaceships and other science fiction movie props. Carl does a good job of explaining the hows and whys of each technique. The best place to find Carl's latest content is on his YouTube channel, youtube.com/carljacobson.



Bob Clagett - ILikeToMakeStuff.com

As his site name suggests, Bob Clagett likes to make stuff — all kinds of stuff. One week you'll see him making a practical piece of furniture for his office or workshop, and the next week he's making a costume prop, or wiring up the controller for a tabletop arcade game, or making an indoor climbing wall. He demonstrates the techniques he used to complete the project and shares what worked well and, in some cases, what didn't work. His relaxed presentation makes it easy for even beginners to follow along and understand the project process. You'll find Bob's latest project videos on his YouTube channel, which is followed by over 1.7 million subscribers, and you can find more project plans and instructions on his website, iliketomakestuff.com



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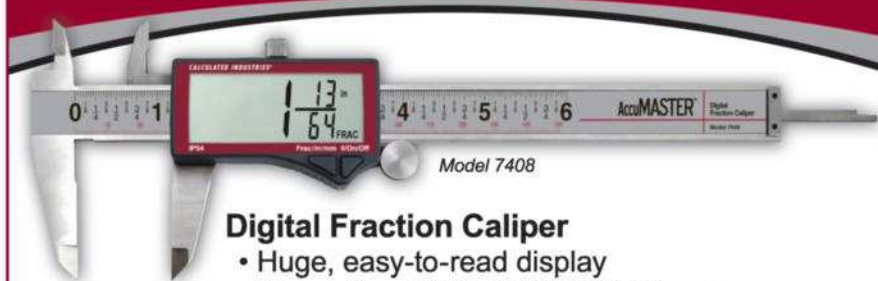
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Mahogany (African)	4/4		Select	2.60	8/4	Select	3.00		4/4	\$124.00	8/4	\$127.00
Maple (Hard)	4/4	Select (N)	3.00	Select (W)	3.65	8/4	Select	4.50	4/4	\$118.00	8/4	\$126.00
Maple (Soft)	4/4		Select	2.60	8/4	Select	3.00		4/4	\$ 97.00	8/4	\$107.00
Oak (Red)	4/4	1C	2.10	Select	2.80	8/4	Select	3.95	4/4	\$107.00	8/4	\$129.00
Oak (White)	4/4	1C	2.20	Select	2.80	8/4	Select	4.95	4/4	\$107.00	8/4	\$135.00
Poplar	4/4	1C	1.30	Select	1.80	8/4	Select	2.00	4/4	\$ 87.00	8/4	\$ 91.00
Walnut	4/4	1C	3.25	Select	6.25	8/4	Select	7.00	4/4	\$129.00	8/4	\$149.00
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Snug Up Your Vac Couplings

It's frustrating when shop vacuum couplings and attachments become worn and no longer form a good friction fit to the hose. To snug things up again, I spray the inside of the coupling area with a rubberized material that you can find at home centers or auto parts stores. A few coats of this stuff will restore a good connection, and it sticks well to plastic.

Larry Demario
Monroe, Michigan



Leather "Grip" Ensures Cooler, Safer Grinding

When I grind the ends of screws and bolts to shorten them, it's hard to hold them steady with a pliers, and they become too hot to grip with fingers. Here's a safer, easier way: punch a hole in a scrap of leather that's the same size as the shank of whatever you're grinding. Center the hole on the leather. Now slip the fastener through the hole and fold the leather over the screw or bolt head to form an easy-to-grip finger protector. This "handle" will keep your fingers cool and a safer distance from the grinding wheel, while also ensuring that the fastener remains securely held while you steady it on the tool-rest.

Oneil Long
Mound City, Missouri



Cough Syrup Glue Cups

Doug Thalacker's ashtray glue holder (February 2018) made me think of another inexpensive option. When I need to use a small amount of glue, I pour it into a plastic cough syrup cup. After I'm done, I just leave any leftover glue in the cup to dry, and it's easy to pry out later with a dental pick, a little screwdriver or even a long nail. The glue won't stick to the plastic, making the cup easy to re-use for other projects.

Jerry Pruett
Blackfoot, Idaho

Plastic Banding Drawer Glides

The next time you receive a box or crate that's shipped with smooth plastic bandings around it, save them. They make handy

glides under drawers for your furniture projects. I cut them to length and attach them inside the cabinet or carcass with rubber cement.

Joseph Raber
Louisville, Ohio



PICK OF THE TRICKS



Drill Press Table with a Twist

A pair of Magswitch® MagJig Magnetic Clamps (rockler.com) provide great holding power for the drill press table accessory you see here. I made mine from a piece of 3/4" scrap plywood, and I cut a dado across the middle of it to fit a 2 1/2"-wide, replaceable drilling surface (mine is 1/4"-thick scrap). I screwed a fence to the table, too. By sliding the table one way or the other, you can adjust the fence's distance from the chuck as needed. It's easy to set and lock the table to your drill press's metal table underneath by just twisting the magnets to activate them, and you won't need extra clamps to secure it. Very handy!

Pat Keefe
Manning, South Carolina

Safety First

Learning how to operate power and hand tools is essential for developing safe woodworking practices. For purposes of clarity, necessary guards have been removed from equipment shown in our magazine. We in no way recommend using this equipment without safety guards and urge readers to strictly follow manufacturers' instructions and safety precautions.

TRICKS OF THE TRADE SPONSORED BY ROCKLER

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QUESTIONS & ANSWERS

Kitchen Cabinet Refinishing Process

THIS ISSUE'S EXPERTS

Jim Larin is director of sales at FUJI Spray.

Sandor Nagyszalanczy is a writer/photographer of several woodworking books and a frequent contributor to *Woodworker's Journal*.

Contact us

by writing to "Q&A,"

Woodworker's Journal,

4365 Willow Drive,

Medina, MN 55340,

by faxing us at (763) 478-8396

or by emailing us at:

QandA@woodworkersjournal.com

Please include your home

address, phone number and

email address (if you have one)

with your question.

Q Help! I have decided to take on the project of refurbishing my kitchen cabinets. They are oak and currently are stained with a golden oak color. I want to make the finish darker with a water-based tinted top-coat. I will likely spray an overcoat to complete the finish. I have no idea what finish is on them now and need advice as to how to prepare them. Do I need to spray a pre-sealer on first? What product would you suggest to prepare the surface? I also have a FUJI turbine HVLP system.

Larry Axsom
Landis, North Carolina

A Fear not! You have a couple of routes to choose from, depending on how dark you would like your kitchen cabinets to look.

First, prior to applying any finish, you will want to give your cabinets a thorough cleaning. We would recommend using a Scotch-Brite™ pad with some TSP, a 50/50 mix of denatured alcohol and water, or even products like Krud Kutter® Kitchen Degreaser.

Before applying your chosen finish, it is always best to test your finishing method on a small section of the cabinet to ensure there are no adhesion issues. If you find some, you'll likely need

to strip or sand the cabinets.

Avoid spraying a pre-sealer prior to staining as this may seal the wood pores and prevent the stain from penetrating deep into the grain. Pre-sealers are better for bare wood.

Once the cabinets are cleaned, give a quick light sand with 220-grit sandpaper and then inspect the cabinets for any dents or dings you would like to repair.

Now that the cabinets are prepped for finish, you will want to decide how dark you want to go. If you would like to go significantly darker than the existing golden oak finish, it would be best to apply a heavy-bodied stain like Gen-

eral Finishes Gel Stain. Gel Stain can be applied with your FUJI Spray system or by using traditional staining techniques.

Once the stain has dried, it is highly recommended to apply a protective top coat. Lacquer would be the ideal choice for a fast-drying and durable finish, especially taking into consideration that kitchens are high traffic areas, prone to moisture, harsh cleaners, grease and wet/dry heat. Your lacquer top coat can also be sprayed with the air cap set that came stock with your spray gun (1.3 mm or 1.4 mm). By spraying on your top coat,



A spray system can come in handy for refinishing kitchen cabinets, whether you decide to go with a gel stain or a colored lacquer.



Why, our reader asks, do steam boxes need to be made out of wood? Curious minds demand an answer — and our expert comes through.



Winner!

For simply sending in his question about refinishing kitchen cabinets, Larry Axsom of Landis, North Carolina, wins a Bora Quickcut™.

Each issue we toss new questions into a hat and draw a winner.

you are ensuring an even coverage and a uniform film thickness throughout.

If you want to only slightly alter the shade of your cabinets, adding a universal colorant to your lacquer will give you the control to gradually darken them. An aniline dye, TransTint®, or Mixol® colorant would be suitable for this application. Once again, you should always spray a test piece to ensure proper finish adhesion. When using

colorants in lacquer, you must also be mindful of your tint-to-lacquer ratio to ensure a uniform finish across all your cabinets.

If you run into challenges as you begin your project, contact the manufacturer of the finish you choose or your equipment manufacturer for further assistance specific to your exact scenario.

— Jim Larin

Q I was wondering about building a steam box from polystyrene foam board insulation sheets. The foam would seem to retain heat, be easy to move about and is waterproof. So why do all steam boxes I see seem to be made of 1x6 or 1x8 lumber?

— Darrel Bickel
Grafton, West Virginia

Continues on page 18 ...

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STUMPERS

Fur Your Information

No fur flies as mystery solved

What's This?



Roger Wall of Martinsburg, West Virginia, shared the mystery tool pictured above. Do you know what it is?

Send your answer to stumpers@woodworkersjournal.com or write to "Stumpers," Woodworker's Journal, 4365 Willow Drive, Medina, MN 55340 for a chance to win a prize!



Woodworker's Journal editor Joanna Werch Takes compiles each issue's Stumpers responses — and reads every one.

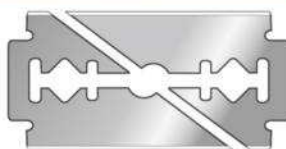
In response to the mystery tool belonging to **Marty Mandelbaum** of Mount Sinai, New York, from our February issue, we received this note from **Ed Wolf** of New York, New York:

"My dad was a Viennese-trained furrier, and I spent many an hour working with him as a kid, but was never allowed to use these tools: 'Too dangerous!' I'll bet Marty Mandelbaum's dad was also a furrier."

Ed, you bet correctly. According to Marty Mandelbaum himself, "My father used to work with furs and used very sharp blades to skive the skins."

For further details, we heard from **Charles Kimble** of Bremen, Indiana, who described himself as a retired furrier who had used these two items "hundreds or thousands of times during my career."

Charles said, "The wood hinged device is a blade splitter. The metal object is a furrier's knife. A double-edge razor blade is inserted diagonally across the small metal channel of the blade splitter (there are two posts to align the blade). The upper portion has a narrow bar that fits in the channel. When the device is closed and tapped (like an



Eventually, it would split hairs, but first, February's mystery tool split razor blades.

office stapler), you have two pointed razor blades. The knife has a top-hinged lock. When the knife is opened, the diagonal blade fits two posts that secure it when the knife holder is closed."

That *almost* concurs with Marty Mandelbaum's description of the pieces as "a blade holder that uses single-edge blades that are cracked at a diagonal and a single-edge blade breaker."

Whether double- or single-edged, these diagonally cut razor blades, Ed Wolf reminds us, were "used by furriers to cut skins in the making of fur coats."



Winner! Ed Wolf of New York, New York, wins a RIDGID Oscillating Edge/Belt Spindle Sander (EB4424). We toss all the Stumpers letters into a hat to select a winner.

QUESTIONS & ANSWERS CONTINUED

AI have seen as well as heard of steam bending boxes being made from all kinds of materials — solid wood (pine, hemlock, fir, etc.), PVC pipe, plywood—as well as from rigid foam insulation board. Most woodworkers seem to base their material choice simply on what they have lying around, or what's inexpensive to buy.

As you point out, a foam box retains heat very well: 2"-thick polystyrene has about 10 times the R-value of 3/4" plywood (R-value is the measurement of a material's capacity to resist heat flow from one side to the other). You're also right that foam is cheaper, lighter and more portable than plywood.

The only things I'd suggest you consider before building your foam steam box are heat and durability. I'm not 100% sure how well polystyrene foam stands up to the



The Rockler Steam Bending Kit generates heat and steam.

212° temperatures generated by the steam. I'd do a quick test by exposing a small foam enclosure to steam for several hours, to make sure it doesn't significantly deform or melt. And, while a foam steam box clearly isn't as durable as a solid wood or plywood box, it probably doesn't matter unless you plan to use it for years of bentwood production work.

— Sandor Nagyszalanczy

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FIVE FAST FACTS

Keeping Sharp

Sharpening is a topic that can evoke controversy and discussion, but here are a few concepts to help you stay sharp.

Sharpening is metalworking, not woodworking, and as such, some woodworkers avoid the task until they just can't. But sharp tools, such as chisels, gouges and plane irons, are a pleasure to use, are more accurate and can even be safer to use.

So here are five tips that will help you sharpen tools with a game plan for better success.



1. The perfect cutting edge would be infinitely thin and infinitely smooth. As that is impossible, all the other cutting edges we form are some sort of compromise of that relationship. Cutting edges that are too thin are easily damaged and lose their smoothness. And, even if you polish a broad edge to a mirror image, the wood fibers will still be crushed rather than sliced.

2. Unless you are well-versed in metal grinding and know something about cutting edge theory, you are best served by keeping the “factory” grind angle on your tools. There are, of course, exceptions to every rule, but it is more likely that you will degrade the performance of your tool by guessing at “improvements” on the grinding angle of your chisel or gouge.

3. There is no single best way to sharpen tools — a lot of systems and machines will deliver great results. The best thing you can do is decide on what works best for you, and then practice. If you think a Tormek is what you need, get one, and take the time to learn how to use it. Waterstones? Same deal. Your success depends more on practice than on finding the “perfect” sharpening system. Just find the one that’s perfect for you.

4. Jigs and guides are your friends. Fixtures that help you keep your tools properly aligned while grinding, whether they are shop-made or purchased, can make a huge difference. For instance, a Oneway Wolverine Grinding Jig for sharpening turning tools is a wonderful investment.

5. Grinding and honing are two different things. Grinding is when you remove a “significant amount” of steel using an abrasive surface of some sort (most commonly, a wheel). Honing is polishing a ground edge smooth. You can often hone an edge back to being super sharp without grinding. But once an edge has nicks or distortions, you’ll need to grind those imperfections completely away.

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SHOP TALK

"Dazzling Woodwork"

Victorian Mansion Turned Museum

By Helen Hannon

Woodworkers have an opportunity to see world-class nineteenth century decor at the newly opened Eustis Estate in Milton, Massachusetts. Owned by the Eustis Family for three generations, it was purchased by Historic New England in 2012. The 1878 mansion has dazzling woodwork: beautifully carved ceiling beams, stairways, elaborate furniture and a variety of wood. There are 14 fireplaces, nine with truly impressive decoration. One of the fireplaces has over 60 carved flowers with individual petals. It is the latest addition to 36 other Historic New England properties. Michaela Neiro, objects conservator, says, "What struck me immediately when I first went to the mansion was the sheer quantity of the wood and that it was in very good condition. I describe it as quality, quantity and diversity." The Eustis Estate is opulent and Peter Gittleman, visitor experience team leader and a wood refinisher himself, says, "This is amazing woodwork and it is pretty hard to oversell it."

Photos courtesy of Historic New England



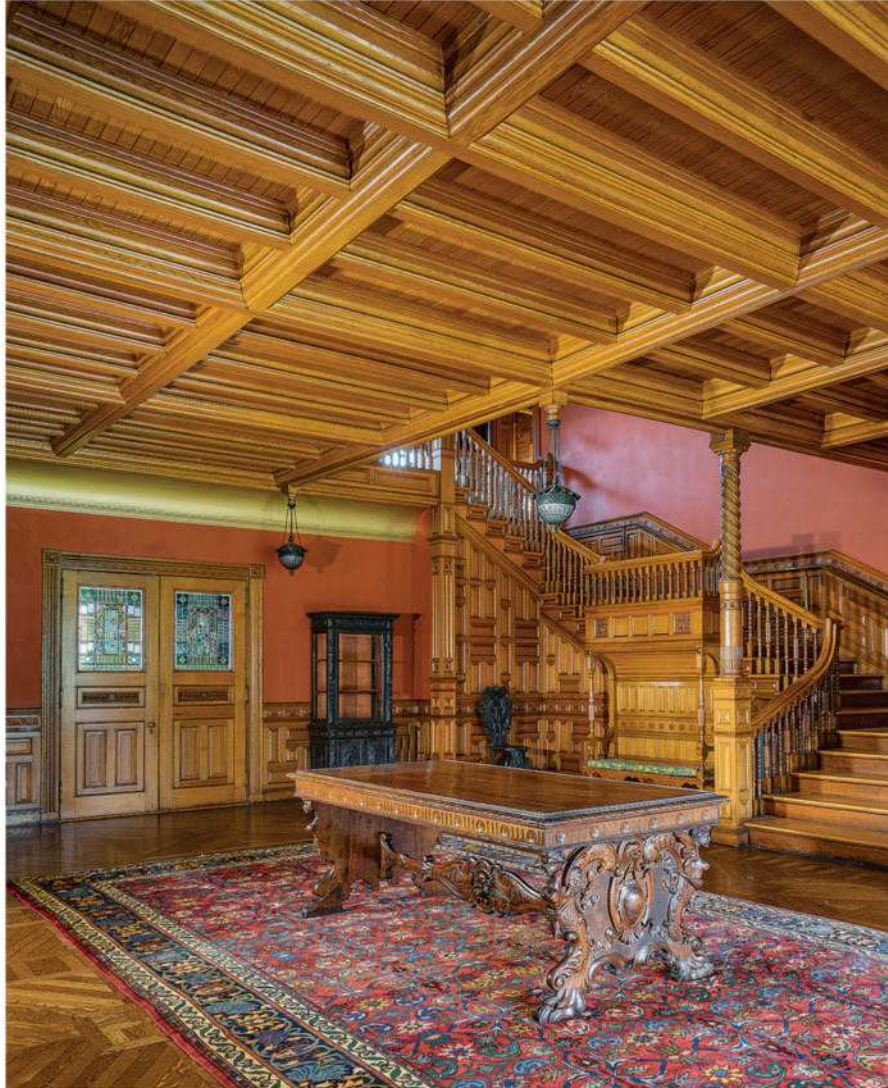


W.E.C. and Edith (Hemenway) Eustis, pictured at left, were the original owners of a Victorian mansion full of dazzling woodwork, as seen in the detail of a parlor fireplace, above.

The story of the Eustis Mansion began on November 7, 1876, when Edith Hemenway married W. E. C. Eustis. Peter says, "The Hemenway and Eustis family properties in Milton bordered each other. Edith's mother, Mary Hemenway, gave the couple approximately 181 acres on the adjoining properties to build their new home." Historic New England describes the Queen Anne style mansion as "a marvel of the Aesthetic Movement." Locally prominent architect William Ralph Emerson designed the home. Peter says, "Unfortunately, not many of William Ralph Emerson's papers survived. There isn't one great repository of his work and that is regrettable because he was pretty prolific. Today, Emerson isn't very well-known and just recently two of his fantastic houses in the area have been demolished. We are hoping the Eustis Estate will shed new light on Emerson's body of work." (Emerson was the fourth cousin of author Ralph Waldo Emerson.) Regarding the decor, Peter says, "We don't know if the emphasis on wood was determined by the young couple, Emerson, interior designers or Edith's mother, Mary Hemenway."

Detective work has tracked down many of the craftsmen who worked on the mansion. Unfortunately, the woodworker remains a mystery. Evidence points to a Boston carver, possibly a German, named Caspar W. Roeth. Peter says, "There aren't any maker's marks visible on the wood, but Roeth was working with Emerson at the time the Eustis mansion was being built." Roeth's obituary in the *Boston Journal* on November 21, 1891, described him as a "well known manufacturer of artistic furniture and a decorator of buildings."

Peter notes, "The family's heavily carved wooden furniture was likely purchased on the couple's Italian honeymoon in 1876. We found the word 'Firenze' underneath one of the pieces, so we feel confident that it came from Florence. Some carved panels in the mansion might have been done by Luigi Frullini. He was working on the Chateau-sur-Mer mansion in Newport, Rhode Island, at the



The then-new concept of a "living hall," one of the first areas seen by guests, was a key component in many of the architect's house plans.



The library served as the home office of W.E.C. Eustis, a metallurgical engineer and 1871 graduate of Harvard University and member of the Harvard Nines baseball team.



The main hall staircase extends for three stories. Paint restoration throughout the house required techniques such as hand grinding pigments.

The master bedroom features an Eastlake style suite of furniture, as well as a fireplace with paneled corner wardrobes and a storage cabinet built into the mantelpiece.



Paint analysis revealed the dining room had an original base coat of dark green oil paint mixed with coarse sand, overlaid with a gold-colored bronze powder. This resulted in light from the gas chandelier glittering off the textured walls.

same time the Eustis Mansion was being built. The fireplaces do not have any identification, but there isn't any evidence they were imported. This is still a new property for us. We have only been in the house for two years, and we hope to learn much more."

Michaela adds, "The mansion has all types of wood, and the carvings have subtle differences throughout the building. Every time I looked at a section of wood, I found something different. In the dining room, there are birds and grapevines. Some paneling has starbursts, swirls; upstairs, there are faces and cartouches. The carving is very playful. The wood is not constrained by one pattern throughout the house. Many houses often have the same types of wood and motif throughout,

but not here. The elaborately carved fireplaces all have different style variations; some of them are subtle." She suspects "the fireplace in the dining room might be by someone not part of the larger woodwork project. It looks like a different hand."

Overall, Michaela said, "The wood is in extremely good condition. The family took very good care of it, and it shows. I can imagine them telling the children to be careful playing in the house."

Liz Peirce, a Mellon Fellow in art conservation who worked on the Eustis restoration, detailed the cleaning process: "We used a mild citrate solution on the woodwork, cleaning with a combination of soft rags, swabs and brushes. We use a 2% citrate solution that has been buffered to approximately pH 8. We use a chemical grade citric acid powder, which is then dissolved in water before adding a base to adjust the pH. In some cases, if the dirt was particularly grimy, a very small amount of benzyl alcohol was added (0.05%) to help cut through grease. When dry, the woodwork was then waxed with either clear paste wax for flat surfaces or a tinted paste wax for highly carved decoration. The clear paste wax dries white, and is difficult to buff out from crevices. Toned waxes are less glaring, should any be left in nooks and crannies. The wax was then buffed with a soft cloth. For heavily handled places, like the



The detail above is from the woodwork on the dining room fireplace. In the larger photo, you can also see its tiles, which may be among the first from the J.G. Low Company to use his patented mold methods, as well as his method of placing wooden dovetails on the back of the tiles during firing to create dovetailed grooves for use in attaching the tiles.



The family ate their meals in this dining room. Speculation is that the carved panels flanking the sideboard may be the work of Italian Neo-Renaissance carver Luigi Frullini.

stairway railing, the clear paste wax was applied twice to build up a protective layer.”

Peter said, “As we were making the final preparations for opening the museum, we gave our office staff a chance to get involved and had volunteer days. People who work at Historic New England love old houses. They welcomed the opportunity to work on the beautiful wood.” Peter also emphasized that “Any restoration work has to be reversible. Anything added may have to be removed at a later date. The restoration in the house doesn’t look ‘perfect.’ We wanted the house to show age and the wood’s patina.”

The Eustis family sold the museum several rooms of original family furniture. However, the sheer size of the mansion led to a revolutionary idea. Peter said, “We wanted to have a furnished look. Period furniture was obtained through dealers and auction houses specifically for use by visitors doing self-guided tours. Information for each room can be found on tethered computer tablets. The only custom-made furniture is a set of Mission-style side tables that accommodate the tablets; the power cords run inside one of the legs.” This is a museum where people can sit on the chairs!

Historic New England, originally known as the Society for the Preservation of New England Antiquities, was founded in 1910 by William Sumner Appleton. Anyone interested in traditional architecture, carpentry and historic furniture would enjoy visiting their 37 properties. The oldest is the 1664 Jackson House in Portsmouth, New Hampshire, and the newest, the 1938 Gropius House in Lincoln, Massachusetts. The Eustis Estate is particularly worth a visit by anyone who loves Victorian woodworking.

For more information, visit the websites www.eustis.estate or www.historicnewengland.org or call the Eustis Estate at 617-994-6600 or Historic New England at 617-227-3956.



Mission-style tables, as seen above, are the only non-period furniture in the house: power cords for tablets accessible to visitors run inside the tables’ legs.

WOODTURNING

Options for Drying Green Bowl Blanks

By Ernie Conover

Our woodturning expert presents three methods that can speed up or improve the drying of green wood blanks.



Turning bowls from green wood is a centuries-old practice. Such a bowl will warp oval as it dries. This does not detract from its usefulness, but today's man or woman on the street sees an oval bowl as quaint. Modern turners solve this problem by rough turning a bowl to a wall thickness that is about 10% of the diameter — a 10" bowl would have a 1" wall thickness. After letting the blank dry for about three months, they re-turn it round and to a pleasing wall thickness.

Why not just let the blank dry and turn a bowl from it once dry? This has to do with wood's dynamic limit: how much it will bend before failure (checking) occurs. Every material has an amount it can bend before breaking. With most materials, a thinner section can bend farther before reaching the dynamic limit — and a wall thickness 10% of the diameter is generally below that limit.

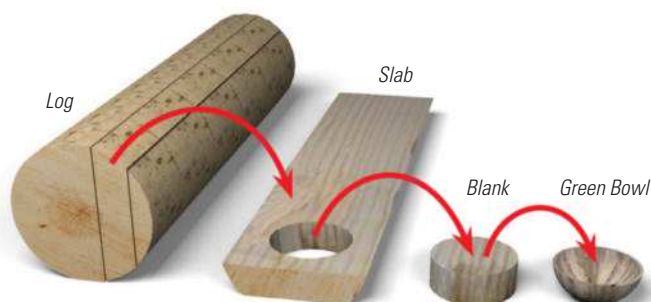
Important to this discussion is that wood only shrinks about 0.1% along the grain. However, it shrinks

4.39% from the center of the log to the outside (the radial shrinkage). The same log also shrinks 7.95% in circumference (the tangential shrinkage). The specific numbers are an average of all species worldwide, but the point is that the average log loses circumference at about twice the rate it loses diameter. This means that circular stress is going to build around each annular ring. Takeaway: to reduce checking, it's important not to have a complete annular ring in any blank you gather.

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MORE ON THE WEB



For a video on the topic of drying blanks via the desiccant method, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.



By sawing outside the log center, you can obtain a plank without a complete annular ring. Round bowl blanks may be band sawed from this plank and then mounted in the lathe and made into bowls.

Also, as your roughed-out bowl is sitting on a shelf drying for three months, the end grain will lose water faster than the face grain areas. This causes faster shrinkage in the end grain, making checking likely.

Wrapping a freshly turned green bowl in sheets of newspaper or putting it in a paper grocery bag can create a sufficient vapor barrier to allow face grain to dry at about the same rate as the end grain. Some turners also paint the freshly turned blank with wax-based wood sealers used by the forestry industry. (Anchorseal® and Sealtite are two popular brands.) This will cause uniform drying, but it adds a month or two to the drying time.

Speaking of time, many turners want to reduce that three-month drying period. With that in mind, I'll take a look at methods that either speed up drying or improve the end results.

(Take note, though: while practicing the science related to wood drying will greatly increase the probability of good results, in real world practice, you will sometimes get a failure even from the clearest of woods coated with wax. At other times, a funky piece of wood thrown in the corner with no paper or wax will dry just fine. That's just the way things go ...)

Method 1 — Detergent:

In this process, you soak rough-turned bowls in a simple solution of one-sixth concentrated dishwashing liquid, such as Dawn® or Joy® (NOT automatic dishwasher detergent). Chemically, detergents are surfactants, substances that reduce the surface tension of a liquid.

You can get wonderful results from soaking your bowl overnight, but three days is the optimum time. After soaking, you have two options. The first option is to finish turn the bowl to a thinner wall immediately. The surfactant makes the final turning go much easier, with much less tearout in the end grain by the tools. There is also an improvement in sanding, with less clogging of the sandpaper. The detergent seems to further reduce checking in clear wood.

The second option is to allow the rough-turned blank to air dry before re-turning. Drying time is reduced and checking becomes non-existent — even without wrapping in paper or waxing. It seems the surfactant is accelerating the water transfer across the cell membranes.

Despite Internet claims of a reduction in warping during drying, there is no change in the ultimate warping of the wood. There is, however, some debate on the



process changing the color of the wood. I have personally found no change in color or how the wood accepts a final oil finish, but I have received reports of various lacquer finishes reacting badly to the detergent.

Method 2 — Microwaving:

This method involves placing your rough-turned bowl in a plastic bag and microwaving it on a defrost cycle until you start to see steam. The blank is removed from the bag and allowed to cool to room temperature. The process is repeated again and again, until you no longer see steam and there is the predictable warping, or until the weight of your wood has dropped by one-third.

Soaking a freshly roughed blank or a turned bowl in a dish soap solution overnight (three days is even better) greatly improves drying. Once your piece is dry, re-turning goes better: the tools cut cleaner and sanding is improved — the paper doesn't clog.

Place the bowl in a sealed plastic bag and microwave on a defrost setting until you see steam in the bag. Remove from bag and allow to completely cool. Do this again and again until you see no steam or the weight has dropped one-third.





Desiccant pellets have a chemical indicator that makes them change color as they absorb water and lose effectiveness. Pellets in the large bag are new and dry while the reddish ones in the small bag are expended and need to be dried.

Even with the most careful finding of the right power setting on your microwave, allowing complete cooling out of the bag and reversing the bag to dry the moisture out of it, you may get some checking.

I've used this process when I absolutely had to get a bowl out the door but have rued the procrastination that caused me to have to resort to it. (Plus, it takes an entire evening, so pick one when you don't care about watching the big game.) Overall, I consider it an emergency triage method only!

Method 3 — Desiccant:

This method involves placing your rough- or finish-turned bowl into a plastic bag filled with desiccant pellets.

Desiccant pellets are used widely in industry to dry items quickly and to keep them dry during shipment. The pellets come in a plastic bag sealed in a screw-top pail with a rubber



Desiccant comes in a plastic bag inside a screw lid plastic pail to keep it fresh until you use it.

gasket which keeps them dry until you want to use them. The pellets have a chemical indicator that makes them turn reddish as they absorb water and become expended.

They can, however, be used over and over: once they have turned red, they may be heated in an oven, which brings them back to new condition. A convection oven works best, with the pellets spread in a thin layer on cookie sheets. They are in new condition in two to two-and-a-half hours. Dry them at 250° Fahrenheit; if you heat them above 260°, the chemical indicator will not tell you when they need drying again. (They will still work, but knowing when they are expended will be problematic.)

Once you have rough-turned a bowl — or, if you've got a bowl that you intend to be oval, you've turned it to its final thickness — bury the bowl in the desiccant pellets. (Note that the desiccant method is limited to bowls with 1" wall thicknesses.) The bowl must be completely buried, with its inside full and at least one inch of pellets in all directions. Incomplete burial will result in checking.

How long exactly a given bowl will take to dry is dependent on a number of factors: how wet the blank is, how thick the wall and the species of wood all factor into the equation. A beech bowl will take longer than a cherry bowl, and a rough-turned blank will take longer than a finished turned one.

How do you know when your bowl is dry enough? The best way is to first place



The best way to check dryness is to weigh the freshly turned bowl on a kitchen scale. When it has lost about one-third of its weight, you can apply finish or re-turn a roughed blank.

your freshly turned bowl on a kitchen scale and weigh it. After 24 hours, weigh it again. When it has lost at least one-third of its weight, you can apply finish to a once-turned bowl or re-turn a roughed-out bowl.

Overall, for thin final walls, leaving the bowl in for about 24 hours will usually do the job. On a rough-turned blank, drying will usually take about 48 hours.

You can also immerse a finish-turned bowl in the desiccant for a couple of hours, then remount it in the lathe for finish sanding. This saves time and sandpaper, because the surface is sufficiently dry to sand well without clogging the sandpaper. Then place the bowl back in the desiccant for final drying before you apply finish.

The desiccant process effortlessly speeds things up immensely. You can order a kit of the desiccant (item 58654) from rockler.com.

Ernie Conover is the author of The Lathe Book, Turn a Bowl with Ernie Conover and The Frugal Woodturner.



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Delaware Chair

By Kerry Pierce

The inspiration for this chair came from an original built in Delaware in the 1700s. The design, a transition between elaborate carvings and simpler styles, was built, unchanged, for nearly a century.

Post-and-rung chairmaking, the discipline practiced in the construction of this chair, is a bit of a woodworking outlier. It involves some uncommon skills like bending wood, dealing with complicated (non-90°) geometry and weaving a seat. And, it doesn't proceed from measured drawing directly to the fabrication of wood components. Instead, there are some critically important intermediate steps involving the construction of simple jigs, some bending forms and a variety of patterns and story sticks.

These devices make it possible to fabricate accurate components in relative ease — once you've got them in hand, you'll be able to make as many copies of this chair as you like, without ever once taking out your rule or tape measure, or referring to the measured drawings. Plus, you can use the mortise jigs and bending forms for this chair in the construction of almost any post-and-rung chair.

The Role of Story Sticks

Before you can begin any chairmaking operation, you need to understand the role of the four kinds of story sticks in the process. The first is the simple pattern that presents the profiles of slats and arms. The second is a stick cut to the length of the rungs with the tenons marked on each end, as well as

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any ornamentation — such as is found on the front “show” rung or stretcher. The third is a length-measuring stick for elaborately turned items. The last is the post stick, which not only provides the overall length of the part but also the lengths and diameters of the turned elaborations along that length. On one side of the post stick, you’ll find the mortise locations for the front-rung mortises; on the back of that stick, you’ll find the locations of the side-rung mortises.

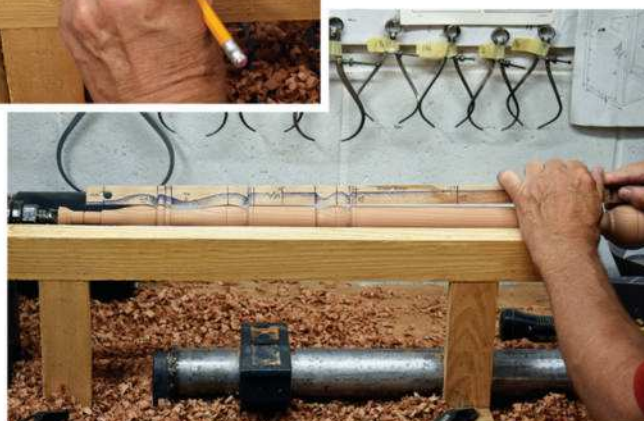
This particular chair requires a front-post stick (shown in the photo at right), a back-post stick and sticks for the front, back and side rungs. These should all be cut to the full length of the finished parts they represent. On this chair, the back seat rung is shorter than the back “show” rung, so on the back-rung story stick, you need to mark off two different lengths. (This difference is a result of the fact that the chair’s back ladder tapers as it rises from the floor.) In addition, this chair requires two length-measuring sticks, one for the front show rung and another for the front post. In the top photo, you’ll see a length-measuring stick in use.

A length-measuring story stick allows the author to accurately measure the length of parts, including large turned elements that make measurement with a conventional rule impossible.



By referring to a story stick, you can quickly mark off turned elements, making it easier to make multiples of those parts.

Story sticks like this truly tell the story of a chair: they provide all the information you need to machine the turned parts.



Marking for the Mortises

The key to successful chair construction is the accurate marking, boring and chopping of the many mortises on each of the chair’s four posts. That marking process begins by drawing two lines along the lengths of each post exactly parallel to the post’s axis of rotation. One line represents the rung-mortise locations on one face of the chair. The second line represents the mortise locations on the adjacent face of the chair.

To make these lines, you need two things: First, you need a way of dividing the outside diameter of the post into equal segments and then locking the lathe’s rotation at any of these divisions. You can achieve this by using your lathe’s indexing head.



The author uses a shop-made, extra-long tool-rest for making these chair parts.



One of the author's simple jigs slides a pencil along the length of a post at the same height as the post's axis of rotation.

The other thing you need is a simple little jig that will hold a pencil so that its point is exactly the same distance from the bed of your lathe as the lathe's axis of rotation. Once you've selected which face of the post will be facing forward, lock the indexing head, and — with the jig — draw a line along the length of the post. The mortises on one side of the post (in this instance, the front-rung mortises) will be bored along this line. Then, move the indexing head eight stops, relock the head and draw a second line along the length of the post. The mortises on the second side of the post (in this instance, the side-rung mortises) will be bored along this line. You've now drawn two lines 80° apart, each perfectly parallel to the lathe's axis of rotation.

An important note here: you need to mark both a right and a left front post *and* a right and a left back post. On one front post, rotate eight clockwise stops from your first line to mark the second; on the other front post, your eight clicks rotate counterclockwise. The same applies to your back post lines.

After the lines have been located on the outside diameters of your posts, it's time to once again pick up your story stick. After you've marked the locations of the rung and slat mortises on the back posts, while the post is still mounted in your lathe with the indexing head's pin engaged to stop the part's

rotation, use a marking knife to lay out the limits of the slat mortises. Unlike the rung mortises, which are centered on one of the lines you just made, the slat mortises are laid out with that line marking their fronts. The back side of each slat mortise is 5/16" (the thickness of the slats) behind the line. The little marking jig shown in the top right photo — which consists of a bit of wood screwed to a 6" metal rule — comes in very handy for scoring the limits of slat mortises on round posts because it has two points of contact.



This little jig makes it easier to hold a straight-edge in a consistent alignment when scoring the limits of the slat mortises with a marking knife.

Front- and Back-Rung Mortise Jig

The various front/back and side-rung mortise jigs I've designed over the last 30 years have all been positioned on a 13" x 28" wood deck I've fixed to the small metal table that came with my drill press. Those dimensions shouldn't be taken as exact. They probably represent the length and width of a glued-up panel I pulled from a bunch of oddments leaning on my shop wall. But you will need a wooden deck of approximately that size on which to secure your mortise jigs.

Now to the front- and back-rung mortise jig: The purpose of this simple construction is to prevent the posts from rotating as they're passed under the lead point of your Forstner bit. If the post is not in exactly the same rotational



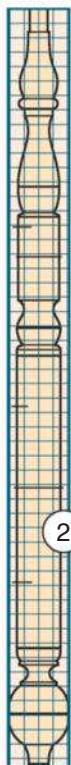
Before locking the post's rotation, sight the post to see that the bit's lead point will enter the mortise halfway across the post's diameter. Then, move jig and post side to side for proper alignment.

Right Back Post (Front View)

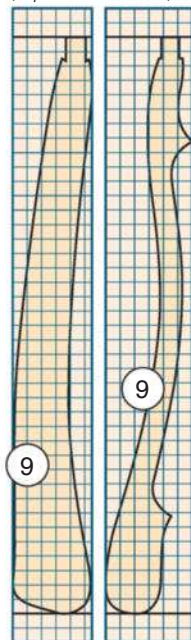


All gridded drawings
Each square = 1/2". More
details available online.

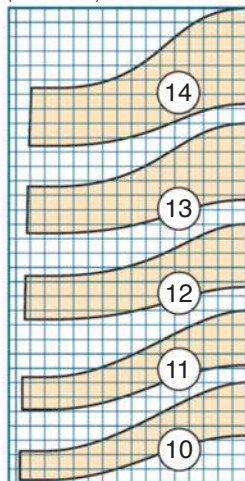
Front Right Post (Front View)



Arm Templates (Top and Side Views)



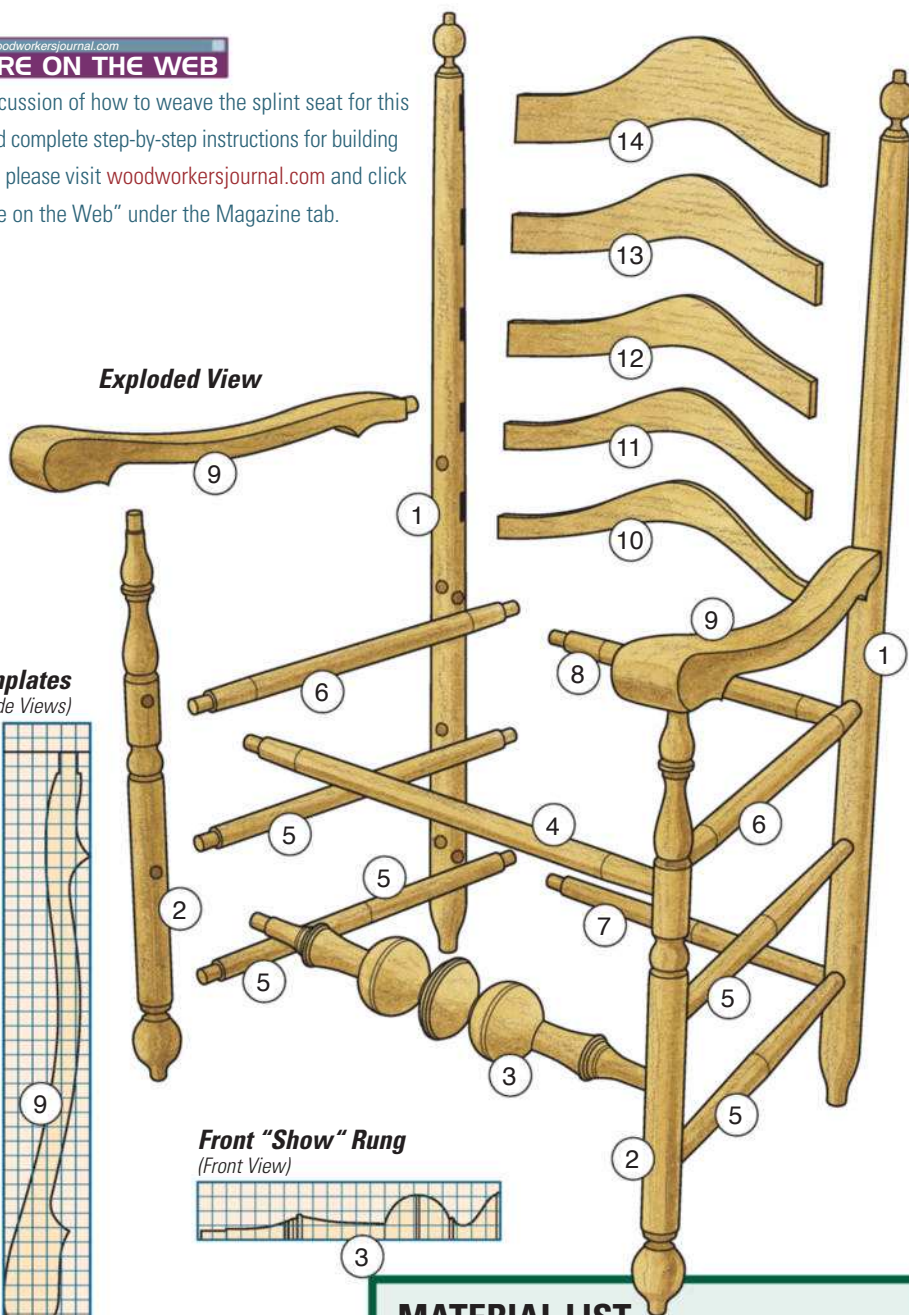
Slat Profiles (Front View)



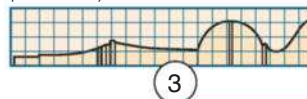
MORE ON THE WEB

For a discussion of how to weave the splint seat for this chair, and complete step-by-step instructions for building the chair, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

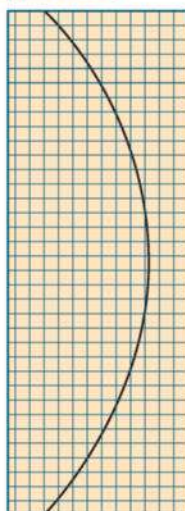
Exploded View



Front "Show" Rung (Front View)



Slat Bending Jig (Top View)

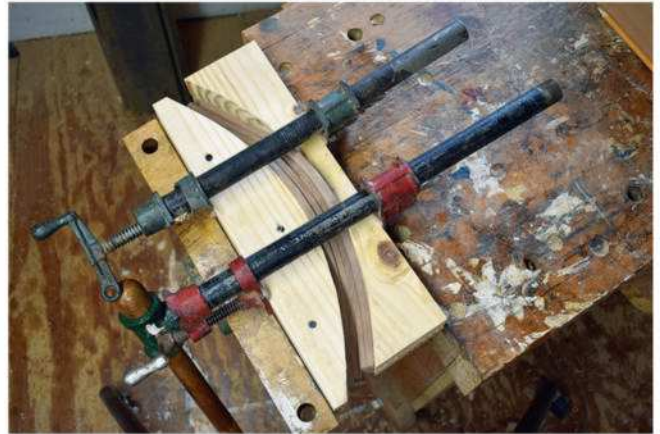


MATERIAL LIST

	T x W x L
1 Back Posts (2)	1 3/4" x 1 3/4" x 44 5/8"
2 Front Posts (2)	2 1/8" x 2 1/8" x 26 5/16"
3 Front "Show" Rung (1)	3 1/8" x 3 1/8" x 20 3/4"
4 Front Seat Rung (1)	1" x 1" x 20 3/4"
5 Side "Show" Rungs (4)	1" x 1" x 17 3/4"
6 Side Seat Rungs (2)	1" x 1" x 17 3/4"
7 Back "Show" Rung (1)	1" x 1" x 16 1/4"
8 Back Seat Rung (1)	1" x 1" x 15 5/8"
9 Arm Blanks (2)	2 3/4" x 3" x 22"
10 Slat #1 (1)	5/16" x 3 1/2" x 15 5/8"
11 Slat #2 (1)	5/16" x 3 5/8" x 15 3/4"
12 Slat #3 (1)	5/16" x 3 5/8" x 15 5/8"
13 Slat #4 (1)	5/16" x 4 3/16" x 15 1/4"
14 Slat #5 (1)	5/16" x 5 1/2" x 14 5/8"



In the pair of slats held here, the rear slat has been radiussed. The front slat has not, but it does have radius guidelines sketched in. The radii on these slats disappear at the ends, where they will later enter the posts.



This setup clamps and bends slats #1 through #4. Allow the clamps to dry for several days. Bend slat #5 separately: it is taller and would carry the impression of the shorter slats in its face.

position for drilling each mortise, you'll find that your rungs are jutting out in different, hard-to-reconcile angles. Before you lock that rotation, you need to determine that the lead point of your Forstner bit can enter the post at the center of its width. While this can be established via measurement on posts with consistent diameters, the tapered posts on this chair require a different approach. To make your determination, you need to eyeball the Forstner bit's lead point from the end of the post to see that it will enter the post halfway across its diameter. Perfection isn't required: If you're as much as 1/16" off in your estimation, the chair will come together just fine.

When the rotation of the post places the bit's lead point in the correct position, lock the rotation by turning two screws into the bit of scrap at the top of the front post (and into the foot of the back post). See bottom photo, page 32.

A cautionary note: it's very easy to start drilling the side-rung mortises when working with this jig, and you must NOT do that.

With this jig, on the front posts, you will drill the front-rung mortises and, on the back posts, you will drill the back-rung mortises. If the post had a consistent diameter from one end to the other, you could set the depth of cut once, then drill each mortise, but here, too, the tapered front and back posts complicate the situation. My approach is to measure the depth of each mortise as I go, checking until each has reached the ideal depth of 15/16".

Slats and Slat Mortises

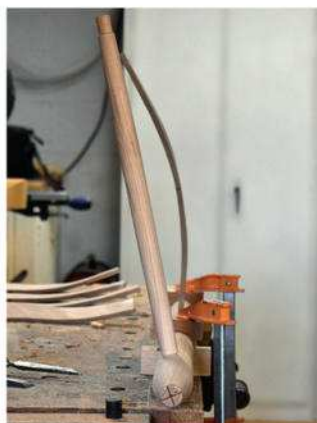
There is a good bit of preparation that must take place before chopping the slat mortises. In the case of this chair, I cut the slats

from leaves consecutively sawn from a single block of cherry. Sometimes that isn't possible, however, and you have to match up material taken from several different sources. After sawing out and planing your slats to a thickness of 5/16", cut out their profiles on the band saw. Then clean up the bandsawn edges with a spokeshave and a sharp rasp. The bottom of each slat is left perpendicular to the front and back faces, but it's important to have curves that arch smoothly along that bottom. The front of the slats' top midsection should be radiussed, as seen on the rear slat I'm holding in the pair in the top left photo.

Once the slats' top and bottom edges have been refined, it's time to plasticize the wood prior to bending. Usually, I do this in a steamer, but the box on my steamer is a 4" length of PVC, which is too narrow for the width of the top slat, so I resorted to Plan B: placing the slats in a large turkey pan on our range and boiling them for 30 minutes. The actual bending is done between forms held in a vise and several pipe clamps.

Keep the slats in their bending forms for at least five days.

When you take them out, you may see that the profile of one



At left, the author chops out the slat mortises with a mortise chisel. In the photo above, notice that the slat mortise angle allows the two ends of the bent slat to mate with the two back posts (one present, one not). The relationship between the slat mortise angle and rung mortise angle is critical if the back ladder is to come together properly.



It's essential to have all your materials prepped before beginning the back ladder glue-up. In fact, if you're a chairmaking first-timer, you might want to enlist an extra set of hands.



Clamp one back post to your bench, mortises up. Insert all rungs and slats, followed by tapping the other post into place. Then squeeze together the pipe clamp and slat so that tenons pop into their mortises.

of the smaller slats is imprinted on the adjacent, larger slat. You can remove most of this imprint by dribbling on a little water and letting the slat dry. Any imprint that remains can be removed with sanding.

The inset photo on the bottom of page 34 is perhaps the most important photo in this article because it shows the essential relationship between the angles of the back post's rung mortises and its slat mortises. In order to chop properly angled slat mortises, you must understand what you're seeing in this image. The rung mortise on this back post was

drilled directly on the line drawn with the post marking jig. The mortise for the slat you see arcing out of the post was cut with that line marking the front side of the mortise. Notice also that the slat mortise was cut so that the ends of the arcing slat both engage the position of the two back posts: one present, one not. This relationship between the angle and position of the rung mortise and the slat mortise is critically important. If the slat mortises are chopped at incorrect angles, the back ladder won't come together.

Assembly and Angles

When the slat mortises have been chopped, it's time to assemble and glue up the back ladder. Afterward, you'll need to determine if the angles at which the back posts rise from the floor are the same. I place a framing square

beside each post and evaluate the post angles by measuring, with my eyes, how well one side agrees with the other. Rack the ladder into correct alignment by keeping the base of one post on the floor, then pressing down on the other.

The front post is then assembled in the same manner, once again evaluating the angles at which the posts rise from the floor.

A Beneficial Mistake

After the glue has cured in both the front and back ladders, it's time to drill the side-rung mortises. The jig I use for this is nothing more than a wedge assembled from five pieces of wood (photos below). When it is turned with the high side closest to the post of the drill press table, you can accurately cut the side-rung mortises for the back ladder. When the jig is reversed, you can



With the jig in this position (high side closest to the drill-press post), drill side-rung mortises into the back posts. The two short lengths of 2 x 4s screwed to the jig raise the posts so the back slats clear the jig's deck.



Reversing the jig's position allows you to drill the side-rung mortises in the front ladder. The 2 x 4s are necessary here so that the turned ornamentation in the front stretcher clears the jig's deck.



Years ago, when working with an early side-rung mortise jig, the author discovered that the angle of the jig's deck was incorrect. He then discovered that chair frames assembled with this error stayed together even without glue, and he has incorporated that error into his process ever since.



Once the side-rung mortises have been drilled, assembling the chair frame is simple. Chairmaking is a bit complicated, but with a good plan and careful marking, it is eminently achievable.

accurately cut the side-rung mortises in the front ladder. As you did with the front- and back-rung mortises, you must measure the depth of these mortises as you go because the posts on both ladders are tapered.

In the top photo, you can see the secret to my chairmaking method: a mistake. Years ago, when working with one of my first side-rung mortise jigs, I discovered I'd miscalculated the angle of the wedge at the heart of that jig. The result is that the side rungs didn't quite

fit simultaneously into both the front and back ladders. I had to force them into those mortises with a little effort. Forcing them in place results in a chair frame slightly under stress, and that stress that will keep the frame together even without glue. Maybe I wasn't smart enough to avoid making the error in the first place, but at least I was smart enough to recognize its value.

As you did with the front and back ladders, apply glue to all mortises and all tenons, then fit the rungs into place

and squeeze them home with a pair of pipe clamps. The clamps should be removed once the tenons have been fully seated. If you see that one of the legs isn't sitting flat on a level surface, rack the frame until all four legs touch the surface. Remember: This must be done when the glue is fresh. If the glue has cured, the adjustment isn't possible.

Making Arms

There are two arm patterns: one for the arm as seen from above, the other as seen from the side. When tracing these two patterns on each of the arm blanks, it's important that the patterns are aligned so that the front and back of the patterns are in agreement. Hence the squared lines you'll see on this blank at the front and back of each arm (shown in the full step-by-step instructions and *Drawings* found online). It's also essential that the two arms are laid out so that you have a right and a left arm.

I begin by sawing out the arm as seen from above. It's important to remove the waste in the fewest possible pieces because you're going to need to reattach those pieces in order to make the next cuts. Once the arm has been sawn out in that orientation, reattach the waste using masking tape. Then redraw the lines on the uncut face where the masking tape has concealed them.

Return to the band saw with the arm rotated 90° and saw in the adjacent plane. It may be necessary to retape some of the scrap to keep the whole bundle stable. When the masking tape has been removed, a rough-cut arm will appear in the middle of the scrap.

To finalize the arm shaping, you must first fix the roughsawn blank in such a way as to allow it to be worked with various hand tools. I use a method involving a pair of wood blocks called "puppets" (or "poppets" in England). These are two blocks drilled at their bases to



Cut out the arm pattern on one side of the blank, taking care to save the offcuts — you will need to reattach them to complete the arm.



When shaping the arm blank, the author secures it between a pair of puppets mounted on a pipe clamp, which is mounted in a vise.



With the offcuts reattached to the blank using masking tape, rotate the arm 90° and saw the blank in the adjacent plane.



The tool in the author's left hand is a planemaker's float, for the clean, quick removal of wood. In his other hand is a sharp four-in-one rasp.

receive a length of 3/4" pipe between the heads of a pipe clamp. Near the top of one block, dish out an area to receive the nose of the arm; on the other end, drill a shallow 3/4" hole that will receive the 5/8" tenon on the other end of the arm, after first roughing in the tenon with hand tools (such as a pocketknife and a rasp). The pipe clamp and puppets are then secured in a vise with the arm blank held between the puppets. This can be a tricky assemblage to get situated your first time, so you might want to call on an extra pair of hands for help.

I use two different tools to do the shaping work: a four-in-one rasp and a planemaker's float. To shape the nose of the arm, set the puppets aside, and clamp the arm — nose up — in your vise.

The tenon end of the arm can be a little trickier to shape. I try to fit the shoulders of the arm to the contour of the post to which it will be fastened. To do this, I define the shoulders with a

carving gouge of the correct radius, finishing up the tenon with a pocketknife and a small rasp. Because the arm rises from the back of the chair to the front, it's necessary to fudge a little on the tenon. I remove a bit of material at the top rear of the tenon as well as a little bit at the front bottom of the tenon.

To install the arm, hold its inside edge up on the outside of the chair's post. Then roll it up onto the tenon atop the front post while simultaneously feeding the tenon at the rear of the arm into its mortises in the back post. You might want to practice with an unglued arm.

Final Thoughts

All of this information on post-and-rung chairmaking can seem very intimidating. However, it's also a very forgiving discipline. In my teaching, I've discovered that it's possible for an individual with very little shop experience to transform a pile of wood into a serviceable chair within the limits of a 40-hour class.

So if this chair appeals to you, don't be afraid to wade in.

If you go online to the website woodworkersjournal.com and look under the "More on the Web" tab, you'll find my discussion of weaving a splint seat for this chair. That's also where subscribers will find *Drawings* of the jigs and more detail on my process for turning the chair's components, as well as using the indexing head on my lathe.

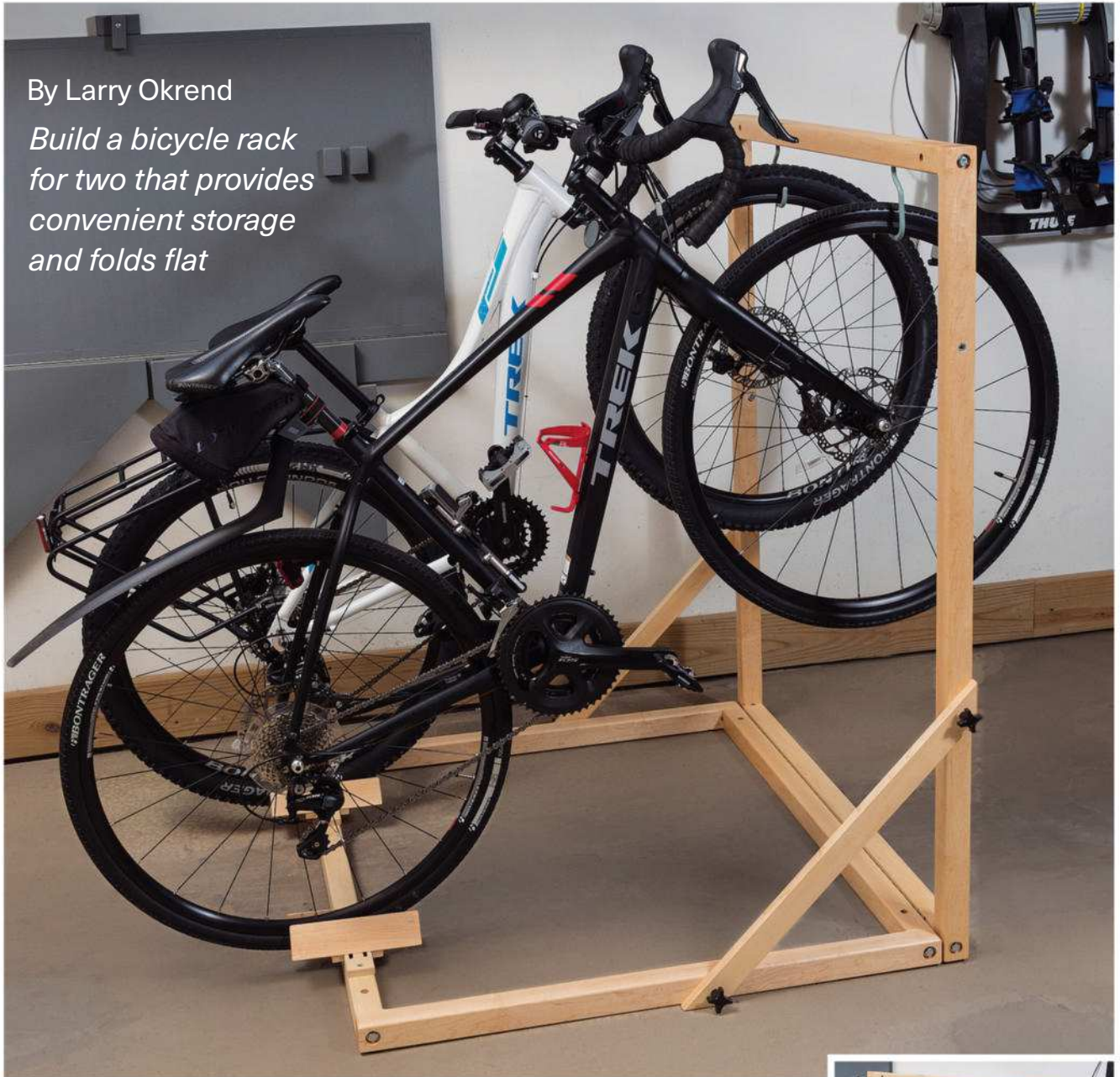
If you do choose to dive into this chair, you'll be rewarded by one of the most satisfying of shop experiences. When you've finished, you can park yourself in a chair that you made with your two hands and contemplate the world around you with a renewed sense of accomplishment.

Kerry Pierce is an Ohio woodworker with a particular focus on the Shaker style. He is the author of several woodworking books, including The Art of Chair-Making.

Folding Bike Rack

By Larry Okrend

Build a bicycle rack for two that provides convenient storage and folds flat



For whatever reason, bicycles often get no respect when it comes to how they're stored. It seems they often wind up rusting in a damp corner of a basement or hanging unceremoniously from a garage rafter. As an avid cyclist, I want to do my part to rectify this wanton disrespect with this sturdy, easy-to-build rack, which also encourages cycling because it provides easy access to your bikes.

This rack folds and is freestanding, so it doesn't require that you drill holes in your walls or lower your bike from an elevated spot like wall-mounted racks do. It's also relatively lightweight (approximately 25 to 30 pounds) and can be built with readily available materials and hardware. And, with a

few bungees to secure the rack and its load, it can be used to transport bikes in the back of a pickup truck. Although it may not be ideal for everyone's bike storage needs, it's very convenient if you have the floor space. Almost any type and size of adult bike with tires up to about 3" wide will fit the rack.





Rout the stopped grooves in the stiles on a router table fitted with a 1/2" straight bit. A stop clamped to the fence prevents cutting too far, and a featherboard keeps the workpiece traveling against the fence.

Tools and Materials

You won't need many tools: mostly just a band saw or table saw (or both), a router table, a handheld drill and a basic set of hand tools. If you want to mill your own wood, you'll also need a jointer and a planer. (It's always better to mill the stock yourself to ensure straight, square workpieces, but it's not essential.) I made the rack out of 8/4 hard maple, but birch, ash and oak are also good choices. However, construction lumber and poplar probably won't be strong enough for this project. If you're unable to get 8/4 lumber, you can glue thinner boards together to achieve the necessary thickness. You'll need about 10 bf of rough stock. Most lumberyards that sell hardwood can mill the stock to thickness, but you'll need to cut it to size.

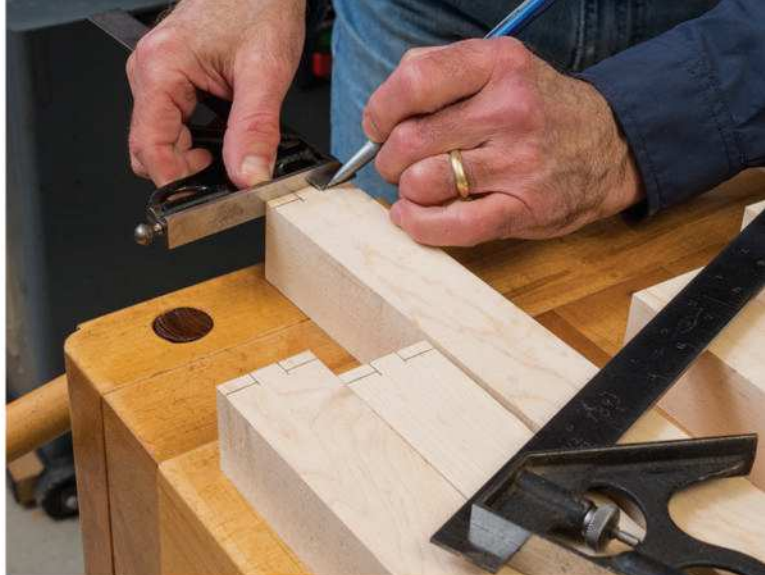
Make the Wood Joints

The joinery consists of stub tenons on the rail ends and stopped grooves in the stiles. They prevent the square-section workpieces from twisting, but alone they don't provide enough joint strength. That's achieved with the hardware: bolts and cross dowels. The joints are easy to make using a table saw or band saw and a router table (see photos), but practice on some scrap stock first. You'll want to have a few extra pieces of 1 3/4" x 1 3/4" stock on hand for these test pieces to check the joinery before committing to the actual workpieces. (If you'd like a simpler joinery method than the tenons and grooves, you could use a few small dowels at each joint to pin the mating parts.)

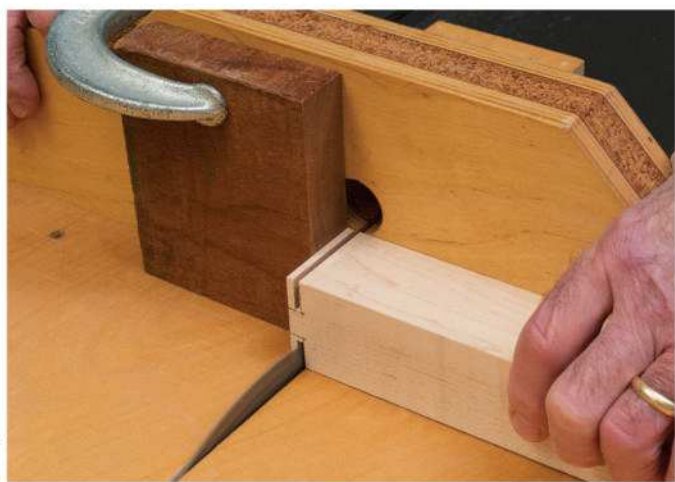
Once you mill and cut the parts to size, lay out the joinery. To keep mistakes to a minimum, it's always advisable to label all the parts with numbers or letters and indicate where and how they

The most accurate way to cut the stub tenon shoulders is with a table saw crosscut sled (top photo). Clamp a stop block to the sled's fence to ensure consistent cuts. Make the depth of cut just a tiny bit less than the finished dimension.

Cut the stub tenon cheeks with a band saw (bottom photo) and make them slightly wide for a snug fit. It's easy to pare the cheeks with a sharp chisel if they're too wide.



Set up two combination squares to mark the stub tenons on the rails' ends. It's a good idea to lay out all the joints to avoid mistakes.





Bore pilot holes for the connecting bolts with a 1/4" or smaller brad-point bit. Before enlarging the holes, drill the 7/8" x 1/4"-deep counterbores for the bolt heads with a Forstner bit.

Install the Joint Hardware

You can bore all the holes for the connecting bolts and cross dowels with a handheld drill, but you'll achieve a better fit if you use a drill press to first bore pilot holes in the stiles. Use a small bit — 1/4" or less — for the pilots, and then use the holes as a guide to drill counterbores for the bolt heads with a 7/8"-dia. Forstner bit. Use pipe or bar clamps to hold the frame together when enlarging the holes to 5/16" dia. If the bit isn't sufficiently long, you may need to take the joints apart to drill holes that are deep enough in the rails. Finding the correct position for the cross dowels can be tricky, so use the joint test pieces to confirm your measurements. For the strongest joint, the cross dowel should be located as close to the end of the bolt threads as possible and centered in the stock (see *Drawing*). Install the bolts and cross dowels as soon as you've completed boring all the holes. There's no need to glue the parts together. The bolts provide plenty of strength without glue and allow you to knock down the stand to its individual parts if necessary.



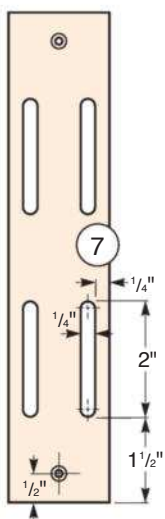
Use a 1/2" brad-point bit to bore the holes for the cross dowels. Limit the depth of the hole by wrapping masking tape around the bit, and be sure to keep your drill as perpendicular to the stock as possible.

The piano hinge that enables the frame to fold up is a snap to install. Simply lay the bottom (horizontal) frame, with its bottom side up, on top of the top (vertical) frame, with its front side up. Place the bottom frame so its inside rail and the top frame's bottom rail are offset to form a 90° corner (see photo, next page). Then center the hinge and drive a few screws to hold it in place. Now you can bore the screw holes and drive the remaining screws. You'll need to remove the hinge from the frames along the way, but it will be easy to reinstall it, now that all the holes are set.

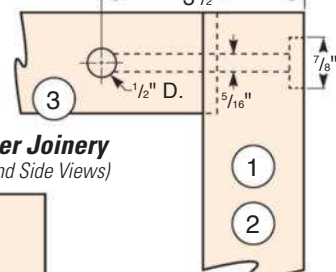


Test fit the bolt and cross dowel and be careful not to overtighten. Wait until all the bolts are installed before fully tightening them and checking the frame for square.

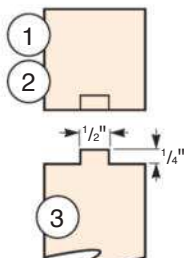
Brace Platform (Top View)



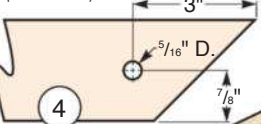
Bolt Location (Side View)



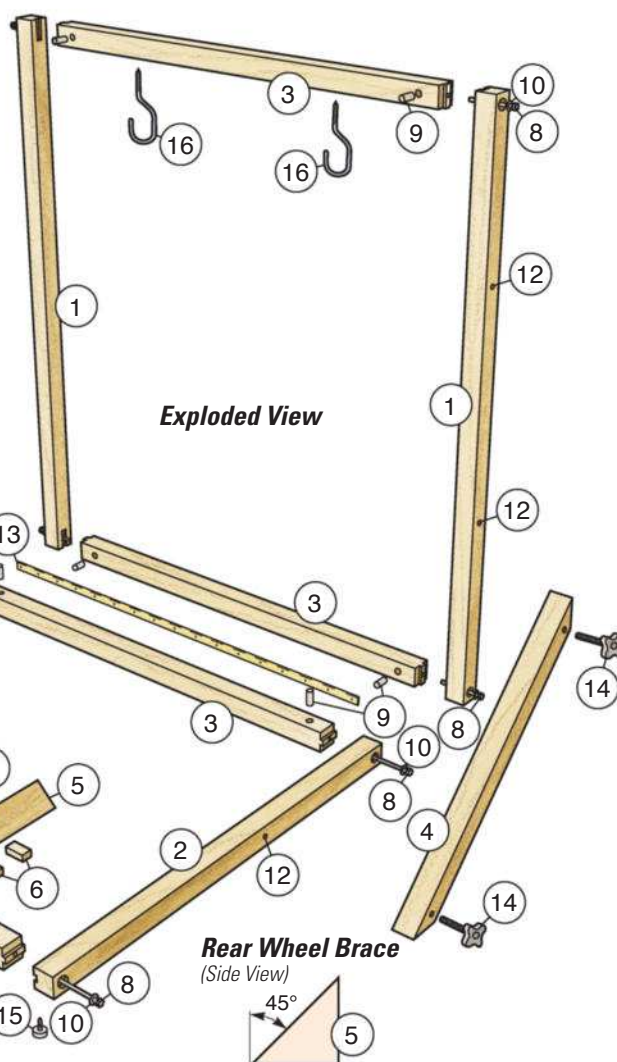
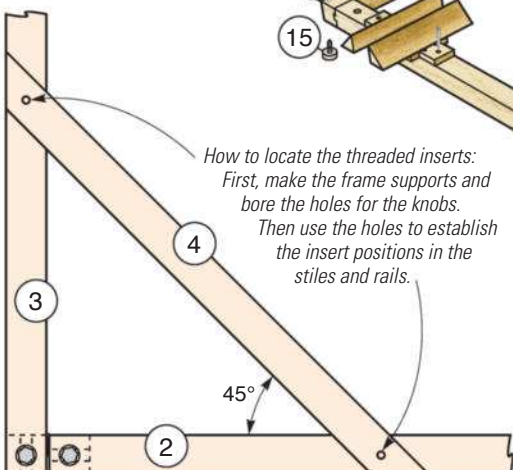
Corner Joinery (End and Side Views)



Star Knob Hole Location (Side View)



Threaded Insert Location (Side View)



When positioning the piano hinge, first drive six or eight screws to hold it in place before boring the remaining holes and installing the screws. Use an awl to center punch the screw holes before drilling.

MATERIAL LIST

	T x W x L
1 Vertical Stiles (2)	1 3/4" x 1 3/4" x 50"
2 Base Stiles (2)	1 3/4" x 1 3/4" x 36"
3 Rails (4)	1 3/4" x 1 3/4" x 39"
4 Frame Supports (2)	3/4" x 1 3/4" x 26"
5 Rear Wheel Braces (4)	1 1/2" x 1 1/2" x 8"
6 Brace Guides (8)	1/2" x 3/4" x 1 1/2"
7 Brace Platforms (2)	1/2" x 1 3/4" x 8 1/2"

Hardware

8 5/16"-18 x 4" Bolts (8)	
9 5/16"-18 x 1/2" dia. Cross Dowels (8)	
10 5/16" Flat Washers (8)	
11 No. 8 x 1 1/4" Flathead Screws (20)	Rockler #29165
12 5/16"-18 Threaded Inserts (5)	Rockler #28811
13 1 1/16" x 36" Piano Hinge (1)	Rockler #19241
14 5/16"-18 Four-star Knobs (4)	Rockler #54545
15 Gripper Feet (4)	Rockler #44219
16 Bike Hanger Hooks (2)	

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Position the frame supports and bore marking holes with a 5/16" brad-point bit for the threaded inserts. Drill only deep enough to mark the hole positions because the insert holes are larger.

Position the Frame Supports

The frame supports tie the two frame halves into a single rigid structure using threaded male knobs and threaded inserts. First, cut 45° miters on each end of the supports. Don't worry if they're not exactly 26" long; close is good enough. Bore the 5/16" holes for the knobs in each end (see *Drawing*). Now you'll need to fit the supports to the frame. Although you can measure to find the positions for the threaded inserts, it's more accurate to use the support as a template to locate the exact position. Use duct tape to secure a carpenter's square to the frame to hold it perfectly square (see top photo at left). Then bore through the holes in the support just enough to mark the threaded insert positions on the frame.

There's no set size for the threaded inset holes; it depends on the hardness of the wood. The holes will need to be larger with maple than with birch or ash because it's harder. Use some scrap and experiment. Rather than installing the inserts with a screwdriver and risk damaging the threads, use a bolt or knob and lock it in position with a nut or wingnut (see photo); then just twist or use a wrench to install. There's one extra threaded insert you'll need to install on the vertical frame (either side is fine). It's used with a frame support to keep the two frames secured together in the folded position. Locate the position of this insert when the stand is folded.



Install the threaded inserts with a threaded male knob or bolt. Use a wingnut or nut to lock the threads against the top of the insert. If the effort required to turn the knob is too high, you may need to enlarge the hole.



Refine and Finish the Rack

Easing the edges and sanding can be done while the stand frames are assembled but with the hinge removed. A 3/16"-radius roundover bit is about right to ease the top and visible edges (photo at left). There's no need to rout all the edges; sanding is sufficient for the bottom and back edges. And, considering the purpose of the stand, 120-grit paper will produce an adequately smooth surface. Do all the routing before sanding, though.

The rear wheel braces are what keep the bikes upright and stable on the stand. They need to fit around the tires snugly, so you should take care making them. Make them

Ease edges on the frames with a router and 3/16" roundover bit. Only the upper and visible edges need to be routed; use sandpaper to ease the other edges.



Use your bike's tire to establish the distance between wheel braces, then mark the braces' position on the frame or the brace platform and measure the gap.



Use the slotted platforms to establish the space between the brace guides, and then fasten the guides to the bottom of the rear wheel braces. The author used a pin nailer (optional) and glue.

from the same square stock as the frame. Simply cut the square-section stock diagonally using a band saw or table saw to make two parts from one piece of stock. Although it's possible to attach the braces directly to the frame, the brace platform and guides allow easy adjustment for different tire widths. If you don't plan to store more than two different bikes on the stand, attaching the braces directly to the frame will save you some time and effort. And if you only need to make a few width adjustments, you can skip routing the adjustment slots in the platforms.

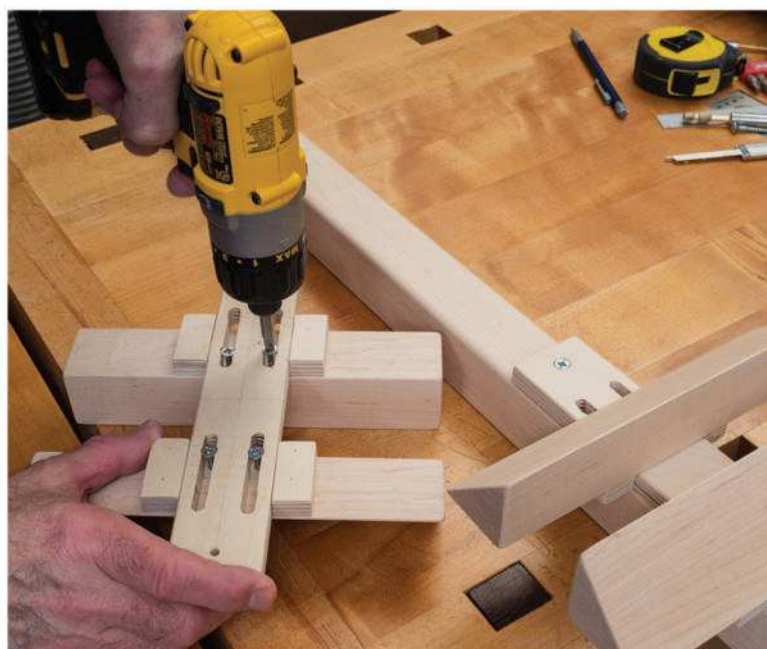
The brace platforms and guides are made from 1/2" Baltic birch plywood, but solid wood works well, too. If you rout the adjustment slots, first bore a series of holes along the slot centerline to make routing easier. Use a router table with a fence, and carefully lower the workpiece onto the spinning bit. But be sure to keep your hands out of the path of the cut.

The brace guides keep the braces aligned and prevent them from rotating under load. Glue the brace guides to the bottom of the wheel braces using the platform as a spacing gauge. A pin nailer can speed up the assembly and ensure that the guides are securely fastened. Once you've completed the wheel brace assemblies, screw them to the bottom frame, centered about 10" from the edge of the frame. Then install the bike hanger hooks on the top vertical frame rail. Now you can check that your bikes fit properly.

The rack may not be a piece of furniture, but a film finish will help protect it from dirt and moisture and prolong its life. Maple isn't very porous, so one coat of wipe-on varnish or water-based polyurethane is all that's needed. Finally, install anti-skid feet to the bottom of the rack. Now that you've finished the rack, maybe you'll be inspired to inflate your bike's tires and take a nice long, scenic ride.



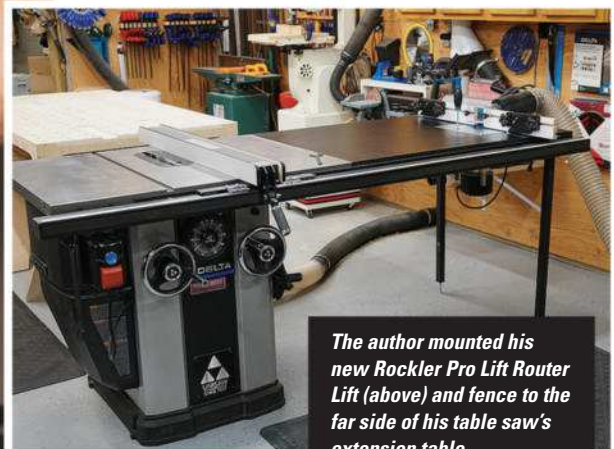
Larry Okrend is the former editor of HANDY magazine and author of BLACK + DECKER Small Space Workshops.



Attach the platforms to the bottom of the wheel braces to the correct tire width with No. 8 x 1 1/4" wood screws. Don't overtighten the screws, but the heads should be sunk beneath the surface of the plywood.



Installing a Router Lift



The author mounted his new Rockler Pro Lift Router Lift (above) and fence to the far side of his table saw's extension table.

By Rob Robillard

A shop-made template, scrap shims and a single router bit make the task precise and easy.

My basement shop is small, and space is at a premium. I keep everything on wheels, and I really do follow that old mantra about there being a “place for everything and everything in its place.”

With my space limitations, I decided to mount my new Rockler Pro Lift Router Lift into the side extension table of my Delta Unisaw. I'm really looking forward to using this router lift, because it will allow me to quickly and accurately adjust the bit height from the top of the table. Rockler has two unique methods built into this system for lifting the

router: a “Quick-Gear” dial for the lift's hex wrench will enable me to raise my router through the lift's full travel in just a few cranks; then, there's a second precision gear for the wrench so I can make fine bit-height adjustments, too.

A Template is Key

Regardless of what brand you buy, there are several ways to install a router table insert plate like this into a tabletop. But with any of the methods, the challenge is cutting the opening precisely so that the router plate fits it like a glove. We all want a perfect fit and don't want to

screw it up, right? The other goal is to make sure that once the plate is installed, it sits flush with the tabletop; if it ends up proud of the surface or too low, you'll have problems feeding workpieces over it smoothly.

The solution to the first part of this challenge is to use a template to help machine the tabletop opening accurately. Some manufacturers of router table insert plates sell a pre-made template that you can use for this job, with a cutout in it that matches their plate size. But in my situation, I decided to create a template from scrap material instead. Then I'd use my handheld router to cut the opening in the table, mill the rabbet that supports the plate and cut out the waste piece in the middle — all with a



For a video of the author's installation process, please visit woodworkersjournal.com and click on

"More on the Web" under the Magazine tab.

single router bit. As you'll see shortly, spacer strips placed around the inside of my template would move the router inward so I could cut out the inner waste piece neatly. But you could also use a jigsaw to cut out the hole. While that's faster, it's not as precise, and you'll still need to use a template and router to cut the plate's recess and rabbet first.

Consider Placement and Fence Usage Carefully

The exact location of where you place the router lift plate on your tabletop is a matter of personal preference, of course. But, here's how my thought process went. I chose to locate my plate closer to the user (infeed) side of the saw table, versus centering the plate front-to-back, for several reasons. First, I wanted to give the material I'd be routing as much table support as I could after it passed by the router bit. Sure, it's always possible to set up a roller support or an outfeed device of some kind behind the table to handle the longer stuff, but having even a few more inches of tabletop behind the plate can't hurt.

Second, positioning the router lift closer to the infeed side will help me maintain a solid, strong stance and good balance while I'm routing. At the same time, it will prevent me from reaching too far across the table to feed workpieces through the cut.

I also wanted to ensure that my router plate feature will not interfere with "normal" table saw operations. By locating the router plate toward the far right side of the table, instead of centering it side-to-side, I can still use my table saw for ripping material or cutting sheet stock up to about 38" wide before the router plate impacts my saw's rip fence. On a previous table saw with a router plate installed, I used the rip fence for both the saw and the router table. It had a custom-built drop-down dust collection hood and, while that worked great, the problem was that when I was routing stuff, I tied up my table saw fence. If I

needed an extra piece ripped on the saw, I'd have to break down my router fence setup in order to use the table saw again. With that said, where you place the router lift is up to you.

This go-around, I decided that I would keep the rip fence dedicated to the saw and integrate a standalone router table fence into the new system. I settled on Rockler's Router Table Fence with a built-in dust hood and featherboard accessories. If you decide to use a separate router table fence, too, be sure that the location you choose won't have the fence or its other components overhanging the edge of the table, which could become a snag and bump hazard.

Important Reference Marks

After settling on the best location for the plate and fence, I set the lift in place and used the saw's rip fence to align and square the plate to the tabletop. Then, I traced around the plate's perimeter with a pencil. That visual reference proved helpful throughout the entire installation process.

What this tracing doesn't tell you, though, is how large to make the template. For that, you'll first need to know the distance from the straight-cutting router bit you'll use to the outside edge of your router's sub-base. Rockler's router plate has 3/8"-radius corners, so I decided to use a 3/4"-diameter straight bit to match those corner curves.

A careful measurement from the edge of this cutter,

To account for the bit-to-base offset, the author surrounded the router plate with 3"-wide spacer strips, then butted his template pieces against them during initial setup.



Drawing a witness mark on the router base can help ensure that the offset distance between the bit and the edge of the base remains the same during routing. Unless the base is perfectly centered, this distance can vary.

installed in my Makita plunge router, to the rim of its sub-base, was 3". My router base has both flat and round areas, so to keep the router oriented consistently during cutting, I drew a "witness mark" with a black marker right onto the router base (see photo, above). I made sure that this line was in contact with my template during every cut. That way, I knew I could keep that 3" offset distance constant as I made my table opening cuts (it can vary slightly around the router base if the sub-base isn't perfectly centered on the bit or, in my case, if the base has both round and flat areas).

Assembling the Template

Making my template was pretty straightforward. First, I ripped four pieces of 1/2"-thick scrap plywood, long enough to span across my saw table (front to back, and side to side). Then, I ripped more scrap plywood spacer strips to





A pair of overlapping strips and screws secure the four 1/2"-thick plywood pieces of the template at its corners. It's crucial that this template is made accurately, because the router base registers off of it directly when cutting the router plate opening.



A 3/4"-dia. straight bit enabled the author to match the corner radii of his router lift plate. With the cutting depth set to match the thickness of the plate, he routed down in clockwise passes. Then, adding 1/2" spacers to the template, he reset the router for removing the center cutout and forming a rabbeted ledge. A scrap straightedge helped check for a flush fit (inset).

3" wide, to maintain the correct offset between the router bit and the edge of the router. I crosscut these spacers to fit around the router plate with it in position over my penciled reference marks on the table. Then, I set the longer template boards against the outside edges of the spacer strips.

With everything in place, and with my rip fence against the closest template piece to keep things square to the table, I screwed the four template parts together with a couple of overlapping strips of 1/2" plywood (see top photo). Use at least two screws per corner joint, and make sure the

parts don't shift at all during assembly. Once screwed together, I clamped the template down firmly to the table. Then, the router lift plate and spacer strips could be removed from the template's interior to get ready for routing.

Routing the Plate Rabbet

At this point, it's a good idea to set the router inside the template and check for accuracy. With the machine unplugged, lower the router bit to confirm that the cutting edges are lined up properly with your traced outline — this is the last opportunity you'll have to be spot-on. If the bit drifts away from the pencil line as you move the router around the template to check things, fix the template to correct it before proceeding — it's an indication that something must have shifted when you assembled it.

From here, I set my router's cutting depth to match the router plate's thickness. This is a critical adjustment if your plate doesn't have built-in leveling screws. If you cut the rabbet ledge too deep, you'll have to shim under the plate to bring it up to flush with the tabletop.

Then, fire up the router and feed it clockwise around the inside of the template, keeping the witness mark in contact with the template all the time. Don't hog out all of the waste down to your final cutting depth in one pass; instead, make several passes that get deeper each time. That'll be easier on both the router and the bit. And if your router has integral dust collection, use it — this is a very messy operation.

Removing the Center Cutout

When the perimeter cut was completed down to the rabbet level, I ripped some 1/2"-thick spacer strips and installed them along all four inside edges of my template. I fit these spacer strips snugly and tacked them in place with some 23-gauge pin nails.

Router Table Hard-to-Find Hardware

Rockler Pro Lift Router Lift (8 $\frac{1}{4}$ " x 11 $\frac{3}{4}$ " plate) (1) #52429 \$369.99 ea.

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Rockler's Pro Lift accepts full-size router motors as well as smaller diameter models when retro-fitted with accessory adapter collars.

Why the new spacer strips? Well, they move the router and bit 1/2" in from the previous cut to set it up for cutting out the interior waste piece. And that way, I'd end up with a 1/2"-wide rabbeted ledge to support the router lift.

With the new spacer strips in place, I proceeded to cut out the center section where the router will drop into. A couple more passes enabled me to cut all the way down through the tabletop thickness, producing a smooth cut edge.

Time for a Test Fit

Leave the template in place while doing your first test fit, in case you need to adjust the rabbit depth. One of the best ways to test the height of the router plate is to use a scrap as a straightedge and slide it over the table and across the router plate. If the scrap catches the edge of the plate, you'll know the plate is still too high. And, if the plate is sitting too low, you'll see a gap between the scrap and the plate. In that case, a router plate that has height adjustment screws can bring it up to flush easily.

As it turns out, my first test fit showed that the router plate was still about 1/32" proud of the table surface, so I removed the 1/2" spacers, reset the router's cutting depth and cut the rabbet ledge a little deeper. After that, my second test fit showed that the plate sat flush with the table — exactly what I wanted.

When the plate fits properly in its opening, you can mount your router motor into the lift. Rockler's Pro Lift accepts my PORTER-CABLE 3.25hp router motor without any modification. But, you can order adapter collars for it to fit several popular motor diameters of smaller routers, too.

Adding a Fence

With the lift plate now in place, I could move on to the router table fence. I first centered the fence's face over the router collet and squared it to the table, again using the table saw's rip fence as a reference. Then I marked the centerpoints of the fence's two mounting slots on the tabletop, removed the fence and routed two 1/4"-wide x 5"-long slots down through the table (see photo and inset, above right). My template again proved helpful as an edge guide for the router to keep these fence slots straight. The slots will allow me to adjust the fence back and forth for setting up various cuts as well



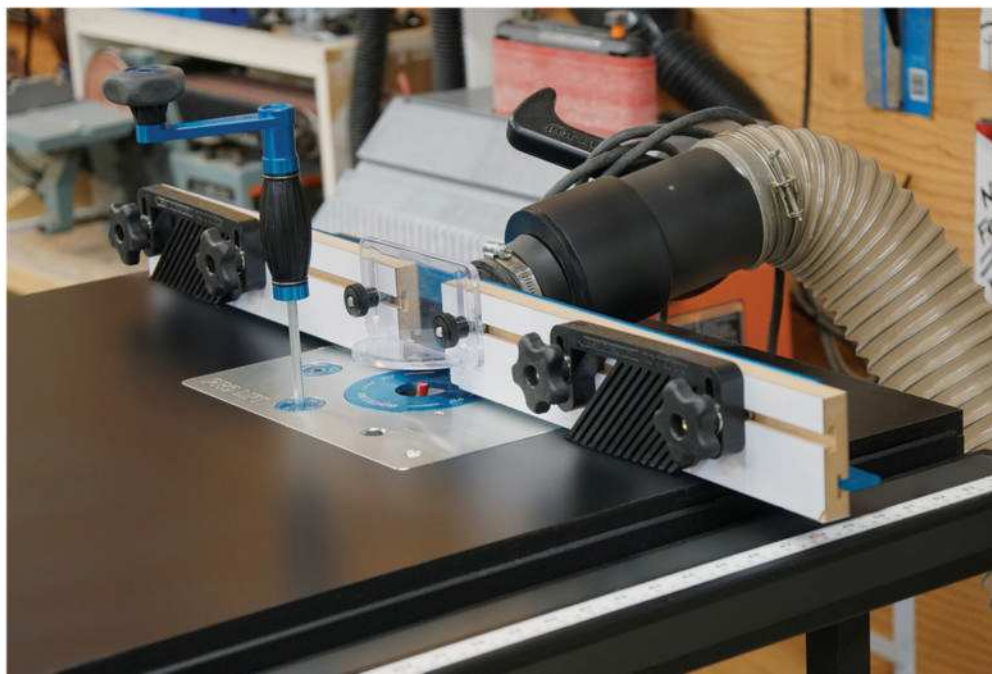
A pair of elongated slots cut through the table on either side of the router lift provide for through bolts and knobs to attach a router table fence. This way, the fence can slide back and forth.



as to slide it out of the way when I need to change bits or remove the router lift. I secured the fence to the table with carriage bolts and T-knobs.

That wraps up this installation procedure. My method isn't the only way to do the job, but it sure worked well for me. I hope it helps you, too.

Rob Robillard is a general contractor, carpenter, woodworker and editor and host of www.aconcordcarpenter.com.



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HEAVY DUTY FOLDABLE ALUMINUM SPORTS CHAIR

Customer Rating ★★★★★

NOW \$19.99

\$29.99

COMPARE TO **\$49.99** COLEMAN MODEL 200002020

SAVE 60%

ITEM 62314/63066
66383 shown

34994638

LIMIT 7 - Coupon valid through 8/26/18*

SUPER COUPON

POWDER-FREE NITRILE GLOVES

PACK OF 100

- 5 mil thickness

NOW \$5.99

12¢ PER PAIR

Customer Rating ★★★★★

\$7.99

COMPARE TO **\$13.32** VENOM MODEL VEN4145

SAVE 55%

ITEM 61363, 68497, 61360,
61359, 68498, 68496 shown

34994709

LIMIT 8 - Coupon valid through 8/26/18*

Bauer **SUPER COUPON**

10 AMP DEEP CUT VARIABLE SPEED BAND SAW KIT

Customer Rating ★★★★★

NOW \$99.99

\$139.99

COMPARE TO **\$299** DEWALT MODEL DWV1010

SAVE \$199

ITEM 63763/63444 shown

70169696

LIMIT 3 - Coupon valid through 8/26/18*

CENTRAL MACHINERY **SUPER COUPON**

4" x 36" BELT/6" DISC SANDER

Customer Rating ★★★★★

NOW \$59.99

\$79.99

COMPARE TO **\$99** GENERAL INTERNATIONAL MODEL 807004

SAVE \$39

ITEM 62502/97181 shown

35018389

LIMIT 4 - Coupon valid through 8/26/18*

PITTSBURGH **SUPER COUPON**

16 OZ. HAMMERS WITH FIBERGLASS HANDLE

LIFETIME WARRANTY

Customer Rating ★★★★★

YOUR CHOICE \$2.99

\$4.99

SAVE 70%

COMPARE TO **\$9.98** KOBALT MODEL 62742

TYPE ITEM
CLAW 69006/60715/60714
RIP 69005/61262/47873

35018580

LIMIT 8 - Coupon valid through 8/26/18*

HYDROSTAR **SUPER COUPON**

50 FT. ELECTRIC DRAIN CLEANER

Customer Rating ★★★★★

NOW \$199.99

\$259.99

COMPARE TO **\$399** COBRA MODEL R0041

SAVE \$199

ITEM 61856
68285 shown

35020205

LIMIT 3 - Coupon valid through 8/26/18*

PITTSBURGH **SUPER COUPON**

PNEUMATIC ADJUSTABLE ROLLER SEAT

- 300 lb. capacity

Customer Rating ★★★★★

NOW \$19.99

\$26.99

COMPARE TO **\$64.99** DURALAST MODEL TRB201C

SAVE 69%

ITEM 61160/61896
63456/46319 shown

35021790

LIMIT 7 - Coupon valid through 8/26/18*

PITTSBURGH #1 SELLING JACKS IN AMERICA

RAPID PUMP® 3 TON LOW PROFILE HEAVY DUTY STEEL FLOOR JACK

Customer Rating ★★★★★

• Weighs 73 lbs.

NOW \$199

COMPARE TO \$149.98 HUSKY MODEL: HJ00120

SAVE \$69

ITEM 62326/61282 61253 shown

35024097

LIMIT 9 - Coupon valid through 8/26/18*

CENTRAL MACHINERY

14" OSCILLATING SPINDLE SANDER

Customer Rating ★★★★★

NOW \$109.99

SAVE \$54

COMPARE TO \$164.98 ROCKWELL MODEL: RK9011

ITEM 62146/69257 shown

35026245

LIMIT 4 - Coupon valid through 8/26/18*

HERCULES BEATS DEWALT

20 VOLT LITHIUM CORDLESS 1/2" COMPACT DRILL/DRIVER KIT

• 576 in. lbs. of torque
• 2.5 amp hour battery
• Weighs 3.6 lbs.

NOW \$99.99

Customer Rating ★★★★★

ITEM 63381

COMPARE TO \$179.99 DEWALT MODEL: DC0780C2

SAVE \$80

35051050

LIMIT 3 - Coupon valid through 8/26/18*

CHICAGO ELECTRIC POWER TOOLS

RECIPROCATING SAW WITH ROTATING HANDLE

Customer Rating ★★★★★

NOW \$199

Blade sold separately.

COMPARE TO \$499.98 PORTER-CABLE MODEL: PC360

SAVE 60%

ITEM 61884/65570 62370 shown

11225898

LIMIT 7 - Coupon valid through 8/26/18*

CENTRAL MACHINERY

2 HP, 5 MICRON INDUSTRIAL DUST COLLECTOR

• 70 gallon capacity

Customer Rating ★★★★★

NOW \$169.99

COMPARE TO SHOP FOX \$324.99 MODEL: W1685

SAVE \$155

ITEM 61790/97869 shown

35035074

LIMIT 9 - Coupon valid through 8/26/18*

WINDSOR DESIGN

11 PIECE WOOD CARVING SET

• Hardwood handles for comfort

NOW \$5.99

ITEM 60655/62673 shown

35044100

LIMIT 9 - Coupon valid through 8/26/18*

luminar OUTDOOR

24 FT., 18 BULB, 12 SOCKET OUTDOOR STRING LIGHTS

Customer Rating ★★★★★

NOW \$19.99

COMPARE TO PORTFOLIO \$39.98 MODEL: SL1208

SAVE 50%

ITEM 63483

35031299

LIMIT 7 - Coupon valid through 8/26/18*

CENTRAL MACHINERY

350 LB. CAPACITY FOLDABLE SAW HORSE

Customer Rating ★★★★★

NOW \$8.99

COMPARE TO \$16.01 STANLEY MODEL: STS11200

SAVE 43%

ITEM 60710 61979/69446 shown

35057721

LIMIT 6 - Coupon valid through 8/26/18*

CENTRAL PNEUMATIC

18 GAUGE, 2-IN-1 NAILER/STAPLER

Customer Rating ★★★★★

WE CARRY A FULL LINE OF NAILS

NOW \$15.99

COMPARE TO HITACHI \$59.99 MODEL: NT50A2

SAVE 73%

ITEM 63156/64269 68019 shown

35087760

LIMIT 9 - Coupon valid through 8/26/18*

THUNDERBOLT solar

100 WATT SOLAR PANEL KIT

Customer Rating ★★★★★

2X MORE POWER

NOW \$14.99

COMPARE TO SUNFORCE \$325.92 MODEL: 30180

SAVE 17%

ITEM 64335/63585 shown

35058024

LIMIT 4 - Coupon valid through 8/26/18*

Lifetime CARBIDE

ALUMINUM OXIDE SANDING SPONGES PACK OF 10

Customer Rating ★★★★★

COARSE ITEM 46751 63918
MEDIUM ITEM 46752 63915
FINE ITEM 46753 63912

Item 46751 shown

SAVE 20%

NOW \$4.99

YOUR CHOICE \$3.99

35081856

LIMIT 9 - Coupon valid through 8/26/18*

SUPER COUPON

4 PIECE ANTI-FATIGUE FOAM MAT SET

Customer Rating ★★★★★

• Each pad measures 25" x 25"

NOW \$6.99

COMPARE TO NORSK \$19.99 MODEL: 00111346

SAVE 65%

ITEM 61607/62389 94635 shown

72139987

LIMIT 9 - Coupon valid through 8/26/18*

WARRIOR

29 PIECE TITANIUM DRILL BIT SET

Customer Rating ★★★★★

SAVE 83%

COMPARE TO DEWALT \$60 MODEL: DW1089

NOW \$9.99

ITEM 62281 61637 shown

35080716

LIMIT 9 - Coupon valid through 8/26/18*

COVERPRO

10 FT. x 10 FT. PORTABLE SHED

Customer Rating ★★★★★

NOW \$139.99

COMPARE TO SHELTER LOGIC \$236.99 MODEL: 70333

SAVE \$96

ITEM 63297

35089253

LIMIT 9 - Coupon valid through 8/26/18*

SUPER COUPON

FULL-MOTION TV WALL MOUNT

Customer Rating ★★★★★

• Fits most 37" to 80"

NOW \$39.99

COMPARE TO ROCKETFISH \$149.99 MODEL: RF-WM1700C

SAVE \$110

ITEM 64037/63155 shown

35090520

LIMIT 3 - Coupon valid through 8/26/18*

SUPER COUPON

DUST AND PARTICLE MASKS PACK OF 5

Customer Rating ★★★★★

• Elastic head strap
• Filters out dust, particles and pollen

NOW 99¢

COMPARE TO ACME UNITED \$7.67 MODEL: ACUM13259

SAVE 87%

ITEM 62606/63723 50027 shown

35094143

LIMIT 4 - Coupon valid through 8/26/18*

CENTRAL MACHINERY

8", 5 SPEED BENCHTOP DRILL PRESS

Customer Rating ★★★★★

NOW \$49.99

COMPARE TO BUFFALO BLACK \$102.99 MODEL: BPPK

SAVE \$53

ITEM 62520/60238 shown

35096043

LIMIT 9 - Coupon valid through 8/26/18*

HaulMaster

4 PIECE, 1" x 15 FT. RATCHETING TIE DOWNS

Customer Rating ★★★★★

• 400 lb. working load

NOW \$6.99

COMPARE TO ATE TOOLS \$40.88 MODEL: 13079

SAVE 82%

ITEM 63057/63056/63094 90984/60405/63150/61524 shown

35096378

LIMIT 9 - Coupon valid through 8/26/18*

PITTSBURGH

24" CLAMP AND CUT EDGE GUIDE

Customer Rating ★★★★★

LIFETIME WARRANTY

NOW \$13.99

• Lightweight aluminum construction
• Quick lever locking mechanism for better security

COMPARE TO BORA \$69 MODEL: S400K

SAVE 88%

ITEM 66126

72747135

LIMIT 6 - Coupon valid through 8/26/18*

CENTRAL MACHINERY

12" x 33-3/8" WOOD LATHE WITH REVERSIBLE HEAD

Customer Rating ★★★★★

NOW \$279.99

COMPARE TO JET \$919.99 MODEL: 708392

SAVE \$640

ITEM 34706

35102021

LIMIT 4 - Coupon valid through 8/26/18*

TOOL TUTORIAL

Table Saw 101

By Sandor Nagyszalanczy



Woodworking expert Sandor Nagyszalanczy turns to the table saw to give you the nitty-gritty info you need to know about this workshop mainstay.



www.woodworkersjournal.com MORE ON THE WEB



For instructions and a video on how to make cove cuts on a table saw, as well as information on how to tune up your table saw, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

If there is a single piece of machinery I couldn't do without in my workshop, it's the table saw. It's the first machine I bought when I set up my first shop nearly four decades ago: an old used Craftsman saw I bought for \$35. From day one, I used that saw for all the basic cuts I needed for my first cabinetry projects and custom furniture commissions. Even though it wasn't the best saw in the world — it had a weak motor and a

puny 8" blade that was difficult to tilt — that vintage saw did yeoman's duty, ripping and crosscutting boards (i.e., cutting them both with and across the grain), cutting miters and bevels and grooves and dadoes. As I took on more complex projects, I discovered just how versatile a table saw could be. Using both store-bought and shop-made jigs, I expanded my saw's repertoire to include cutting tenons and box joints, raising panels and more.

Just What Can a Table Saw Do?

This versatile machine is capable of such a wide variety of cuts, it's no wonder that a table saw is the centerpiece of most modern shops.

Using nothing more than the basic equipment that comes standard, you can perform all the basic cuts needed for an endless number of traditional woodworking tasks and home improvement projects:

Using the miter gauge, you can *cut 45° corners* for picture and mirror frames and small boxes, cases and drawers. The rip fence is used to *cut stock to width, panels to size, or to recut boards*, thickness wise, to make your own veneers or split stock to book-match the grain for decorative panels. Working with the saw's blade tilted, you can *take compound cuts* for frames, chests or planters with angled sides. Fit the saw with a dado blade and you can *cut all manner of grooves, dadoes and rabbets*, perfect for simple cabinet joinery, say to build a bookcase or display shelf.

By employing a variety of jigs and fixtures, a table saw can perform a vast array of tasks including:

- *Cutting large sheet goods to size.* Sliding tables, cross-cut sleds, and long extension tables can all be used for safely sawing full-sized sheets of plywood and large panels to final size when building cabinets and furniture.

- *Sawing tenons for mortise-and-tenon joinery.* Tenons are cut by passing frame members vertically past the saw blade using a sliding jig.

- *Cutting box joints.* Milled with a dado blade and special jig, box joints are a series of alternating fingers and notches that interlock to form the corners of boxes, drawers, blanket chests, etc.

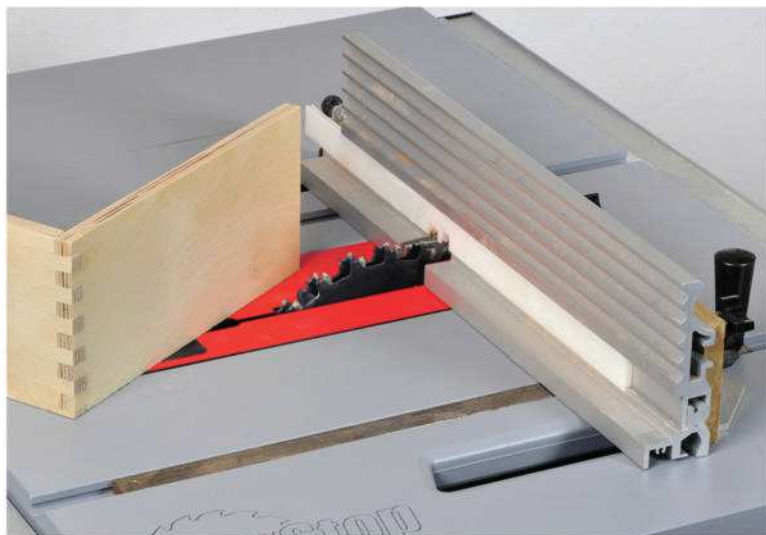
- *Tapering.* A tapering jig is used



A standard miter gauge fitted in a table saw's miter slot is just right for cutting mitered corners on moldings used for small picture and mirror frames.



Cutting tenons on frame members used for mortise-and-tenon joinery is done with a dedicated jig that firmly supports the stock as it slides past the saw blade.



A box joint jig and a dado blade mounted on the table saw are all that are needed for creating interlocking joints, which are great for building drawers, boxes and more.



Using a special fence jig, stock is run at an angle over the top of the blade, thus cutting an arc-shaped hollow cove in a series of shallow passes.

to cut tapered furniture legs and other parts that need to be wider at one end than the other. Bevel-cut tapered staves can be used to build projects with angled sides, like stands and planter boxes.

- **Panel raising.** By running the edges of a panel vertically past a slightly tilted blade, you can raise them (where the edge is thinner than the middle) for classic-

looking raised panel doors. Smaller panels can be cut using the standard rip fence as a guide; larger panels require a jig.

- **Cutting coves and moldings.** Using a special fence jig that guides the stock at an angle over the top of the saw blade, you can cut hollow shapes for moldings and trim. (Look online for additional information, including a video, on how to make cove cuts.)

- **Shaping stock.** Fitting a table saw with a molding head — a special blade with interchangeable cutters — allows you to cut many of the same profiles that you'd normally

create with a shaper or router: beads, ogees, flutes, etc.

Choosing a Table Saw

All table saws are basically built the same: a motor powers an arbor-mounted saw blade; controls allow you to raise and/or tilt the blade above a table that supports the workpiece. Beyond that similarity, there are several different types of table saws

to choose from, including cabinet, contractor, portable and benchtop. The particular type, make and model saw you choose will depend on various factors, including the saw's overall size and capacity, how powerful it is, how portable it is, its features and, of course, how well it fits your tool budget. Particular models are better suited to some woodworkers' needs more than others. For example, it doesn't matter if your saw is super light and portable if it doesn't have the power to handle the heavy stock you need to cut and, conversely, a powerful saw doesn't help you if it's too big and heavy to move around your shop that must serve double duty as your garage. A quick rundown on the four most common types of table saws will help you decide which one is best for you:

Cabinet Saw

The first choice of professional woodworkers and serious DIYers, the "cabinet" in a cabinet table saw refers to the boxy sheet-metal base that totally encloses the saw's inner workings. These saws feature heavy-duty trunnions and saw arbors designed to keep their 10" or 12" saw blades (depending on the model) running rock solid even during the most punishing cutting situations. Power is supplied by a 2-, 3- or 5hp

induction motor (single or three-phase) controlled by a magnetic motor starter switch. Most models feature a large extension table to the right of a heavy cast-iron saw table and long rails that allow them to cut panels up to 52" wide or more.

Don't want to spend big bucks on a top-shelf cabinet saw? Some saws, including JET's ProShop series, are hybrid models that incorporate some features of cabinet saws into more compact and affordable contractor style machines with partially enclosed bases.

Contractor Saw

The traditional choice of professional contractors and home workshops, the contractor saw (seen in the photo on page 50) includes about three-quarters of the features of a cabinet saw in a lighter and more affordable package.

You can spot this saw by its open-legged sheet metal stand and motor and bracket hanging off the back. Most models feature a 10" blade, sturdy cast-iron or cast-aluminum table and an extension table and fence rails long enough for rip cuts 24 to 30 inches wide or more. Most saws sport induction motors in the 1½ to 2½hp range: ample enough to power a saw blade through wet construction lumber, thick sheet goods and hardwood stock.



All of a cabinet saw's heavy-duty components — motor, belts and pulleys, saw arbor and trunnions (that allow the arbor to tilt) — are housed inside a sheet-metal base that also supports the saw table.

Portable Jobsite and Benchtop saws

Although lighter and more compact than other saws, portable jobsite and benchtop table saws are impressively powerful and full-featured. Most models use a standard 10" saw blade and have the same depth-of-cut capacity (3⅞" at 90°) as full-sized saws. To get a portable's weight down, heavy steel and iron parts are replaced by aluminum alloy castings and/or molded plastic. Weighty induction motors are replaced by the same kinds of universal motors used in portable power tools. Although noisier and not as powerful as induction motors, universal motors can handle most light- and medium-duty cutting jobs. Some portables have built-in folding stands with wheels that make them very easy to move around and stow when

not in use. Benchtop models have short bases and must be mounted on a work table or stand before they're ready to run.

Most modern jobsite portable table saws, including this model made by SawStop, come with a built-in stand that quickly converts into a convenient wheeled cart.





General-purpose carbide-tipped saw blades (rear) are great for everyday use, but for specialized tasks, choose special blades: (left to right) cross-cut, rip and melamine/plywood.



Dado blades are used to cut grooves, dadoes and other joinery. The width of cut is determined by the number of chipper blades and shims set between a pair of outer saw blades.



A table saw's blade guard, splitter and/or riving knife and anti-kick-back pawls all serve to protect the user from harm during cutting.

Selecting Blades

Although just about any saw blade will cut wood, you'll get better long-term performance with a good carbide-tooth combination or "general-purpose" blade, such as the Forrest Woodworker II. As their name implies, these blades can tackle most of the everyday cuts taken on a table saw. But for the best, cleanest, cuts, choose a saw blade that's specifically designed for the kind of cut you're taking.

Crosscut blades, such as Freud's D1080X Diablo, employ a high number of teeth (60 to 80 on a 10" blade) with an alternating-top-bevel (ATB) tooth grind to produce square- or miter-cut ends that look as though they were sanded smooth. In contrast, ripping blades have far fewer teeth: typically 24 to 30 on a 10" saw blade. Each rip tooth has a flat grind and a high hook angle, allowing it to slice through wood fibers along the length of a board. Thin-kerf blades (combo, crosscut or rip) require less motor power to run and generate less sawdust, to boot.

For super-clean cuts in materials such as plywood,

melamine, plastics and non-ferrous metals, choose a saw blade specially designed for cutting that material.

Cutting wide grooves, dadoes and notches for joinery, such as box joints, calls for a dado blade. A stacking dado set sandwiches individual chipper blades between a pair of outer saw blades. You change the width of the groove/dado by using more or fewer chipper blades, with shims between them.

Table Saw Safety

First of all: never adjust a table saw or check a saw blade without first unplugging the saw. Using safe table saw operating practices (see the "Making the Cut" section of this article for more), push sticks and featherboards can help avoid unfortunate accidents — as can the following safety devices specifically designed for your saw:

- **Blade guard.** Most stock blade guards have a hinged, clear plastic hood that surrounds the saw blade, allowing stock to be fed while preventing fingers from straying into the blade. The guard also deflects sawdust and small cutoffs from being thrown up toward the operator. Unfortunately, stock blade guards can be fussy to set up and must be removed for operations such as dadoing, box joint cutting, etc. It's best to employ shop-made

guards during these special operations, or fit the saw with an over-arm-style guard: a clear box-like guard suspended above the saw blade.

- **Splitters and anti-kick-back pawls.** Whether built into the blade guard or mounted separately, a splitter (aka riving knife) is a thin steel vein set right behind the blade. It's designed to keep the saw kerf from closing up and binding the blade as stock exits the cut, thus preventing the saw motor from stalling and the work from being hurled back at the user. Usually mounted on either side of a blade guard's splitter, anti-kickback pawls are spring-loaded fingers with serrated points that scrape along the top of the work as it's fed through the cut. They are "one-way" devices that further prevent stock from kicking back.

- **SawStop.** One of the most significant develop-



The SawStop mechanism is a protective device built into SawStop brand table saws.

ments in table saw safety is the safety system incorporated into all SawStop brand table saws. The blade on the saw is charged with a small electrical signal. If the user's



When adjusting a table saw blade for a square cut, the author uses a flashlight to shine light on the gap between a handheld speed square and the saw blade itself.

skin accidentally contacts the blade, the electrical signal change activates the saw's safety system: An aluminum brake springs into the spinning blade, stopping its rotation in less than five milliseconds. The blade's angular momentum drives it down beneath the saw table, removing the risk of subsequent contact, and power to the motor is shut off.

- **Dust Collection.**

Although it doesn't prevent saw blade-related accidents, using dust collection with a table saw is an important part of protecting yourself from respiratory-related ailments.

That's especially important because most table saws throw dust around like crazy. Fortunately, most saws these days feature a dust port, which makes hooking the machine up to a portable or central dust collector a simple matter.

Prepare a Successful Cut

Before you take your first cut, it's important to make sure that your table saw is clean, in good condition and properly adjusted. (You can find hints on how to make this happen in my table saw tune-up article, posted

online.) A poorly set up and/or maintained saw is not only bound to be less accurate, but it also can be downright dangerous to use. For example, stock being ripped using an improperly aligned rip fence may kick back suddenly and cause injury. Also make sure your saw blade is sharp and running smoothly, without vibration or obvious wobbling.

Basic saw prep before any cut should begin with checking the angle and height of the saw blade. Once you've mounted and secured the best type of blade for the job at hand, install a throatplate that, ideally, has the narrowest opening that still allows the blade to spin freely. For regular 90° cuts, raise the saw blade up to near full height and check the blade's squareness with a dependably accurate try square, placing the edge of the try square flat against the body of the blade. It helps to put a flashlight behind the square as you sight to see if there's any light showing between the square and blade. If there is, adjust the angle using the table saw's bevel (tilt) adjuster (reset the tilt stop if necessary).

For bevel cuts, tilt the saw



For safety's sake, always adjust the height of a table saw blade so that the saw teeth only protrude about 1/4" above the thickness of the stock being ripped or crosscut.



The author uses a sliding bevel gauge that's been set to the desired miter angle to adjust the angle of the head of a miter gauge relative to the saw blade.

blade to the desired angle and check it with a protractor, angle block or sliding bevel. After adjustments, it's very important to reset the height of the saw blade so that only about 1/4" of the blade protrudes above the thickness of the stock you intend to cut.

From there on, saw preparation depends on the kind of cut you intend to make. When ripping stock, set the distance between the face of the rip fence and edges of a saw blade tooth closest to the fence to the desired width of cut (your fence should already be adjusted so that it's near parallel to the saw blade, with just a skosh of clearance at the back edge of

the blade). If your fence has a built-in cursor and scale, make sure that it reads accurately with the blade you're using; double-check with a rule if there's any doubt. Lock the fence, and you're ready to rip.

To prepare for crosscutting, set the angle of your miter gauge relative to the blade. As when checking blade squareness or tilt, use a try square or protractor/bevel gauge to check the setting (your saw table's miter slots should already be set parallel to the saw blade). Now is a good time to set the miter gauge's built-in stop(s), so you can repeat oft-used angle settings (90°, 45°, etc.) more quickly in the future.



When cutting small or narrow workpieces, use a push stick to feed the stock forward and a featherboard to help it bear against the rip fence.

Making the Cut

Regardless of the kind of cut you're making, make sure that the stock — and your hand and fingers — are clear of the blade before hitting the saw's "On" switch. When taking a rip cut, make sure

that one edge of the stock has been planed or jointed so that it's arrow straight. Set that edge against the rip fence, start the saw, then use a push stick to feed the work into the spinning blade. Feed at an even rate of speed while keeping the work in firm contact with the fence. If your stock is narrow, it's best to use a featherboard to keep the work pressed against the fence and down on the saw table. Whenever possible, stand to the side of the stock and blade rather than directly behind it. That way, if the workpiece is kicked back, it won't strike you.

When ripping dense hardwoods or "problem" boards (wood with knots, twisting grain, etc.), the motor/blade may bog down as you cut. In this case, try easing off on your feed speed. If the work starts smoking or binds on the blade, it's best to turn the saw off immediately, remove the board, then repeat the cut or switch to a different piece of lumber.

Large panels and sheet goods can also be ripped using the rip fence as a guide. If you cut a really big piece, make sure it's well supported at both ends of the cut with infeed and outfeed tables or supports. You can also crosscut large panels as long as the work isn't too long or the side that rides against the fence isn't too narrow.

When using the miter gauge, make sure that the end of long workpieces won't hang up on the rip fence before you begin. Unless your stock is hard to handle, you can use hand pressure to keep the work firmly planted against the face of the gauge (a piece of peel-and-stick sandpaper applied to the face helps keep the work steady during cutting). When you're ready, slide the miter gauge and work slowly and evenly through the cut, making sure to keep both hands well clear of the blade. After the cut is complete, it's safest to shut the saw off before removing the workpiece and cutoff



Small- and medium-sized pieces of plywood and other sheet goods are easy to cut, even on compact jobsite table saws, using the saw's standard rip fence.

scrap: never reach over a spinning saw blade! For long, large, or extra short workpieces, either clamp the work to the gauge's head or use a table saw crosscutting sled or specialized jig.

Sandor Nagyszalanczy is a furniture designer/craftsman, writer/photographer and regular contributor to Woodworker's Journal. His books are available at Amazon.com.



Tilt Right or Left?

Traditionally, table saws tilted their blades to the right, in the direction of the rip fence, as was viewed most practical for right-handed users. A few long-standing models, including the Powermatic model 66, tilt their blades to the left, which helps prevent stock from binding and kicking back during bevel cuts. Taking miter cuts with the blade tilted left is also advantageous, as marked cut lines are on top where you can see them. While many woodworkers still prefer a right-tilt saw, left-tilting saws are popular enough that many makes/models of cabinet, contractor and portable saws are now available as southpaws.

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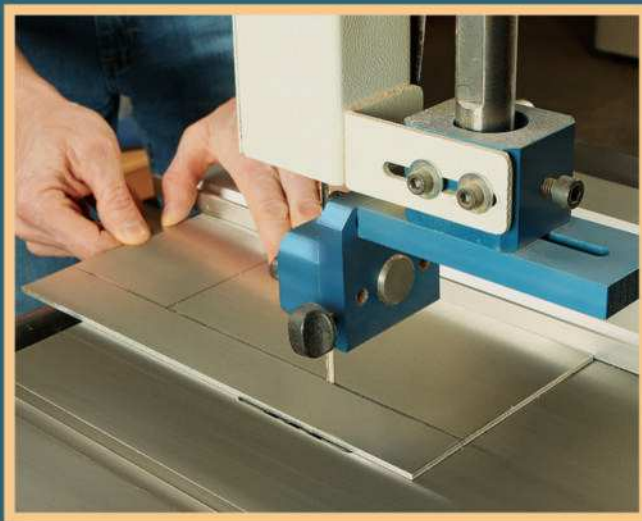
Tabletop Fire Pit

By Chris Marshall



There's nothing quite like a fire pit in the yard to bring people together for some quality time. But, we don't all have the acreage, zoning permission or desire to make one. Well, this little tabletop fire pit can bring a bit of that smoldering, campfire ambiance to any deck or patio. Made of mahogany and metal, our version is easy to build in a couple of afternoons, and it will also give you a chance to try your hand at working with aluminum.

I used a commonly available, $3\frac{1}{4}$ "-wide x $5\frac{3}{4}$ "-long x $2\frac{1}{4}$ "-deep mini bread loaf pan for the "pit"; it hangs by its rim from a hole in the aluminum plate. Then, inside of that, the fire source is just a 2.6-oz. can of Sterno® Canned Heat that produces a long-burning, contained flame. But you could replace that with a tea candle or two if you'd prefer a more docile fire instead. Whichever you choose, the fuel source sits in a bed of colorful, crushed and tempered glass. This stuff is intended for the purpose, and you can buy it inexpensively in 1-lb. bags at diamondfireglass.com.



Aluminum this thin can be cut with a jigsaw, hacksaw or even a wood-cutting hand saw and skip-tooth blade. Use an older blade if you have one.

Routing Aluminum



It may seem like a stretch, but a 1/4"-dia. carbide spiral upcut bit is quite up to the task for routing nonferrous metals, like the 1/8" aluminum for this project.



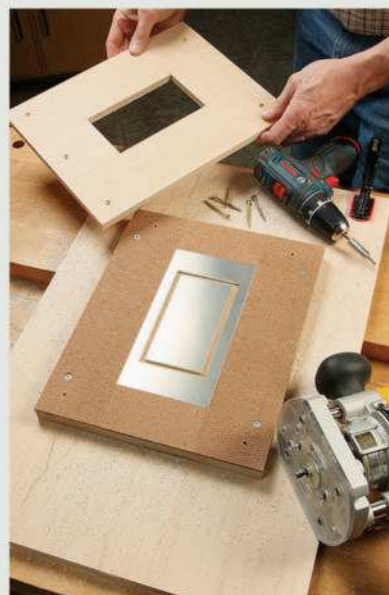
A strip of carpet tape will prevent the inner waste piece of aluminum from interfering with the bit when it's routed free.

And that's what I used to rout a 3³/₁₆"-wide, 5³/₄"-long opening for the bread pan. It captures the pan just under its rim. I built a three-layered jig to assist in the task: a 1/2" plywood top template has a cutout that matches the pan's top outer dimension: 3³/₈" x 5¹⁵/₁₆". The jig's midsection is a built-up layer of 1/2" MDF topped off with 1/8" hardboard to hold the aluminum blank securely



A 7/16" guide collar insets the 1/4"-dia. router bit 3/32" to create an opening in the plate that will hold the bread pan under its rim.

during routing. Its base is just a big piece of scrap plywood that provided clamping points for my workbench. A 7/16" O.D. guide collar in the router provides the right offset for the bit — 3/32" — to create the opening in the metal. I routed



Several shallow passes with a carbide bit and a normal feed rate are all it takes to rout this sheet aluminum cleanly. It's easy.

down through the plate in four passes, increasing the depth of cut by 1/32" each time. The result: clean, straight cuts that look like they were made by a CNC machine. And the bit is still sharp and ready for use in wood again when duty calls.

Milling the Aluminum Plate

We'll begin this project by machining the 1/8"-thick aluminum plate. While you could certainly use a jigsaw and metal-cutting blade or a hacksaw, I cut the plate to size with a 6-tpi skip tooth woodcutting blade that was nearing the end of its woodworking life (repeated use on aluminum will dull the blade). The metal is so soft that a band saw and an ordinary blade cuts it easily, and I could use my rip fence and miter gauge to ensure flat edges and square corners.

Here's the second machining step that worked well for me: I milled the bread pan cutout in the plate by template-routing the opening with a shop-made jig and a trim router (see *sidebar*, above).

Making the Sides

Any outdoor-suitable wood will work here, and whatever you choose, a piece

of 6"-wide stock, 5 ft. long, will provide ample material to build it. Joint and plane the board down to exactly 1/2" thick, and finish-sand it up to 180 grit.

Crosscut a 20" length to make the two side panel workpieces, and rip this blank to 3¹/₄" wide. Save the long offcut — we'll use that for making the lid cleats, later.

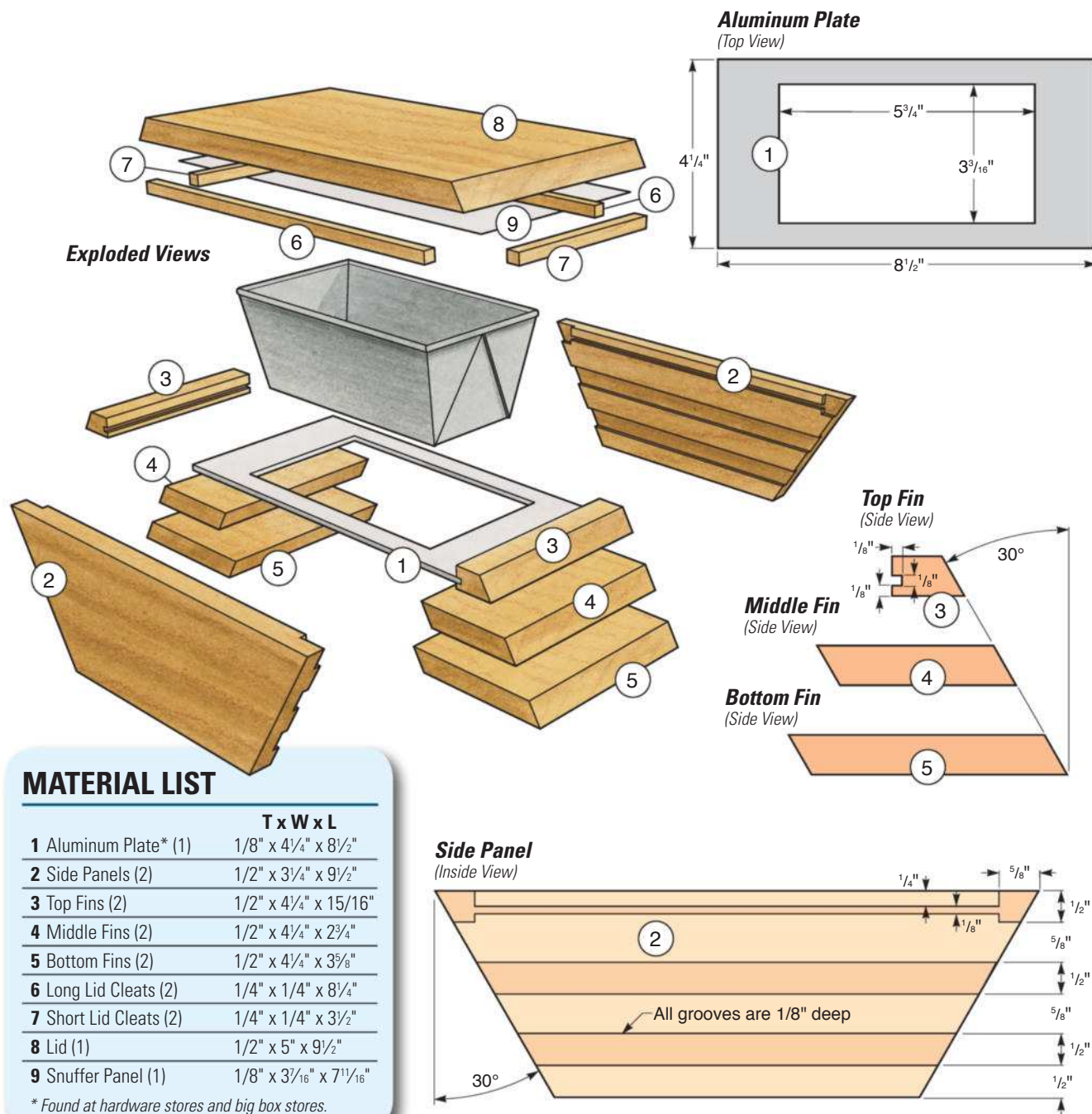
You'll see in the *Drawings* that the project's three layers of beveled fins fit into grooves cut in the sides. We'll mill those now. Chuck a 1/2" straight or spiral bit in your router table, and set the fence 1/2" away from

the bit. Raise the bit to 1/8", and rout a groove into the face of the workpiece along the full length. This groove will house the bottom fins. Then reset the fence 1⁵/₈" away from the bit and rout another continuous groove for the middle fins.



Route 1/8"-deep, 1/2"-wide grooves in the side panels to house the fins. Don't forget that the top grooves are stopped cuts.

WEEKEND PROJECTS CONTINUED



Now crosscut the blank into two 9 1/2"-long pieces — one for each side. Return to the router table with your side workpieces so you can complete a pair of short, stopped grooves for the top fins. This time, reset the fence so the bit protrudes its full 1/2" diameter out from the fence opening, but no more than that. Cut the stopped grooves 5/8" long along the top edge of the side work-

pieces. Mark your router fence so you'll know where the bit's limits are.

Next, miter cut the ends of the side panels to 30°. Be careful not to shorten them in the process, and set up the cuts so the groove for the bottom fins will end up closer to the shorter (bottom) edge of these parts. Then square up the back, rounded ends of the top fin grooves with a chisel.

Plowing the Plate Grooves

Both side panels and the inner ends of the top fins have 1/8"-wide grooves to hold the aluminum plate. We'll cut those next. But first, crosscut a 12"-long piece of your project stock: we'll use it for both the top and middle fins.

I cut the plate grooves with a 1/8"-kerf ripping blade on the table saw (in order to make square-bottomed



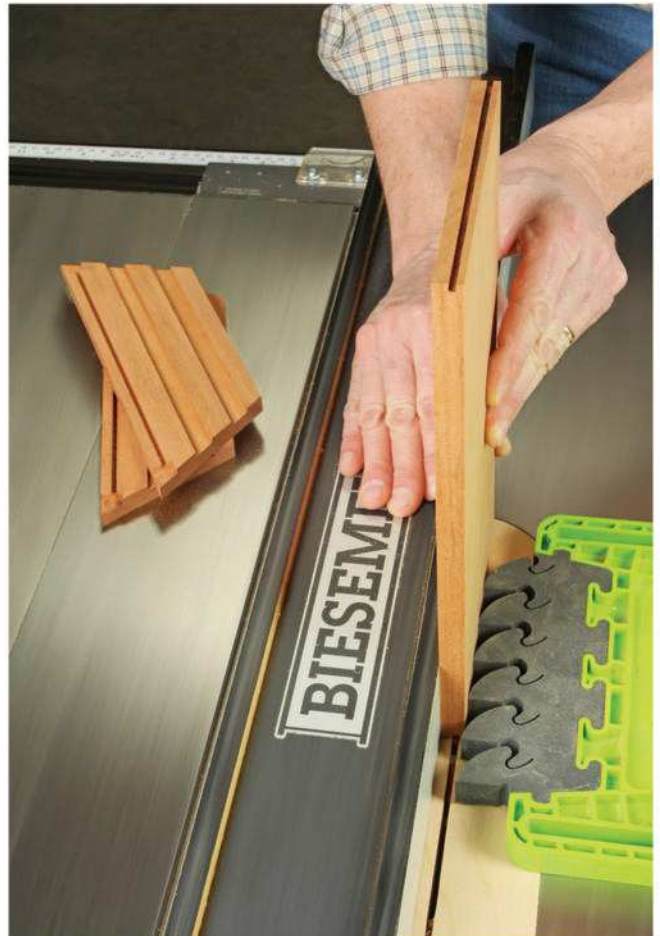
Miter cut the ends of the sides to 30°. A crosscut sled with a hold-down clamp handles these short pieces safely. Chisel the top grooves square.

grooves), and set my rip fence 1/4" away from the blade. Raise the blade to 1/8", and plow the plate grooves into the inside face of the side pieces, with the longer top edges against the rip fence. Then cut a groove across both ends of the combined fin workpiece, keeping the same face of the workpiece against the rip fence when making these two kerf cuts.

Creating the Fins

Crosscut a 10"-long piece off of your project board and set it aside for the lid panel. Then rip the top/middle fin workpiece (that just received the aluminum plate grooves) and the remaining portion of the project board to 4 1/4" wide.

To complete the two short top fins, all you need to do is crosscut the grooved ends off of the combined top/middle fin workpiece, with your saw blade tilted to 30°. Mark these two cuts so the bottom faces of the top fins are 15/16" long.

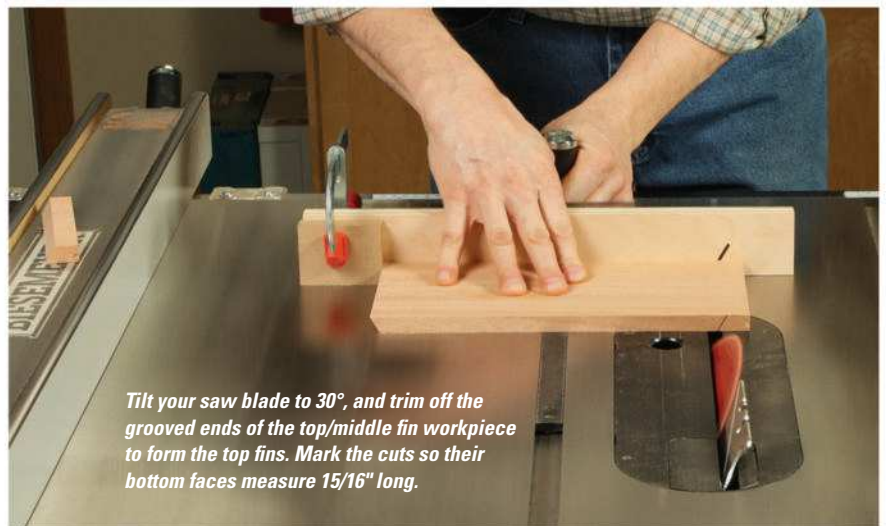


Cut 1/8" x 1/8" grooves along the top of the side panels and into the ends of the combined top/middle fin workpiece. These hold the aluminum plate.

And be careful that the grooves for the aluminum plate are closer to the longer bottom faces of these fins than their shorter top faces, so they'll line up with the plate grooves in the side panels.

Take what's left of the blank from the top fins and mark a crosscut line 2 1/2"

in from each of the bevel points on its ends. Crosscut the blank at these lines with the blade tilted to 30° and so the bevels on the ends of these parts are parallel. Repeat the bevel-cutting process on your other 4 1/4"-wide workpiece to form two 3 5/8"-long bottom fins.



Tilt your saw blade to 30°, and trim off the grooved ends of the top/middle fin workpiece to form the top fins. Mark the cuts so their bottom faces measure 15/16" long.

WEEKEND PROJECTS CONTINUED



Dry assemble the base components and adjust the fins so their beveled edges align. Pencil where they intersect the side panels inside and out; these marks will be helpful during glue-up.

Assembling the Base

Carry out a dry assembly of the aluminum plate and fins in the side panels to make sure that the parts fit their grooves well. Adjust the fins so their beveled ends slope away from the top in a straight line. Once you have them aligned, reach down inside the bread pan opening and mark the positions of the back ends of the fins on the side panels, and do the same thing where the edges of the fins meet the side panels on the outside. These markings will help you realign the fins at glue-up.

At this point, I used dark- and light-brown exterior stains to color the parts. Since it was oil-based, I covered the glue joint areas with painter's tape so the



Stain and finish the fire-pit's wooden parts. If you use oil-based stain, mask off the glue joint areas to make sure glue will bond properly.

glue would stick properly, later. Topcoat the project parts with an exterior finish, like spar varnish, if you wish. When the finish cures, assemble the base with exterior-rated wood glue.

Completing the Lid

The lid is the last component to build. Besides just making the project look neater, putting a lid on the fire pit also serves to keep the rain out of the interior.

Start by ripping your lid blank to match the width of the base, and bevel-cut its ends at 30° so the bottom face of the lid is 9½" long. (Its bevels should line up with the top fin bevels when the lid is installed on the base.) Now take the narrow offcut you set aside



You can turn the lid into a fire snuffer by adding a piece of aluminum plate inside the lid cleat area. Silicone adhesive will hold it in place.

the cleats to the lid. I used 5/8"-long, 23-gauge pin nails to hold them in place while the glue dried.

Apply stain and finish to the lid. If you have some extra aluminum as I did, you can turn the lid into a handy flame snuffer by installing a piece inside the cleat area. Then follow the *sidebar*, below, for preparing the fire pit for use. I hope this little project helps bring a glow to your table for those special outdoor evening meals this summer.

Preparing For Use



Gel-based Sterno® Canned Heat in the 2.6 oz. size fits inside the bread pan to provide the fire for this pit. You can find it online, in kitchen supply stores and at camping outlets. To prepare the pan for use, pour a single layer of the decorative tempered glass into the bottom of the pan to bring the can up to level with the rim. Set the can down inside, and fill in around it with more glass. Pry off the lid, and the fuel lights easily with a long match. It burns for around 45 minutes, but you can snuff it out sooner using the project lid (lined with aluminum) or the can's lid. The unburned gel that remains can be lit again another time.



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Rockler's new *Pro Lift Router Lift* has two patent-pending features: a "Quick-Gear" for rapid height adjustments and "Snap-Lock" tool-free insert ring changes. The Quick-Gear, accessed above the table, raises or lowers the bit along the lift's full range of travel in about five cranks of the handle, each revolution changing bit height about 1/2". A second fine-adjustment gear dials in final height adjustment to within .001". The Snap-Lock feature enables the bit insert ring to be removed by simply pushing a button to unlock it from the Pro Lift's top plate. Pushing the ring back down again locks it in place without tools. The 3/8"-thick machined aluminum plate on the Pro Lift model 52429 measures 8 1/4" x 11 3/4" to fit Rockler and Bench Dog router table openings; a second plate size on model 55803, coming soon, will measure 9 1/4" x 11 3/4" to fit most other router table openings. The Pro Lift accepts router motors that

WORX 20V 6 1/2" Circular Saw with ExacTrack



Rockler Pro Lift Router Lift



measure 4.2" in diameter, with adapter collars available for routers of different sizes. The Rockler Pro Lift Router Lift (item 52429) is priced at \$369.99.

The **WORX® 20V 6 1/2" Circular Saw with ExacTrack™** makes the track saw guide an integral part of the circ saw's shoe or base. For ripping plywood, 1x stock serves as a track cutting guide and acts like a fence on a table saw. When not set for ripping, ExacTrack returns to its standard position for crosscuts and other cutting operations. The WORX 20V 6 1/2" Circular Saw with ExacTrack has a maximum depth of cut of 2" and will bevel up to 50°. In addition to the saw, the kit includes battery, charger and a 24-tooth, carbide-tipped saw blade. It's priced at \$119.99.

Kapro Tools' line of OPTIVISION™ Red leveling products includes the 935 OPTIVISION Red Torpedo 10" Toolbox Level. Like others in the line, the 935 features the patented OPTIVISION vial, a red bubble in high contrast to the liquid in the solid acrylic vial, designed for visibility in both low and bright light. It's also UV-resistant, to maintain color contrast and visibility. An extra set of reading lines is designed for setting gradients at 1% and 2% while an epoxy-locked tilted setting offers a direct line of sight to the bubble.

The 935 OPTIVISION Red Torpedo 10" Toolbox Level includes three shockproof vials, an angle finder with gradient markers every five degrees, and rare-earth magnets to grip to metal surfaces. Drop tested up to two

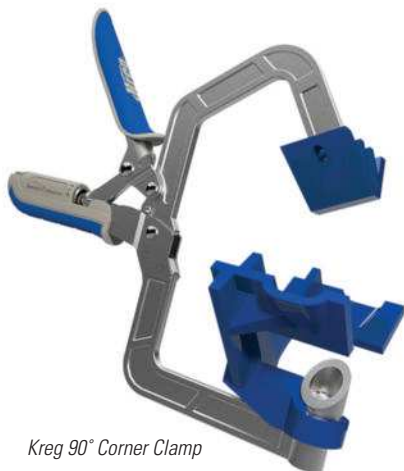


Kapro Tools 935
OPTIVISION Red Torpedo
10" Toolbox Level



meters, it has an accuracy of 0.0005" and a suggested price of \$27.50.

The **Kreg® 90° Corner Clamp** holds 90° corners and "T" joints together when assembling boxes, drawers, cabinets and cases. Cast-aluminum pads press against the inside and outside faces of the pieces being joined to hold them at a 90° angle. Edge stops align the edges for accurate assembly. Openings in the outer "V" clamp pad simplify "T" joints, commonly used to attach things like shelves and partitions. Automaxx® technology in the 90° Corner Clamp means that all you have to do is squeeze the clamp handles, and the clamp will automatically close with the amount of pressure you have set, for materials up to 1" thick. Suggested price is \$39.99.



Kreg 90° Corner Clamp

The **Hitachi Power Tools Portable 1-Gallon Oil-Free Quiet Air Compressor, model EC28M**, is the first in a new Low Noise Series. It produces sound at 59 decibels, a volume low enough to allow a normal conversation to take place while the compressor is cycling. The "hot dog" style compressor produces 0.8 cfm at 40 psi. An overload protection circuit stops the unit in a possible overheating situation, while the locking regulator and 90 on/125 off pressure switch eliminates pressure wander or a pressure-starved tool. The EC28M weighs 25.2 pounds and has a rubber carrying handle for easy transport. A ball valve drain cock allows quick and easy tank draining, while shock-absorbing feet reduce vibration and minimize crawling. Suggested price is \$149.



Hitachi Power Tools
Portable 1-Gallon Oil-Free
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DeWALT has introduced the new **20V MAX* Compact 3.0Ah Battery (DCB230)**, which weighs in at 1.1 pounds —18% lighter than the DCB200 battery, but with the same capacity. At 5" long and 2.1" high, the DCB230 is compatible with the 165 products in DeWALT's 20V MAX* system. It includes a three-LED fuel gauge system that provides immediate feedback on the state of charge and comes with a three-year limited warranty and three years of free service. The price for a single DCB230 battery is \$99, while a two-pack (DCB230-2) is \$129.



DeWALT 20V MAX*
Compact 3.0Ah Battery
DCB230



WHAT'S IN STORE CONTINUED



Lake Erie Toolworks
ClampGAUGE System



JET's new 10 in. ProShop™ Table Saw includes upgrades such as a clear view blade guard assembly with separate leaves that function independently of each other, a quick-release riving knife and a newly designed arbor lock to make blade changes quick and easy.

Inside the saw, an improved shroud surrounds the blade to improve dust collection capabilities. The reset switch for the saw's motor has also been relocated; it's now next to the saw's power switch. The JET ProShop saw is powered by

a 1¾hp single-phase motor prewired for 120-volt or 230-volt operation. The consumer makes this choice, as well as choosing between the standard 30" rip fence guide rail system or an upgrade to a 52" version, and selecting cast-iron or stamped steel extension wings.

With a 10" blade installed, the saw will cut through stock up to 3½" thick at 90° or 2⅝" material when the blade is set to a 45° bevel. It will also accommodate 8" dado sets for making cuts up to 13/16" wide. The cast-iron tabletop with beveled edges measures 44" long by 27" wide. Pricing for the saw starts at \$1,399.99 and varies with the options chosen.

and access to a smartphone or web application with information on which ClampGAUGE size combinations to use and where along the board to space them.

As you tighten the clamp, the ClampGAUGE flattens out; as soon as the middle of the tool bottoms out on the wood, you have achieved proper clamping pressure to ensure the best glue joint possible. ClampGAUGES, made in the U.S.A. and under a lifetime warranty, self-adjust to accommodate all wood species, whether softwoods or hardwoods.

The 3/4"-thick ClampGAUGES come in sizes A (5" long), B (6" long) and C (7" long) as well as kits of multiple sets designed for clamping panels in lengths ranging from 48" to 120". Pricing for individual ClampGAUGE pairs ranges from \$34 to \$38, with the kits ranging from \$135 to \$330.

The new *ClampGAUGE System* from **Lake Erie Toolworks, Inc.**

consists of patent-pending flexible clamping cauls designed to help you achieve proper clamping pressure on glue-ups.

ClampGAUGES are made of aluminum barstock. They come in three different sizes and work in pairs, inserted between the jaws of a pipe or bar clamp and the wood on each side of the boards to be glued up. Each ClampGAUGE kit includes a chart

The book *Chicken DIY: 20 Fun-to-Build Projects for Happy and Healthy Chickens* by Samantha Johnson (**CompanionHouse Books**; ISBN 978-1620082300), with photographs by David Johnson, covers projects ranging from a collapsible chicken run to nest boxes, a roost, feeder/waterer, chick

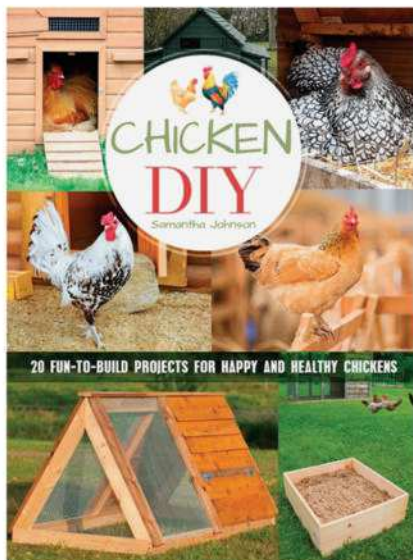
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JET 10 in. ProShop
Table Saw



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brooder, egg incubator and more. The author, a Wisconsin farmer, says, "The required infrastructure for a flock of chickens is minimal and well within the reach of a DIYer who would like the satisfaction of building these items." The book is priced at \$19.99.

color temperature from 2,700 to 5,000 degrees Kelvin, correlating light temperature for improved color perception in your workspace. The P795 has a light output of over 1,200 lumens and over 24 hours of runtime using a RYOBI ONE+ battery. The light head rotates 360° for a



RYOBI HYBRID LED Color
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variety of positions and also has multiple hanging options. Its HYBRID feature allows it to run with either a ONE+ battery or on an AC extension cord (not included). It is compatible with all 1/4" x 20 tripod mounts, and a tripod adapter is included with the 2.6-pound light, which sells for \$79.97.



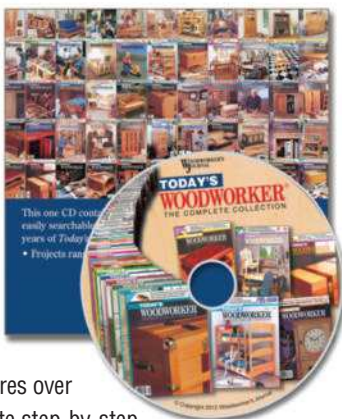
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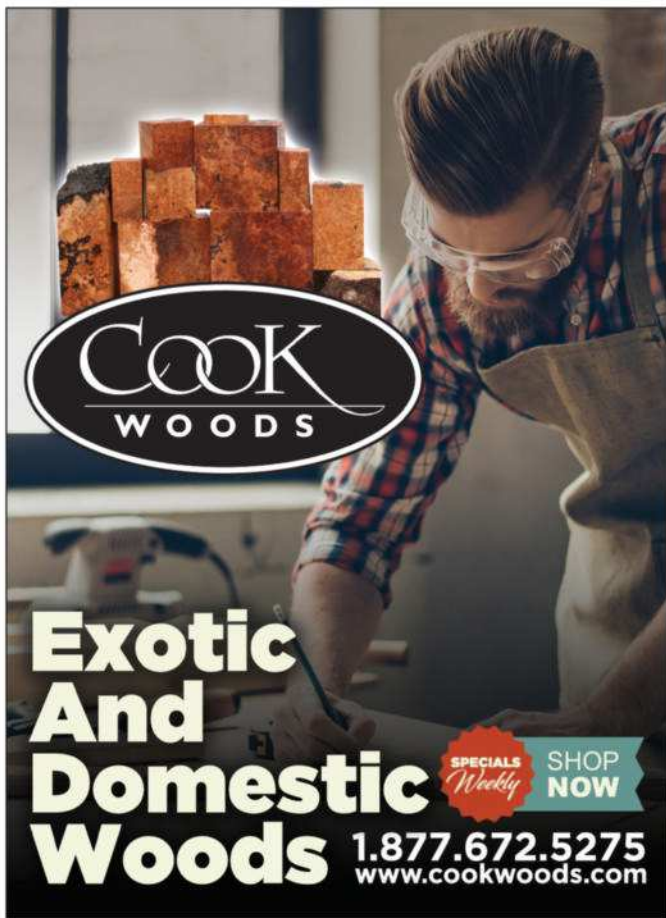
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FINISHING THOUGHTS

Oil and Wood: a Happy Marriage

By Michael Dresdner

Both true oils and varnishes are easy to apply for a beautiful finish.



Left to right: Drying oils (boiled linseed oil, tung oil); non-drying oils (peanut oil, mineral oil).



Michael Dresdner is a nationally known finishing expert. He shares his expertise on the DVD *The Way to Woodwork: Step-by-Step to a Perfect Finish*, available through the store at woodworkersjournal.com.

Oil finishes are an ideal match for wood. They are incredibly easy to apply, very beautiful, and some of them are extremely eco-friendly. As finishes, they divide into two large categories — pure oil and oil/resin varnishes. We'll start with pure oil.

Drying vs. Non-drying

There are two types of oils — drying oils and non-drying oils. In my mind, drying oils are the only valid finishing oils. They start out as liquids, but they cure to a solid film. To me, that's the definition of a finish.

Typically, nut oils are drying oils, and the most common ones we use are linseed, tung and walnut. These drying oils cure by taking oxygen from the air and cross-linking the oil molecules into much larger molecules. Once

the new molecules get big enough, the resulting matrix they form becomes a solid instead of a liquid, forming a film either in the wood or on the wood.

The most common is boiled linseed oil (BLO), which, in spite of its name, is neither boiled nor heated. Instead, it contains metallic

drier that speeds up the cure time. A coat of raw linseed oil will take over a week to dry; one of BLO will often dry overnight. Tung oil dries quickly by itself, so it generally does not need driers added to it. Unmodified walnut oil dries even more slowly than raw linseed oil, which is why I avoid it.

Non-drying oils are usually vegetable (peanut, olive, corn, coconut, rapeseed) or mineral oil, which is extracted from petroleum. Orange and lemon oil, typically mineral oil with citrus scent added, are also in this group.

These do not form a film but stay wet indefinitely. They can come off onto whatever comes in contact with the oiled wood, and they will soon wash off with soap and water.

Thus, putting vegetable or mineral oil on wood is not a finish, but a wood treatment, and a temporary one at that.



Unlike drying oils (left), a non-drying oil, like mineral oil (right), will stay wet and come off on whatever comes in contact with the wood.



Pure drying oil is eco-friendly and efficient, with no VOC-laden solvents or added resins.



One coat will look woody, but add enough coats of oil and you can build a shiny film reminiscent of varnish.

VOCs vs. Solids

Concerned about VOCs? Those are the finish solvents, restricted by the EPA, that can cause dangerous ozone buildup in the presence of sunlight. Pure oil has none whatsoever, because it has no solvent in it. Thus, it is a 100% solids finish. Solids are whatever stays on the wood, after the solvent, to become the film. Clearly, this

is a very eco-friendly finish; it comes from plants and contains no solvents, harmful or otherwise.

Where's the Film?

In many woods, the first coat of oil penetrates and is almost entirely absorbed by the wood, so it does not look like a film was formed. It's there, but it is in the wood, not atop it. The oil

cures in the outer layers of wood fibers. But even if you add no more than one coat, cured oil will still help the wood shed water, oils, dirt and some, but not all, of the things that stain wood. Add more and you get more protection. Multiple coats can eventually build up a gloss film.

Continues on page 72 ...

Contact us

with your finishing questions by writing to Woodworker's Journal, 4365 Willow Drive, Medina, MN 55340, or by emailing us at:

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Please include your address, phone number and email address (if you have one)

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Important Safety Note!

Drying oils are spontaneously combustible. Take all rags and wipes containing drying oils and lay them out one layer thick until they are dry and crusty, at which point they can be safely added to your household trash.



You'll get your best results using boiled linseed oil straight, without adding thinner.



If you notice the oil absorbing faster in some areas, add more oil, keeping all the wood wet until it can't absorb any more.



Sanding oil onto the wood surface with wet/dry paper helps fill pores with the swarf/oil slurry you create, and it can result in a smoother finish.



Scrub unreduced polyurethane varnish liberally onto the wood with a fine nylon abrasive pad, then wipe off the excess.

Applying Oil

Do not add solvent to pure oil. It will not, as some believe, increase absorption, and will only reduce the amount of protective film per coat while contributing to environmental problems.

Flood oil onto the wood liberally, keeping it wet for at least 10 minutes. If areas of the wood absorb all the oil in under 10 minutes, add more, keeping the whole surface fully wet. When it stops absorbing oil, wipe all the oil off the surface. You'll have a uniform, dust-free coat with almost no effort.

Want more build? Do the same thing the next day, and the next, adding one flooded on/wiped off coat per day until you get the look you want. One coat will look woody and natural, while 12 coats (over 12 days) will look like traditional varnish.

To speed the process, or create a slurry to help fill open pores, sand the oil into the wood with fine wet/dry paper.

Oil Varnish

Where oil has only one ingredient, varnish contains resin and solvent. Traditional spar varnish, for instance, contains tung oil, phenolic resin and mineral spirits or naphtha. The most common

varnish resins, alkyd and polyurethane, can be made by chemically modifying linseed oil.

In spite of their names, Danish oil and teak oil are not oils, but thin varnishes. Manufacturers call them "oil" because they are designed to be applied just like oil. The truth is that you can apply any oil varnish the same way you apply pure oil: flood it on, wipe it all off, and repeat with one coat per day until you get the build you want.

Forget the Solvent

Whether it's Danish oil or polyurethane varnish, there's no need to thin it for this type of application: any solvent only acts as a diluent and does not effect how well the finish penetrates the wood.

With thicker varnish, a nylon pad (such as ScotchBrite®) works best to scrub the varnish on before wiping it off. Of course, should you prefer to spray or brush thick varnish, you'll likely have to thin it for workability.



Oils and oil varnish won't always cure over Dalbergias (rosewoods). Solve the problem by sealing it first with dewaxed shellac.

Exceptions

There are a few woods over which oils will not cure properly. Notable among them are most Dalbergias (rosewoods) and some aromatic cedars.

Remember how oil and oil varnish cure by using oxygen from the air to crosslink the molecules? Such "problem" woods contain antioxidants that prevent oxygen cure.

The solution? Seal them first with a thin coat of dewaxed shellac, after which you can switch to oil varnish.

But What About Nut Allergies?

Once they cure, drying oils, which are usually nut oils, form a solid, inert matrix that will not come off on your hands or in your mouth. Thus, the odds of a negative reaction should be substantially less than with wet oil.

Anything can happen, but in more than 45 years in this field, I've never seen an allergic reaction to a cured film of linseed oil.



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- Motor: 2 HP, 110V/220V, single-phase, 1725 RPM, prewired 220V, 19A at 110V, 9.5A at 220V
- Table size: 19 1/4" x 14 1/8" x 1 1/2" thick
- Table tilt: 45° R, 8° L
- Floor to table height: 42 1/4"
- Cutting capacity/throat: 13 1/2" left of blade
- Maximum cutting height: 10"
- Blade size: 106" L
- Blade width: 1/8"-3/4"
- Overall size: 29 1/4" W x 29 1/2" D x 73" H
- Blade speed: 3000 FPM
- Dust port: 4"
- Approx. shipping weight: 284 lbs.



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- Motor: 1 HP, 120V/240V, single-phase, TEFC
- Cast iron 25" x 25" table tilts to 45° forwards, 15° backwards
- Spindle sizes: (10) 1/4" x 5", 3/8" x 6", 1/2" x 6", 5/8" x 6", 3/4" x 9", 1" x 9", 1 1/2" x 9", 2" x 9", 3" x 9", 4" x 9", tapered and threaded
- Spindle oscillates at 72 strokes-per-minute
- Includes formed and welded steel stand
- Floor-to-table height: 35 1/2"
- 1725 RPM spindle speed
- Stroke length: 1 1/2"
- Built-in 4" dust collection port
- Shielded and permanently lubricated ball bearings
- Approximate shipping weight: 296 lbs.



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- Motor: 2 HP, 240V, single-phase, 10.8A, 3450 RPM
- Precision-ground cast iron table measures 14 1/8" x 10" x 7 1/8"
- Max planing width: 7"
- Max planing height: 7 1/2"
- Cuts per minute: 14,000
- Number of knives: 2 HSS
- Approx. shipping weight: 324 lbs.



W1812 ~~\$1650⁰⁰~~ SALE **\$1550⁰⁰**



14" DELUXE BANDSAW 35TH ANNIVERSARY EDITION

- Motor: 1 HP, 110V/220V, single-phase
- Amps: 11A at 110V, 5.5A at 220V
- Precision-ground cast iron table size: 14" x 14"
- Table tilt: 10° left, 45° right
- Floor-to-table height: 43"
- Cutting capacity/throat: 13 1/2"
- Max. cutting height: 6"
- Blade size: 93 1/2" (1/8" to 3/4" wide)
- Blade speeds: 1800 and 3100 FPM
- Overall size: 27" W x 67 1/2" H x 30" D
- Footprint: 23 1/2" L x 16 1/2" W
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15" HEAVY-DUTY PLANER

- Motor: 3 HP, 240V, single-phase, 14A
- Max. cutting width: 15", depth: 3/8"
- Max. stock thickness: 6 1/2", min.: 1/4"
- Min. stock length: 6 1/2"
- Feed rate: 16 and 30 FPM
- Cutterhead diameter: 3"
- Number of knives: 3 HSS
- Knife size: 15" x 1" x 1/8"
- Cutterhead speed: 5000 RPM
- Table size: 20 1/4" x 15" x 3 1/2"
- Overall size: 32" W x 28" D x 23 1/2" H
- Approx. shipping weight: 382 lbs.

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10" CABINET TABLE SAW WITH RIVING KNIFE

- Motor: 3 HP, 220V, 12.8A, single-phase
- Blade tilt: Left, 45°
- Table size with extension: 27" x 40"
- Floor-to-table height: 34"
- Arbor: 5/8"
- Arbor speed: 4300 RPM
- Max. dado width: 1 1/8"
- Capacity @ 90°: 3 1/8", @ 45°: 2 1/8"
- Max. rip capacity: 29 1/2" Right, 12" Left
- Overall dimensions: 62" L x 41" W x 40" H
- Approx. shipping weight: 530 lbs.



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HEY DID YOU KNOW?

Woodworking trivia: those animals!

Beavers and other animals can kill or damage trees by "girdling" them (stripping the bark off a circumference of the tree). This interrupts the flow of nutrients.



What Does It All Mean?

A quick guide to terms from the world of woodworking.

Flatsawn: Lumber cut in parallel slices from a log so that the grain pattern is partially or entirely parallel to the face of the board; also called plainsawn

Rip: To cut wood with the grain

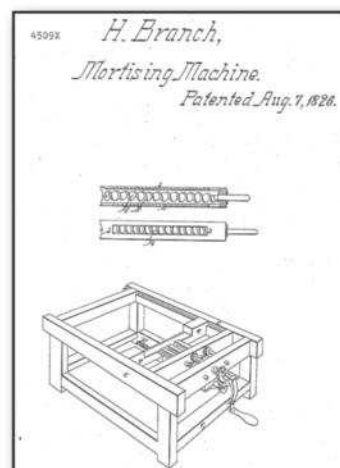
Hot-melt glue: A cylindrical plastic adhesive that is heated to melting temperature in a special glue gun/applicator and bonds nearly instantly upon cooling to room temperature



Image courtesy of i3ai/Bigstock.com

Pharaoh Khufu's funerary boat, now displayed in a museum next to the Great Pyramid of Giza, was held together with a combination of ropes (with fancy knots) and mortise-and-tenon joinery. The boat, made from Lebanon cedar, also contained 12 oars, each carved from a single piece of wood.

On December 15, 1836, a fire in the U.S. Patent Office destroyed many records, including the 1826 patent for the first hollow-chisel mortiser (the drawings were recreated from a model). All patents from prior to that fire are now listed as X-Patents. (Ironically, the Patent Office was the only Washington, D.C. government building not burned by British troops during the War of 1812.)



Submit your own trivia ...

Send in a curious fact about your favorite topic and ours: woodworking. If it is selected for use, you will win an awesome prize!

Submit your Trivia to Woodworker's Journal, Dept. Trivia, 4365 Willow Drive, Medina, MN 55340. Or send us an email: trivia@woodworkersjournal.com

Your Trivia Test:

Q What other animals can be the culprits for tree damage caused by stripping the bark?

Answer
Mice, voles, deer, bears — and porcupines.



Tom O'Brien of San Antonio, Texas, will receive a Hitachi 18V Lithium-Ion Cordless Circular Saw (C18DSL) for having a contribution selected for the Trivia page.

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