

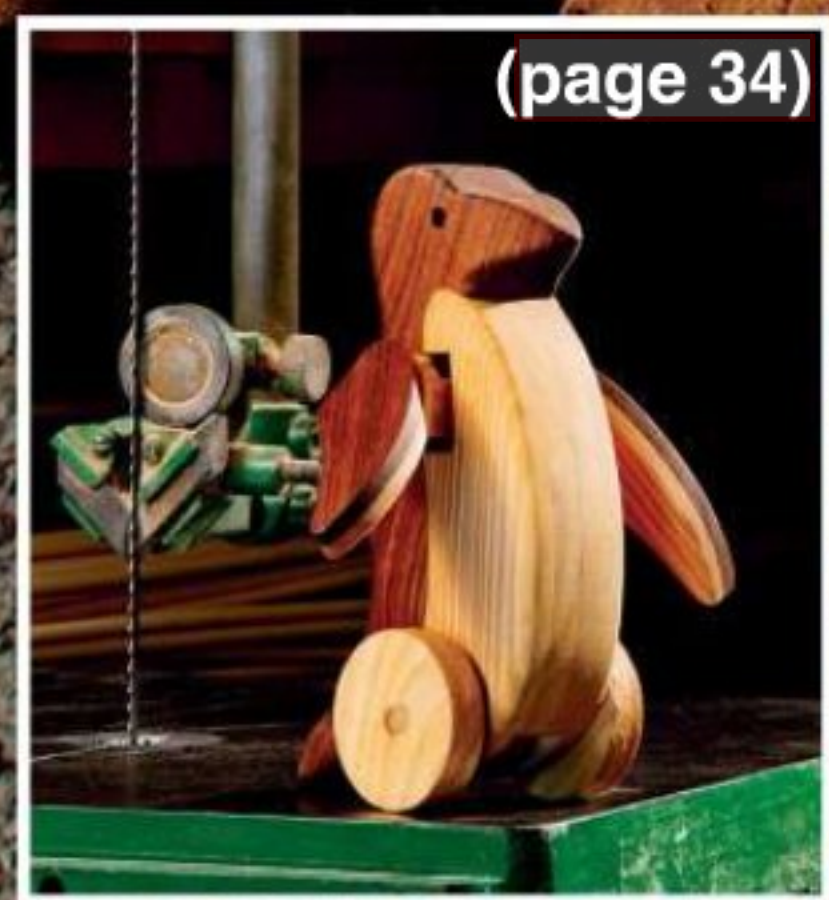
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(page 34)

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Stylized Spice Rack



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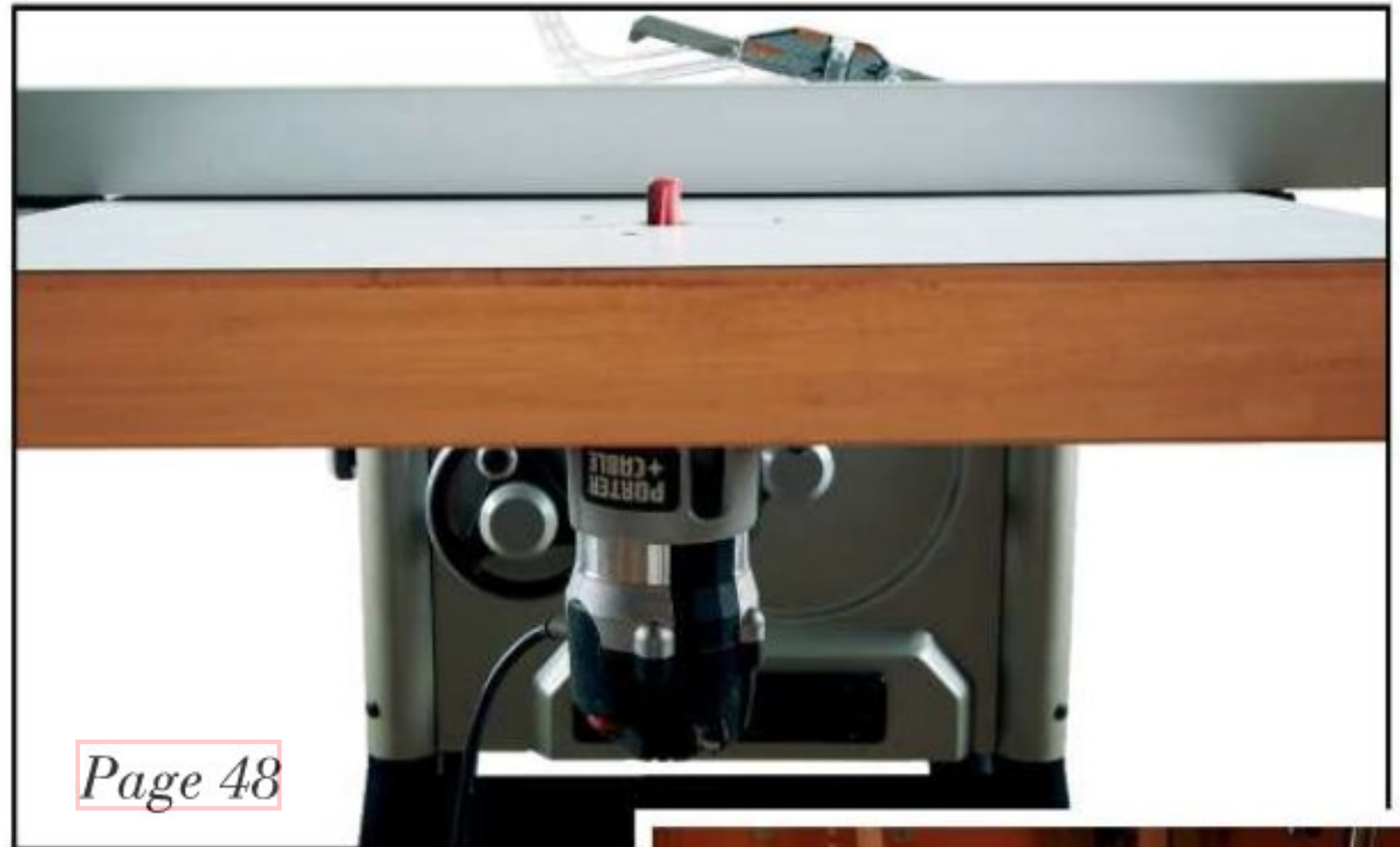


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The Well-Tailored Penguin

By David Wakefield

A pivoting flipper arm gives animation to this Adelie penguin.



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Router Table Insert

By Bill Wells

Turn the extension wing of your table saw into a router table, with built-in dust collection.



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Greene & Greene-Inspired Bed

By Chris Marshall

This master bedroom showpiece highlights style details inspired by the Arts & Crafts icons.



Spice Rack

By Kimberly McNeelan

Templates create a stylish spice rack, which you can easily craft with basic tools in a small space.



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FOR WHEN SMALL DETAILS MATTER

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I've got big news: We've got a new website! *Woodworkersjournal.com* has been completely transformed. The new site features the same outstanding content you've come to expect from us, but it's presented in a new, state-of-the-art online experience that works equally well on your home computer or mobile devices. That means you can access our content just about anywhere — your workshop, the lumberyard or even killing time in line at the DMV.

One look at the new site and you'll notice larger photos, easier-to-read text, and more video, including a new video gallery page that's easy to navigate and search.

This list of updates is too long to share here, so your best bet is to go to *woodworkersjournal.com* and check it out for yourself. We know you're going to love it!

—Dan Cary

Follow our Facebook page and other social media channels for daily updates, tips and fun stuff, including great sweepstakes. Right now we're giving away a table saw from Baileigh!



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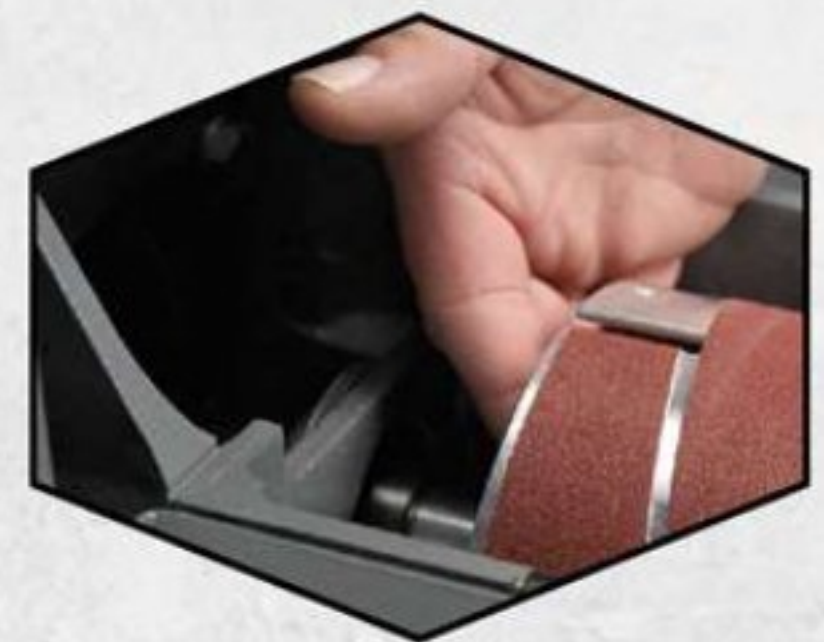
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Where is Your Shop Going?



TURN AROUND — AND WHAT DO YOU SEE?

In the old song, "Turn Around," a mature man observes that he just seems to turn around and his children have grown, changing his life significantly. That experience is repeated in many aspects of our lives — and, as I observed in my workshop the other day, woodworking has not been immune to change. While the changes in woodworking are likely not as melancholy an occurrence as your children growing up and leaving home, when I looked around my shop I was struck by the fact that I missed some things. True, I do not miss my high-speed steel router bits or my old 4x24 belt sander that looked like (and weighed as much as) a locomotive, but I did feel a bit of nostalgia for the inches of wood shavings that used to surround my jointer at the end of a day. Once upon a time, sharpening my tools took an afternoon and some elbow grease. Now, a few minutes and the flip of a switch. Which leads me to ponder: what about you? Does your shop look different from when you started woodworking? Has it (I hope) changed for the better? Do you miss anything from "back in the day," or are you happier with the advancements that have graced so many of our workshops?

— Rob Johnstone



Charger Timer Automated

I was a little disappointed to read about [the Pick of the Tricks selection in *Tricks of the Trade* in the October 2014 issue]. This is an unnecessarily complicated solution requiring human involvement every time it is used. For at least 10 years, I have always used a six-hour windup timer built into a duplex electrical box. All my chargers can be plugged in and the timer wound to two hours. Then I can forget it. I never have to worry about cooking batteries, overcharging, etc.

John Hoerner
Birmingham, Alabama

I read with interest the methods used to control the possibility of overcharging batteries (*Tricks of the Trade*, February 2014 and October 2014). I add an inexpensive 24-hour timer and set it for the number of hours recommended

by the battery manufacturer. This way I can disconnect the charger the next day without overcharging the battery. Adding the light to the system is also a good idea so one will realize the next day that the timer needs to be unplugged.

John Lysaker
Sunriver, Oregon

Cider Press Finish

Regarding the question about the best finish for a cider press [*Questions and Answers*, October 2014]: My father-in-law passed along a very old cider press to us since we

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Jim Mead had something to say about finishing a cider press: he's been using this one for three years.

have a few apple trees. After a thorough cleaning, the only restoration needed to make it functional was building a new hopper for the grinder, for which I used hard rock maple and stainless hardware. The

press and grinder need to be sanitized before and after each cider-making session by rinsing with a hose, followed by water and detergent, followed by a dilute bleach solution, and finally a last rinse with the hose. To protect the press from all this rinsing and from absorbing apple juice, I use mineral oil to lubricate the grinder and lightly coat all the metal. For the wood, I use a butchers block wax based on food-grade mineral oil and beeswax (George's Club House Wax or Butcher Block Conditioner by Howard). I reapply at the end of each year when we're finished for the season.

Jim Mead
Apex, North Carolina

It Came in a Dream ...

I'm a knife maker. After several knives, I have to cleanse my brain by making something different. That's where your wonderful, idea-filled magazine comes in.

I built a Civil War chair to your patterns [August 2012]. It turned out really nice. Then I had a dream one night: my wife and I were just done

fishing, and I went to fold up our two chairs, but it was one chair for two people. I had to make one. As soon as I saw this elm branch in the woods, I saw a rocking chair. I came up with this idea, a dual-purpose chair. Pull the pins and it's a regular chair.

Jim Wydra
Keewatin, Minnesota

"Teaching" Woodworking

I am writing in response to your invitation in the October 2014 issue ["Who Have You Taught?", *Letters*] to tell you "how you have fared sharing the craft of woodworking."

I am a self-taught hobbyist woodworker. So, in effect, the first person I taught to do woodworking was myself.

I have also engaged my elder daughter, Mary-Alis Kelly, to work with me on what we term "Woodworking Wednesdays." She comes over at about 8:00 a.m. each Wednesday, after delivering her children to school, and we work together on our projects — with a short break for lunch — until she has to leave to

Continues on page 12 ...



An elm branch found in the woods inspired a rocking version of our Civil War chair. Pull the pins on Jim Wydra's version, and it's a regular chair again.

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pick up her youngest daughter around 2:45. We have been doing this for the past 10 years now, from the time her youngest child was about a year old.

We began with simple projects and with each new project try to incorporate new and more challenging ideas. Many of the projects have also required new machines: a planer, a mortiser, etc. It is always fun to be able to rationalize buying a new tool!

I feel pretty sure that I have created a lifelong woodworker in my daughter.

Even better, this past spring and summer I have been introducing my 15-year-old granddaughter to woodworking. We have begun making boxes, progressing in difficulty with each one. Her interest began in a SciTech class at her high school, where she had to use a band saw to construct a project in triplicate. She was the band saw whiz of her group of four. She is so much fun to work with!

William W. Kibler
Austin, Texas

I started my woodworking career in 1975 when my wife bought me my first table saw.



William Kibler and his daughter, Mary-Alis Kelly, have been learning new woodworking skills with projects like these for over 10 years. Now a third generation is getting into the act.



We have three sons and none of them was the least bit interested in working with their hands [until] my youngest son showed me a picture of a poker table and asked if I could make it. I said yes. We have since sold 2,000 tables. I am pleased to say my sons are now woodworkers extraordinary, at least in building poker tables. I am glad they will now have this knowledge to pass on to my six grandsons.

Michael Stine
Lakeside, California

"Teach" is not how I would describe what my sons picked up from me over the years. I started fooling around with wood and building projects in 1960 [as a] young married, our firstborn not yet two years old. I built board games, fixed chairs, etc., to pick up some extra money. Four sons and a daughter later, and I was still fooling around with wood as I or someone else needed something: tackle box, hobby kits, fishing lures and so on.

All this time, my sons were watching and learning. They would help and do what they could and I would encourage as needed. The pleasure I get today is when they send an email with pictures of their most recent project completed and say "Thanks, Dad, for giv-

ing us the ability to try and do the things that we do; without you we would never have tried anything like we have."

Proud is not the word to describe how I feel about what they can do because they watched me and learned.

John P. Cich
Apple Valley, California

I wanted you to know the love of woodworking is still going strong in our family. I have been a woodworker for 60 years. We have two sons who grew up in sawdust and wood chips and have developed the love and appreciation of making something out of wood. Both sons are accomplished woodworkers, having started making simple things at a very early stage.

Due to health problems, I had to give up the shop a few years ago and divide the tools between the boys. Our youngest son lives out of town, and his calls to me are about all the latest techniques and products available. I can live through his experiences all over again even though I no longer can work in the shop. He always tells me how much it means to him that I passed on this knowledge. Although this isn't his primary

Continues on page 14 ...



Parents and grandparents share the love and lore of woodworking.



Some Woodworker's Journal readers are officially shop teachers, but they're not the only ones who've taught someone about woodworking.

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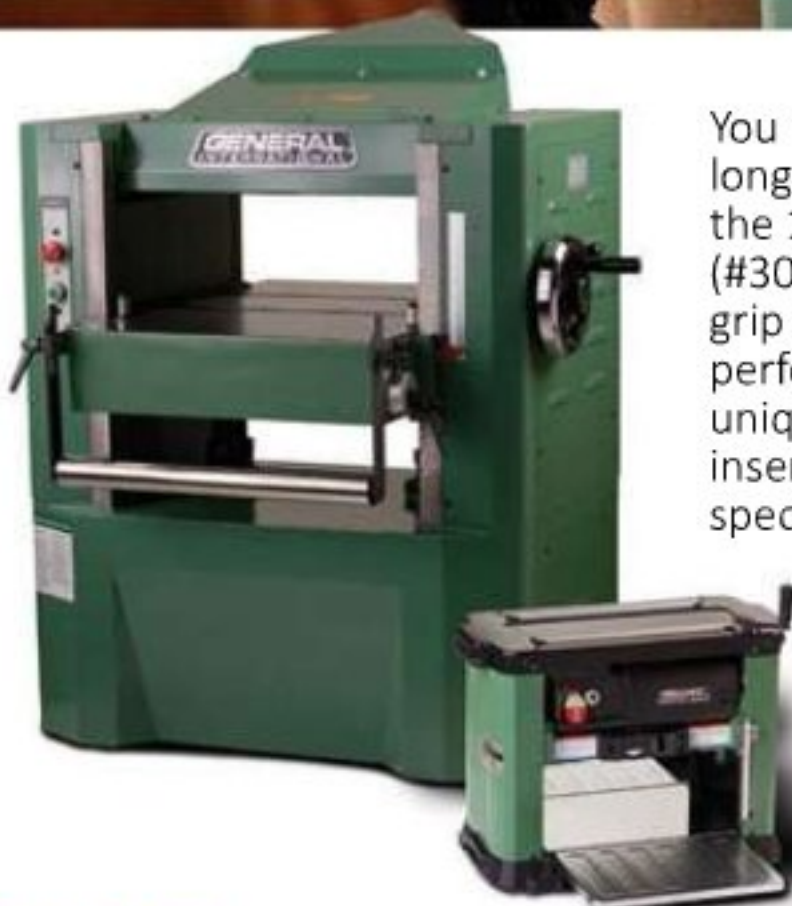
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Correct sanding process from Step-by-Step to a Perfect Finish DVD (video)

job, it has become a love and outlet for him that he will always treasure.

Floyd Blake
St. Louis, Missouri

I have been a shop teacher for 30 years in public schools (high school). I also taught 39 years one night a week for college (adults, senior citizens, etc.). It was rewarding to see folks very interested in my expertise, and really wanting to learn: some to get another job, others for a hobby, etc.

I have one student who started his own cabinet shop; another opened a store selling lumber and wood products and hardware. I had another student start in carpentry and move up. Now he is a superintendent.

I taught cabinetmaking and carpentry, home maintenance, furniture repair, millwork, an-

tiques, some math and technology, and varied subjects.

There is a real difference between vocational cabinetmaking, carpentry and technology.

As for home learning, my younger son liked the fine work and helped me in my home shop. The older son liked and is real good at carpentry (finish or rough).

Fred Schmidt
Baltimore, Maryland

Why Haunched Tenons?

This may seem dumb but in the article, "Outdoor Storage Chest" [October 2014], a breadboard end of sorts is part of the top or lid.

I understand the reasons for the lid ends with the elongated holes for the dowels and use the technique frequently. What I don't understand is the need to use haunched tenons. Because of wood movement, it seems that the haunch is of little value in the strength of the assembly.

Why use the haunched technique in this application? Wouldn't a full-width tenon work as well in this application?

Rich Flynn
Huntington Beach, California

WJ Responds: Good question you raise about the need for a haunched portion on a long breadboard end, like the one we have in the deck box project. Here's my best attempt at an answer.

If you were to cut a continuous, deep mortise to house a full-width tenon, you'd be removing a lot of material from the lid ends. That would weaken the walls of the mortise unnecessarily. Once the walls are thin and flexible,

Why did we use haunched tenons in the Outdoor Storage Chest? Read the answer below.

they could warp out and provide an uneven joint seam.

By cutting a series of shorter mortises for narrower tenons, you leave more material in the lid ends and limit the length of those long, deep mortise walls. Conventional wisdom is that the haunched sections between the tenons help keep the lid ends aligned with the center panel all along their length (keeps the full length of the joint interlocking). Since the process for raising the initial tenons provides material for the haunch, it sure doesn't hurt to leave it there. In a sense, you really could consider this to be a full-length tenon; it just has long sections and short sections (regular tenons and "stub" tenons, if you will).

There are always more ways to skin a cat. If you've had luck running continuous tenons into deep mortises for your projects, stick with it. Go with what works. I tried doing it that way on an end table once, with a 3/4"-thick top and 1/4"-thick mortise walls, and I can literally squeeze the mortise walls and flex them down, depending on the season, in the finished joints. Bugs me every time I try it.

— Chris Marshall



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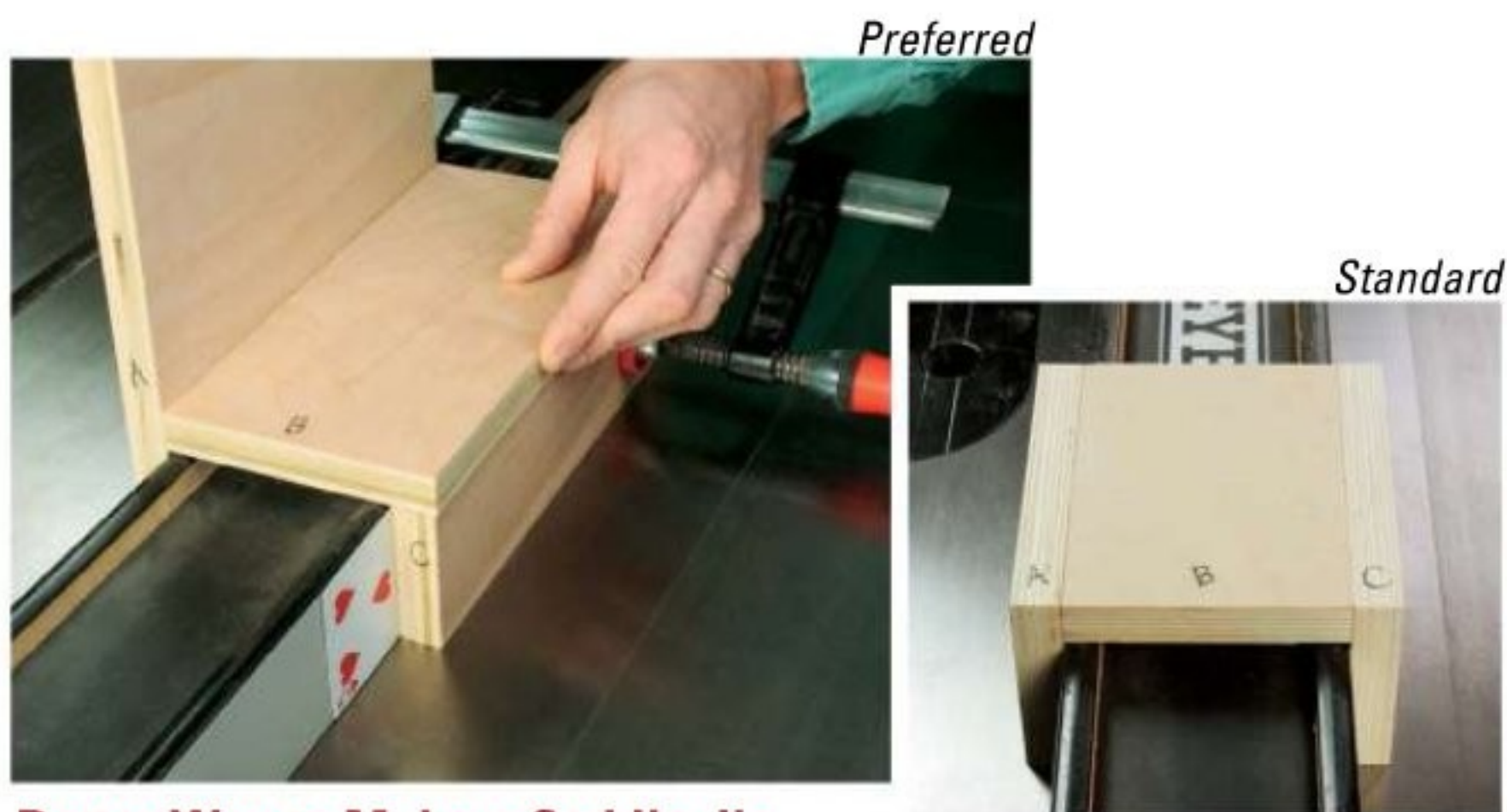
Tested and photographed by
Chris Marshall



Nitpicky Sander Solution

When the “loops” on a sander’s hook-and-loop pad become clogged with dust, the sanding discs won’t cling properly. Here’s a simple fix: Buy a nit comb at a pharmacy. They’re sold for removing head lice eggs, and the metal tines are much closer together than a standard hair comb. Drag it across the sander’s pad vigorously, and the tines will clear the debris easily without harming the loops. Works great for cleaning other hook-and-loop items, too.

David Thomson
Carson City, Nevada



Better Way to Make a Saddle Jig

“Saddle” type jigs that fit over and slide along a table saw’s rip fence are handy for many purposes. Most of the designs I see look like the inset photo here, where spacer “B” is sandwiched between the “A” and “C” facings on either side of the fence. But, getting the sizing right for the sandwiched piece can be tough: too wide, and the saddle is too loose for an accurate jig. If it’s too narrow, the jig binds on the fence. I prefer to make mine with the “B” piece overlapping “C” and butting against “A” instead. That way, I can slip a couple of playing cards next to the fence when I assemble the saddle to give it just the right amount of sliding clearance, and there’s no trial and error to get a spacer sized correctly.

John Cusimano
Lansdale, Pennsylvania

Dial in Your Jointer Cuts

The factory depth gauges on most jointers aren’t very accurate. Even the best jointers seem to have flimsy and crude “pointer” style depth gauges. Here’s the simple improvement I made on mine: I fabricated a pair of aluminum brackets and mounted a dial calipers to one of them. The other bracket is a contact point for the caliper’s index pin. Now, I can set my jointer’s infeed table to thousandths-inch cutting depths with ease.



Willie Sandry
Camas, Washington



Magnetic Featherboard Stop Block

Recently I needed to crosscut many small pieces to the same length, and I was about to make a shop-built stop block for this task when I happened to look over at my magnetic featherboard. I flipped it around backwards to the non “feathered” side and locked it down to the part length I needed. It offers great cutoff precision and doubles the utility of your featherboard.

Bill Wells
Olympia, Washington



Another use for Wrenches: Planer Thickness Gauges

Woodturners often use this technique to size tenons on spindles, but it works just as well for planing. I keep various sizes of open-end wrenches attached to my thickness planer on a magnetic strip. When I need to plane lumber to a standard thickness — say, 3/8" — I use a 3/8" wrench to check my progress. It's a lot quicker and more accurate than a tape measure: when the wrench just fits over the workpiece, I know I'm done planing.

Jeff Dees
Ethel, Mississippi



In addition to our standard payment (below), Jeff Dees of Ethel, Mississippi, will also receive a RIDGID 10" Dual Bevel Miter Saw (R4112) for being selected as the "Pick of the Tricks" winner. We pay from \$100 to \$200 for all tricks used. To join in the fun, send us your original, unpublished trick. Please include a photo or drawing if necessary.

Submit your Tricks to Woodworker's Journal, Dept. T/T, P.O. Box 261, Medina, MN 55340.

Or send us an email: tricks@woodworkersjournal.com

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.

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Questions & Answers

Can I Soup Up My Saw?

THIS ISSUE'S EXPERTS

Rob Johnstone is publisher of *Woodworker's Journal*.

Bob Behnke is the technical service manager for Titebond products.

Michael Dresdner is a nationally known finishing expert and the author of *The New Wood Finishing Book*.

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 I have the DELTA hybrid table saw with 1¾hp motor. My motor is going south. Can I replace it with a 3hp motor? I could get my frame rewound to a 2hp but would rather have a 3hp. I am just wondering if the shaft and bearings will stand the 3hp.

Ned Woodard
Walton Beach, Florida

A The answer to whether the drive components will hold up to a larger motor is "maybe."

If you are asking for my advice, I'd say go for it. You would, of course, need to step up to 220V circuit, as 120V will not power a 3hp saw.

If you ask the manufacturer, I am sure they would say "Don't do it," but over the years a lot of folks have switched motors on saws and other machines.

You just need to accept the possibility that the larger motor may cause problems. For example, a saw designed for a larger motor will likely have more than one drive belt



Can you replace a table saw motor for more horsepower? And, if you do, what are the consequences?

to transfer the motor's power to the arbor. A single belt (which is what you have on your hybrid saw) will not be as robust and is not going to perform as well. (It may break, get worn out in a hurry, etc.) The pulleys that the belt runs in might not be up to the task and may fail at some point.

What I want you to know is that you won't be getting the performance of a \$2,000 cabinet saw by upgrading the motor on your hybrid.

— Rob Johnstone

A When cyanoacrylates come into contact with cotton, leather or wool, it can result in a rapid reaction or polymerization. The reaction is exothermic (gives off heat), and the heat can boil off the cyanoacrylate in the air, forming white smoke-like particles that can drift and set off the alarm's particle detector. Use a polyester or nylon cloth instead of a cotton one, and apply the glue in thinner coatings.

— Bob Behnke



Don't try this at home! Just take some simple steps to avoid having your CA glue set off your smoke alarm — and stay safe!

Q I was recently caught off-guard and a little confused when my smoke detector in my workshop went off. I naturally started looking around thinking it was a fire, but nothing was burning or smoking. When the detector stopped, I continued my gluing, and again the smoke detector went off. I then realized that the CA glue was causing the smoke detector to go off. Does anyone know why this is happening?

Amy Nielsen
Maple Valley, Washington

Q I am ready to wipe down my Eastern black cherry and bloodwood inlay bookcase. I'm not a big fan of tack cloth to clean the wood pores. To your knowledge, are there any drawbacks of using naphtha, other than the safety precautions? My intentions are to use Minwax® fast-drying polyurethane, clear semi-gloss, applied by hand — no brushes of any sort.

Dennis Benz
Klamath Falls, Oregon

Continues on page 20 ...

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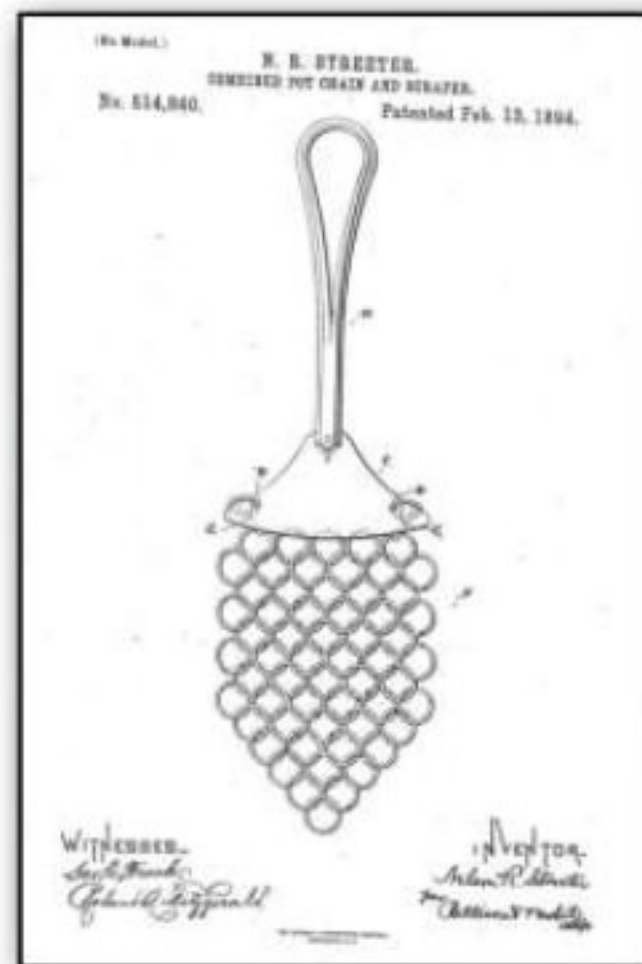
Stumpers

A Kitchen Tool

Mystery solvers threw their answers into the pot.



Patented in 1894, this tool was the Brillo® pad of its day.



What's This?

William Rosevear of Spokane, Washington, found this item in a parts organizer he got from his grandfather about 20 years ago. Neither he nor any of his woodworking friends know what it is. Do you? 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.

Speaking of the mystery tool from the October 2014 issue, **Steve Wirts** of Washington, Indiana, said his family "jokingly called it a salesman's sample for a suit of armor."

Dr. Jack Gruber of Sylva, North Carolina, added that the item belonging to **Tom Mitchell** of Perham,

Minnesota, "has little to do with woodworking except to clean the pots and pans after the hungry craftsman eats."

Sue Stehling of Victor, New York, among others, identified it as an "antique pot scraper or scrubber." "It was generally used on cast-iron skillets and pots," said **Denton Hushaw** of Hot Springs Village, Arkansas.

"More than a hundred years ago, before the time of abrasive scouring pads, this was the kitchen tool used in dishwashing," said **Charles Kimble** of Bremen, Indiana.

"We have to remember that back in the good old days cooking was done in a cast-iron skillet, so grandma did not have to worry about scratching a delicate surface,"

said **Rod Stevens** of Fairbury, Illinois.

"The rings are the scouring part, and the end of the handle where the rings are attached can be used as a scraper for really thick residue," explained **Keith Hoke** of Dauphin, Pennsylvania.

Russ Ellis of Springfield, Massachusetts, noted that he "found one listed in a 1902 Sears catalog, page 572, listed as the sensible pot chain and scraper for 8 cents."

Several readers own one of these items. **Walt Littleton** and his wife "have collected primitive kitchen items for many years," and he says that Tom Mitchell's pot scraper "is a nice one because it's hard to find one that still has the handle." **Don Carlin** of Henderson, Nevada, inherited one that originally belonged to his grandmother; "My mother passed it on to me last year just before she passed away at the age of 101."

And some still use them. **Marshall Johnson** of Mechanicsville, Pennsylvania, said, "I have a smaller version I have used at church suppers, after explaining to the other cooks what I was going to do with this piece of chain mail on a handle."



Winner! Phil Gilstrap of Norman, Oklahoma, wins a Hitachi 18V Lithium Ion Brushless Hammer Drill & Impact Driver Combo Kit. We toss all the Stumpers letters into a hat to select a winner.

Questions & Answers continued



What benefit do you get from wiping down with naphtha?

A Can you wipe down a piece with naphtha? Yes. Do you need to? No.

If you don't like tack cloths to remove sanding dust, use a damp cotton cloth. Wet it, then wring the water out completely so it is only damp, not wet. It will do a great job of removing surface dust: it leaves no residue, is quite a bit cheaper than either naphtha or tack cloths, and it can be reused again and again. Just throw it into the washing machine between uses.

When would you wipe down a piece with naphtha? I can think of only three times you'd do that. The first is if you had to remove some oily or waxy surface residue whose solvent was naphtha. That's rare.

The second is to reveal glue spots. While they may be invisible on recently sanded wood, glue spots will show up immediately under a naphtha wash.

Finally, you can use naphtha to see the true "wet" color of the wood. Sanded wood is lighter than it will be under a finish. Wet the wood with naphtha and you'll see if you need to stain it, and if so, what color stain to use.

— Michael Dresdner

Q I'm making mitered picture frames for a series of family photos that I'd like to hang in our home's entry hall. But my first attempt at cutting frame members using a miter gauge on my table saw fell far short: Even though I set the gauge to 45° very carefully, all

of the frame's mitered corners were off, resulting in unsightly gaps. What's the best way to cut these joints perfectly?

Marilyn Norberg
Hanalei, Hawaii

A There are two conditions that must be met to create a nice square picture frame with perfectly mating miter joined corners: 1. Each pair of miters must form a perfect 90° corner. 2. Each opposite pair of frame members must be exactly the same length. Although there are many ways to cut a good miter, I prefer to use a sliding jig with a table saw fitted with a sharp cross-



Using a miter jig on a table saw is one of the best ways to ensure perfectly matching mitered corners when you're making picture frames.

cut blade. This kind of jig, as shown in the photo (above) is guided by a pair of rails that slide in the table saw's miter slots. A pair of fences attached to the jig's thin plywood baseplate form a precise 90° angle, and orient both left- and right-hand frame members at 45° relative to the blade. The jig lets you make all your frame cuts without having to reset the jig (or, as in the case of miter saws, reset the blade angle for right- and left-hand cuts),

and each pair of cuts form a frame corner that's exactly square. Plus, you can use the jig to cut both flat stock and frame stock that's shaped on one surface and/or edge. If the picture frames you're making aren't too large, you can also clamp or screw stops to each of the sled jig's fences, which assure that opposite pairs of frame members are cut to exactly the same length.

— Sandor Nagyszalanczy



Winner!

For simply sending in her question on CA glue, Amy Nielsen of Maple Valley, Washington, wins a **General International 7-piece Deluxe 8" Dado Blade Set** (item 55-185).

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



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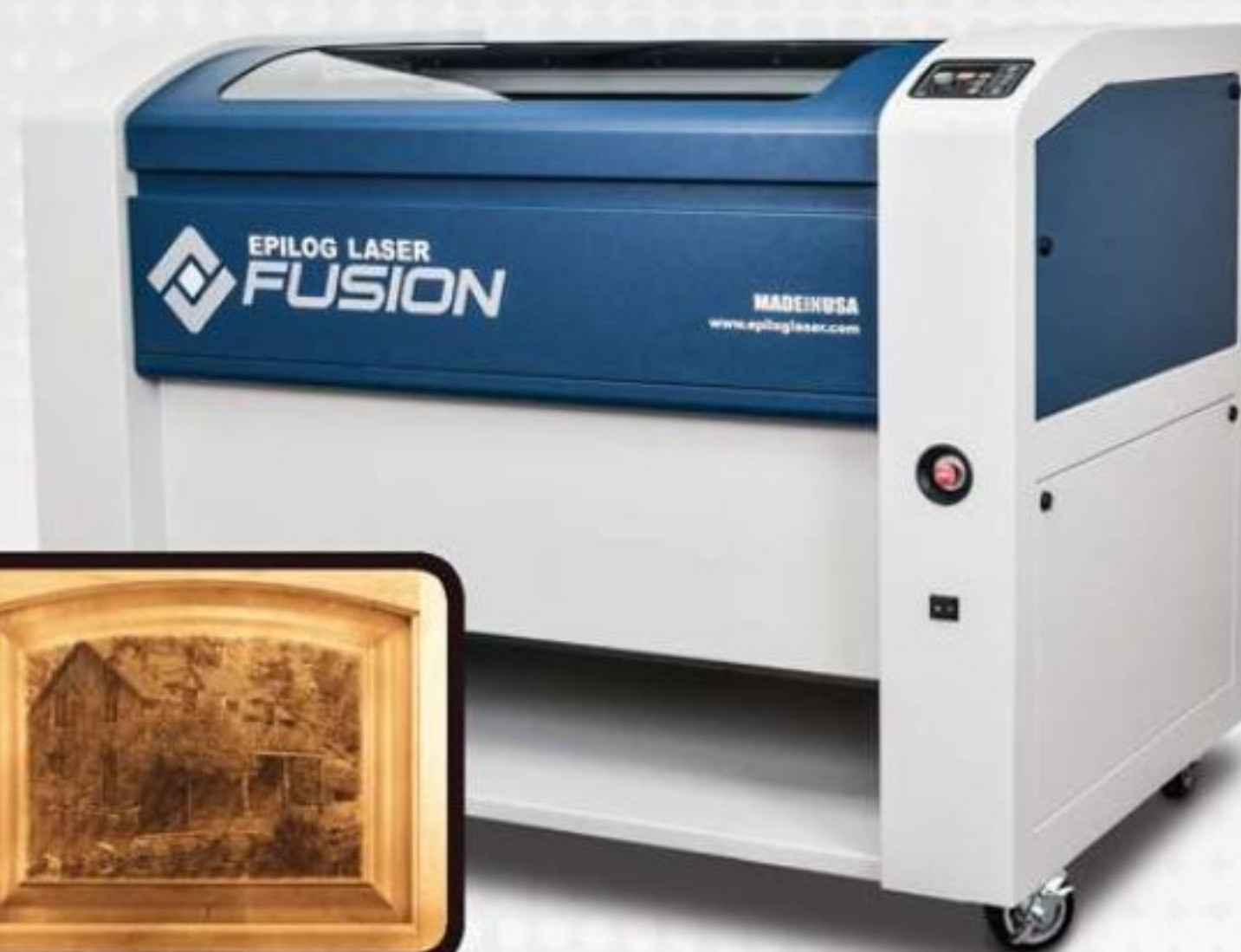
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Help Desk Furniture Operates in Uganda



Brice Aarrestad used a Ugandan “locally made” mortising machine (a motor on one end with a shaft connected to a drill chuck) to bore holes in a bench frame.



Architecture Student's Business Supports Carpenters, Schools

Impressed with what Ugandan carpenters have been able to accomplish, “often with just a hacksaw,” Brice Aarrestad has founded Help Desk Furniture Co. to promote the carpenters’ talents, while also supporting Ugandan schools and putting his own skills to use.

The company setup: furniture made in Uganda, from sustainably sourced African hardwoods, will be sold to customers in the U.S., with profits funding Ugandan schools.

Brice first traveled to Uganda in 2009, on a two-week volunteer trip with Engineering Ministries International, acting as a designer and construction manager. He participated in another two-week trip in 2010; moved to Jinja, Uganda, for a 1½-year stint in 2011; and spent another five weeks there this past summer.

Last summer’s work included finding potential local workers with whom to partner, and building some prototypes. “There are workshops throughout the area, kind of like a warehouse, where carpenters will rent a corner of space. I went to those and asked around,” plus got recommendations from expatriates, Brice said.

Most Ugandan woodworkers do a lot of their work with hand tools, Brice said. “It might be old Stanley #5s they got from the Brits who

colonized the area. Antique tools are in regular use.”

The Ugandan carpenters do have power tools; again, “Some are relics from the imperial times of the Brits. They keep them working as best as they can,” Brice said.

As he worked with the local carpenters last summer to make prototypes for Help Desk Furniture products, “The guys I was working with, it was the first time they’d seen a tapering jig. They wanted to know ‘Why don’t we just hand cut everything?’ After passing a couple of legs through, they realized pretty quickly the benefit of using jigs.”

Among those prototypes were tables built in a mid-century modern style. “I think it works well with their skills – it’s simple to build, but the key is in the details,” and fits his own personal design preferences, Brice said.

“Right now, the Ugandan style seems to be locked into



With this Ugandan tilt-top table saw, the lower the angle, the deeper the cut.



A crowd of craftsmen who had never seen a circle jig used with a router observed Brice's setup.

a Victorian sensibility," he added. "Every guy seems to be making the same design as the guy next to him."

In part, that's due to demand. "If the locals want a bedframe, they want to pay as little as possible," Brice said. "The market isn't there for quality work – but the desire is there," on the part of the carpenters. "They realize we're paying for quality, and they're excited about that."

A portion of the profits from Help Desk Furniture Co. will also go to supporting Ugandan schools. "If you've got an existing school that needs maintenance, there's not a lot of funding," Brice said. "They might have 40 students in a class and enough desks for 10, and the desks that are there are probably 30 years old."

The desks and many other Help Desk products will use the same types of woods the Ugandan carpenters are likely to use for local commissions.



Ugandan carpenter Robert Machi (left) provided support as Brice Aarrestad routed a mugavu wood tabletop using a circle cutting jig.

Mvule (*Milicia excelsa*) and mugavu (*Albizia coriaria*) are "both pretty dense woods. They're a little more difficult to work with, but they're gorgeous," Brice said.

Sourcing them sustainably, however, is a challenge of working in Uganda. The one forestry officer in the Jinja region is understaffed and underfunded. At least at first, Help Desk Furniture will work with private landowners who have timber resources, plus the forestry officer, making every effort to document that the wood is being harvested in a legal manner.

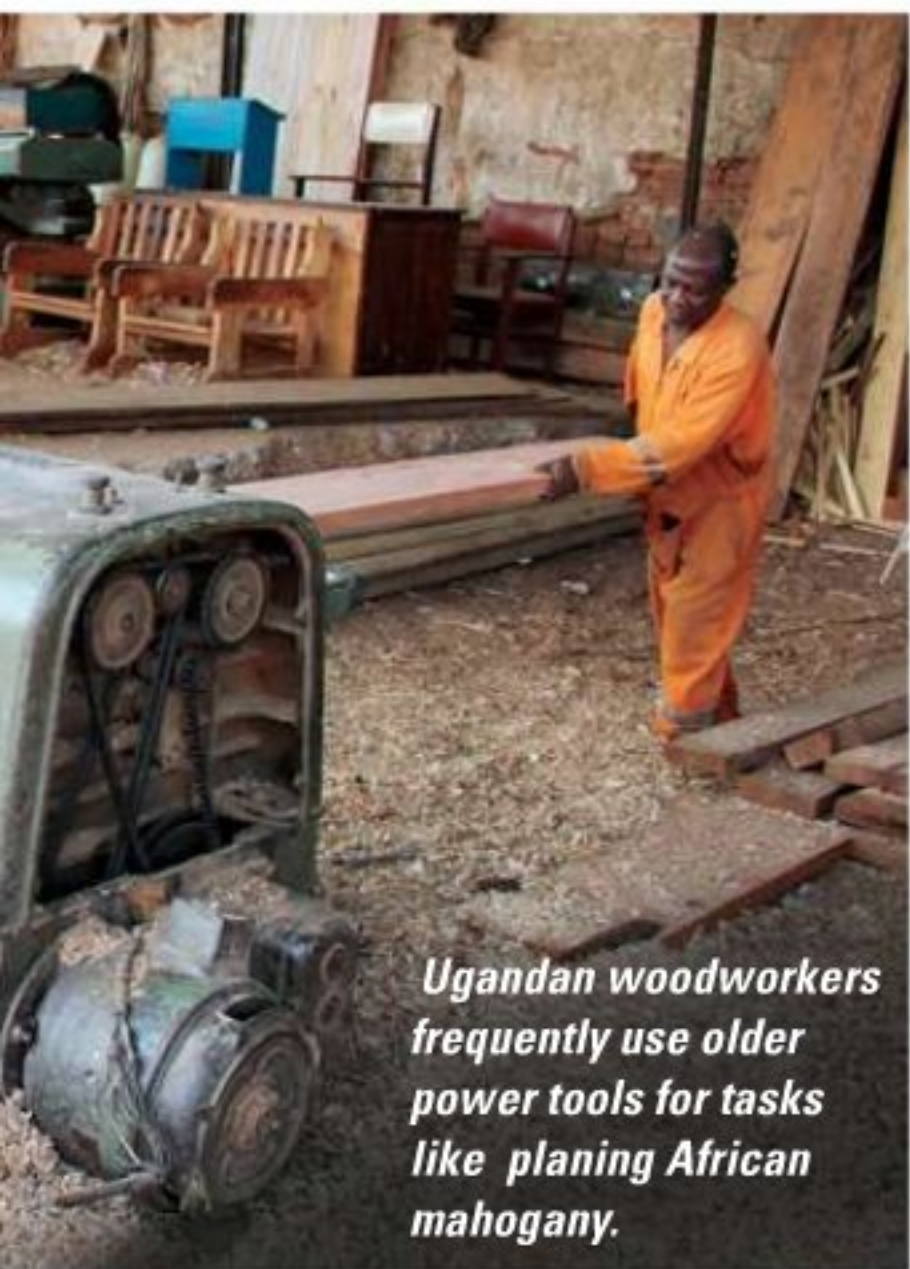
When a production facility is set up in Uganda, Brice and his wife Meredith would likely move back to that country. For now, however, Brice is concentrating on finishing his master's degree in architecture at the University of Minnesota (he should graduate in May). He's also moving forward on the next steps for Help Desk Furniture Co.: "securing investors and funding; finding retailers to pick up the line; and finding advisers interested in helping me shape the future of this and bringing things to market," Brice said.

For more information, visit www.helpdeskfurniture.com.

— Joanna Werch Takes



The "Help Desk No. 1" is made from African mahogany and steel legs.



Ugandan woodworkers frequently use older power tools for tasks like planing African mahogany.



This version of the prototype Strap Bench, shown next to the Nile River, is made from lufugo (*Celtis mildbraedii*).



**"On Eagle's Wings" - Vase
by Don Scott**

There's a whopping total of 120 precisely cut joints overall, including triple-mitered corner joints and several different kinds of complicated mitered mortise and tenons.

Van Winkle designed his large, freestanding cabinet, built primarily from walnut, after a similar one he saw on a trip to China. The unit has seven open display shelves, featuring panels covered in beautiful olive ash burl veneer. The lower cabinet, which sits atop a low base, has three drawers and two pairs of doors, all of which can be opened from either the front or back of the cabinet. A clever arrangement of magnets keeps the latch-less doors closed and automatically centers the drawers in their closed positions.

Donald told me that one of the trickiest aspects of building the cabinet was assembling its many parts. It took 11 different carefully planned subassemblies, glued up over as many days, to put everything together correctly (even the drawer pulls are each constructed from several separate parts). Overall, it took about 650 hours to build the piece.

One of my treats during my visit to the Design in Wood exhibition was spending time

Continues on page 26 ...

The 2015 Annual Design in Wood Exhibition at the San Diego County Fair will run June 5 to July 15. For more information, including registration forms and deadlines, visit www.sdfwa.org or call Ed Gladney at 619-251-4410.

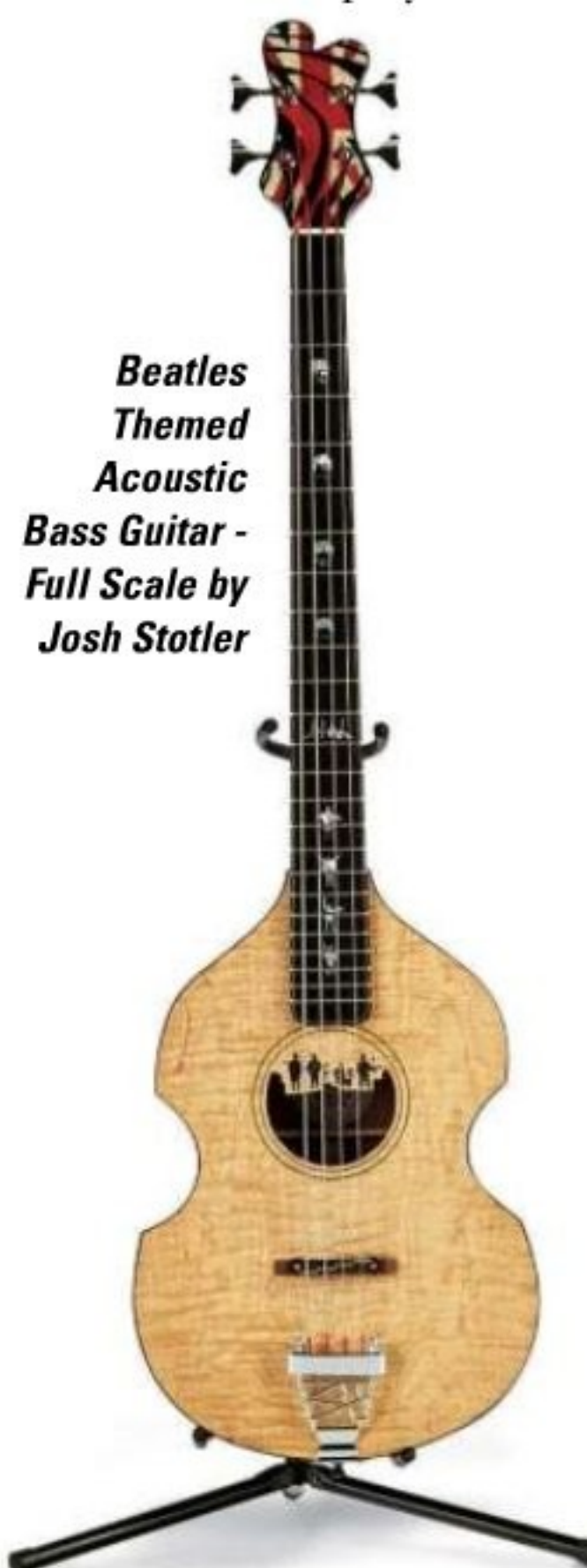
A Woodworker's Journal Judge Visits San Diego Design in Wood

One sunny Saturday this past May, I had the pleasure of previewing 2014's 33rd annual Design in Wood show at the Del Mar Fairgrounds, just north of San Diego, California. One of the most impressive — and largest —

shows of high quality woodworking in the country, the exhibit is part of the annual San Diego County Fair.

Cosponsored by the 22nd District Agricultural Association and the San Diego Fine Woodworkers Association (SDFWA), Design in Wood was founded in 1982 by the SDFWA's first president, Lynn Rybarczyk. This juried exhibition had 332 entrants last year, competing for 61 awards and more than \$20,000 in prizes. That's where I came in: I was there to choose a winner for the "Excellence in Joinery" award, presented by *Woodworker's Journal* magazine.

The piece I chose certainly displays excellent joinery in abundance. First-time show entrant Donald D. Van Winkle used seven types of traditional Chinese joints to build his "Chinese Display Unit."



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**"Chinese Display Unit" by
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"King of the Savannah"
by Chuck Collins



with show coordinator Bob Stevenson. Bob, an excellent woodworker in his own right, had been running the show since 1995. It's clearly a mammoth undertaking, organizing a gallery-style show that each year juries and displays an average of 270 to 310 pieces submitted from woodworkers all over the U.S. (with an occasional international entry). As Bob and I walked around the spacious 7,500 square-foot Mission Tower building that's home to the show, I was impressed with how well all the woodwork was displayed

and lit: Many of the larger pieces were organized into harmonious groupings and set on low platforms. Smaller and delicate work was displayed so it could best be seen, either atop tables or inside Plexiglas® showcases.

In addition to the gallery show, Design in Wood boasts quite a few additional events, including turning, carving and other demonstrations; and the use of traditional hand tools in a 19th century cabinet shop re-creation to make pre-school-sized oak chairs that are donated to local communi-

ty organizations. They've made over 1,600 of these small chairs to date.

My visit ended on a bitter-sweet note. The night after the judging, I attended an appreciation dinner where Bob Stevenson was honored for his 20 years of exemplary show stewardship. After he had passed the show's reins to SDFWA's special events chairman Ed Gladney, Bob told me that at least now, he'll be eligible to enter a piece in the show himself.

— Sandor Nagyszalanczy

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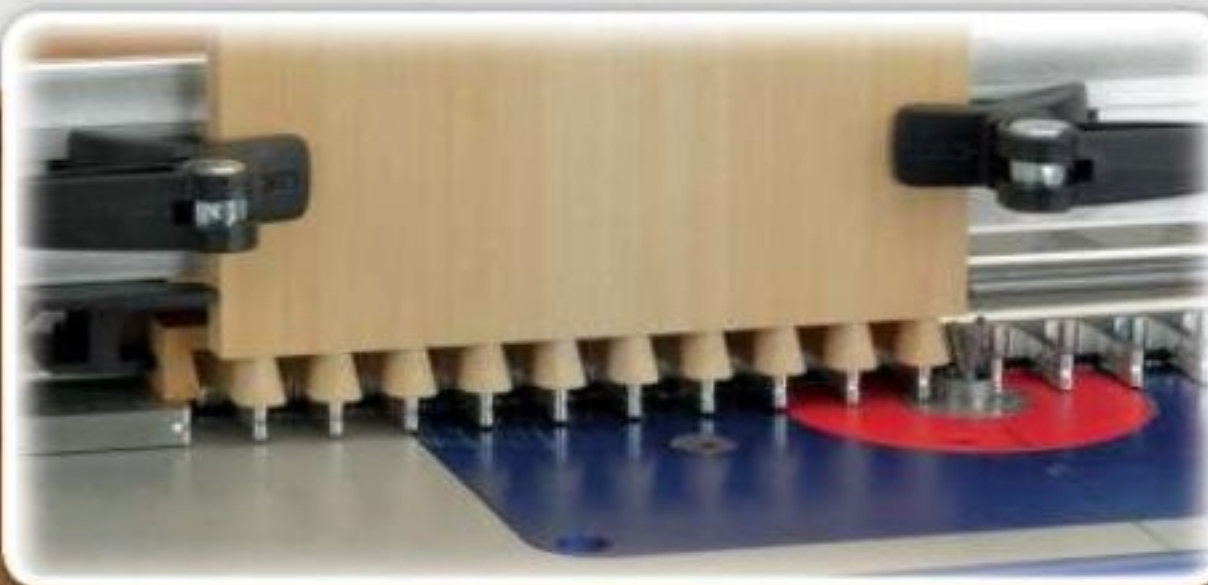
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Multi-Axis Turning: Legs Fit for a Queen

By Ernie Conover

Our author reveals how to use the technique of turning in more than one axis to create cabriole legs — a furniture feature made popular in the Queen Anne style.



www.woodworkersjournal.com **MORE ON THE WEB**

For a video of the author demonstrating turning a cabriole leg and marking the offsets, please visit woodworkersjournal.com and click on “More on the Web” under the Magazine tab.

Multi-axis turning is a furniture-making technique dating to the Queen Anne period. Queen Anne reigned from 1702 to 1714, but she never used a piece of her furniture, nor was the style called by that name until a century and a half later. The style really took off during the reign of George I, her successor, which is why the English call the style Georgian. It was tremendously popular in the Colonies, becoming the predominant style of the eighteenth century. There are fine examples in the collection

of Colonial Williamsburg. Elements of the Queen Anne Style are still used in furniture today, and a hallmark of the style is the cabriole leg.

Most cabriole legs were carved, which was expensive because hand work was, and still is, labor-intensive. Cabriole legs were also turned, in a fraction of the time that it takes to carve one. Turned legs were often employed for the back legs of furniture that would be against a wall when the client wanted to save some money. Turned legs were also used on small tables. Most of these legs were turned with

converging axes; the exception was the Hudson River Duck Foot chair, for which they were turned in parallel axes. (This chair is rarely made, but if you understand converging axes, parallel is a walk in the park.)

Turn in Converging Axes

Turners created the cabriole shape by turning the leg in two converging axes. The first step is to turn the foot of the leg with the blank chucked on center, as in any spindle turning. The area between the foot and the pommel, which is the part of the leg left square to accept the aprons, is also



The High Chest of Drawers above is a fine example of carved cabriole legs with piercing between the claws and the ball. It is signed by John Townsend and dated 1759. (Yale University Furniture Study Collection)

turned during this on-center chucking. Then the blank is chucked in a new axis with the bottom of the leg being offset considerably more than the top, but in opposite directions along the same diagonal between two corners of the blank. The idea is to have the two axes converge just below

the pommel. The leg is now turned in this axis with a lot of material removed at the bottom and practically none at the pommel.

Preparing the Billet

Billet preparation is very important in any furniture turning, but especially so

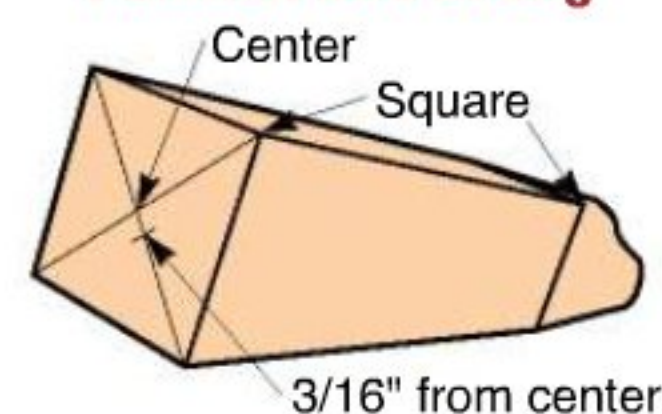


The author made the porringer table in the Queen Anne style, above. The original is in the collection of Historic Deerfield, Massachusetts.

for cabriole legs. For grain matching reasons, I try to cut all the legs for a table from one plank. Milling starts with jointing one face and one edge, then cutting squares with the table saw fitted with a high-grade ripping blade. Because the plank is slightly thicker than the desired leg dimension, a second rip cut is necessary, but I get perfect squares that are dead straight.

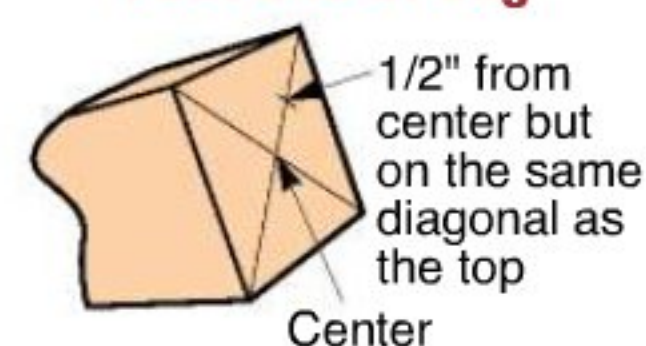
Very accurate layout is key to getting consistent results. That being said, I have demonstrated the turning of cabriole legs so many times that I can grab a billet of any size and turn a reasonable leg, guessing at the offsets once I

Pommel End of Leg



The top of the leg has the smaller offset of $\frac{3}{16}$ ". Draw diagonal lines to the corners. Center punch the center and $\frac{3}{16}$ " from the center on one of the diagonals.

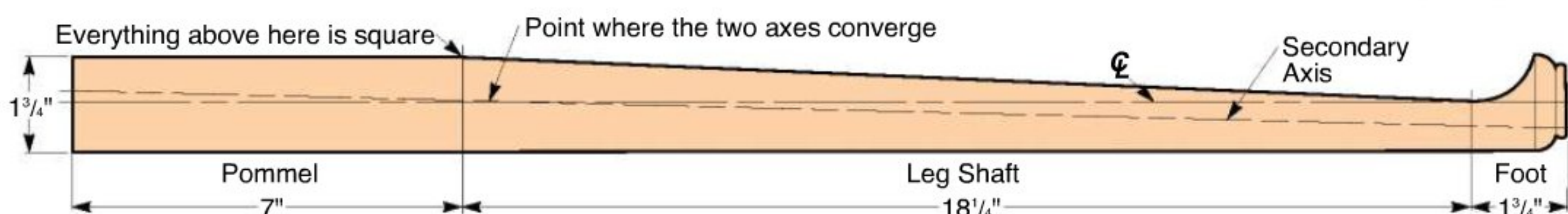
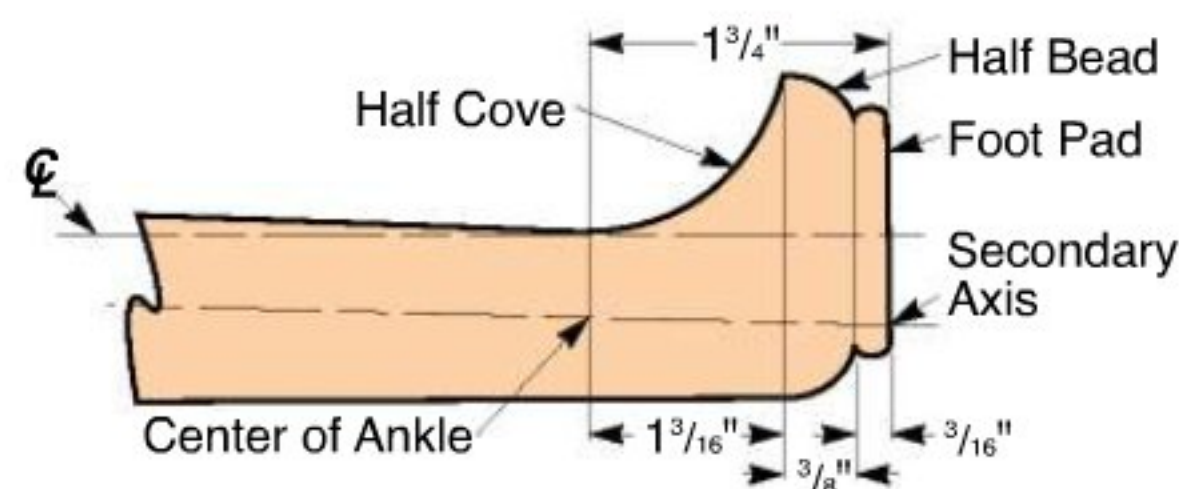
Foot End of Leg



The bottom of the leg has the larger offset of $\frac{1}{2}$ ". Center punch the center and $\frac{1}{2}$ " point (drawing above) from the center on the same diagonal as the top, but to the opposite side of the center.

Figuring the Offsets for A Converging Axis Cabriole Leg

The easiest way to figure the offsets is to draw the leg full-size on a piece of shelf paper. Draw a center line, the pad foot, the half-bead and the line denoting the bottom of the pommel, which is the area left square to accept the aprons. Now draw the half-cove that forms the top of the foot and the ankle. Draw a straight line from the cove that forms the ankle to the bottom of the pommel. Find the center of the ankle. Use a long straightedge to draw a line that crosses through the center of the ankle and slightly below the pommel on the center line. This will tell you the offsets on each end.





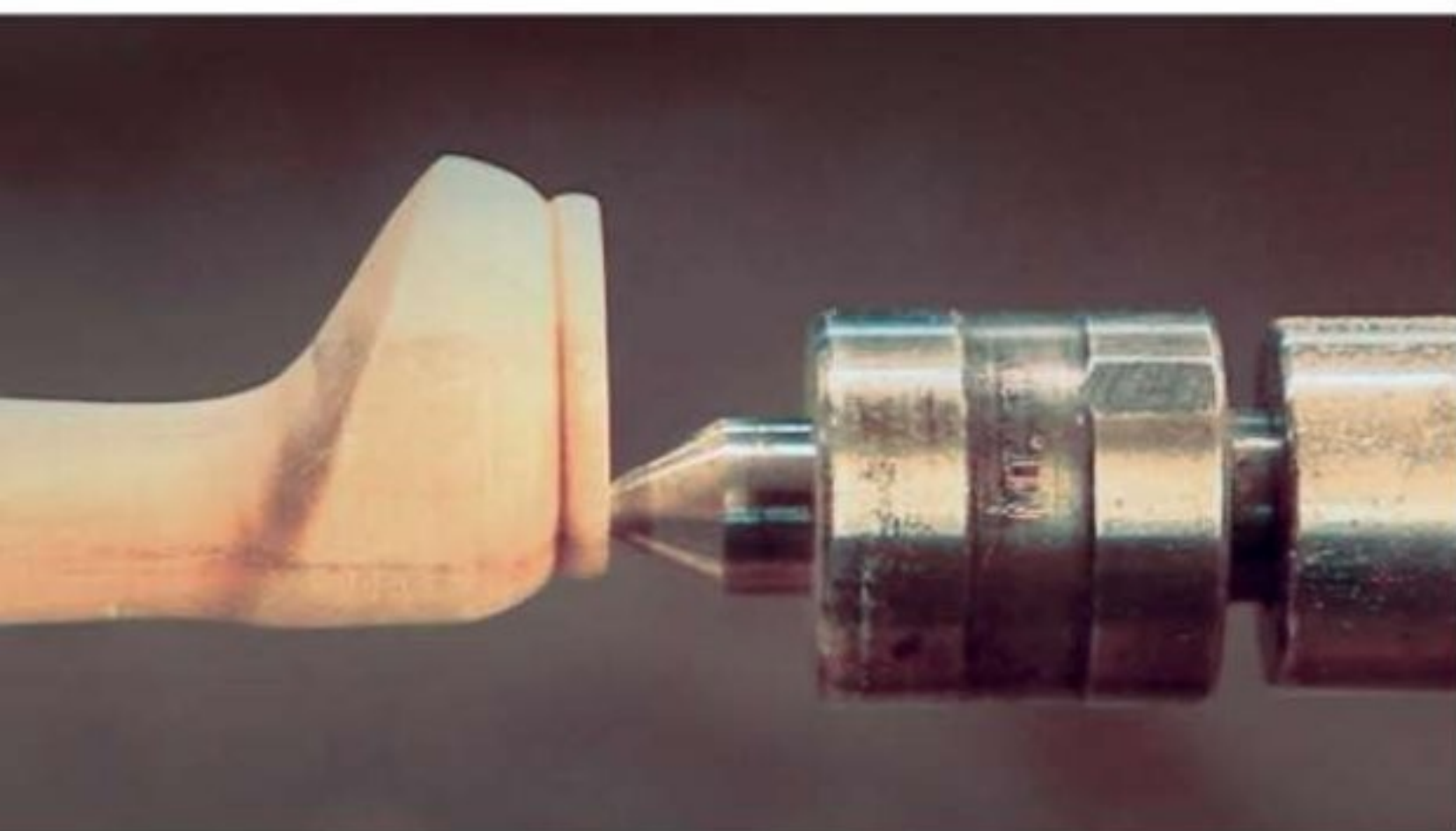
An automatic center punch (above) eliminates setting down the center finder and marking knife to punch marks.

Chuck the billet on center to turn the pad foot and half bead. Then bring the rest of the leg shaft round to the pommel.



Chuck on the offset marks and turn a large cove slightly above the foot until the shaft comes round.

The best tool for turning the shaft is a roughing-out gouge ground to a 25° angle.



The finished foot has a well-turned ankle. Your Queen Anne style cabriole leg is now ready for use in your projects.

turn the foot. Turning a second one the same would be where the problem would arise. For a more accurate method of figuring your offsets, refer to the sidebar and illustrations on [page 29](#).

When putting the measurements onto my stock for layout, I draw diagonals between the corners of my perfectly square billets with the aid of a machinist's center finder and a marking knife or scribe to draw the lines. I use a set of dividers to transfer the distances, first adjusting them on a steel ruler, then picking up a center punch mark with one leg and swinging the other across the appropriate diagonal to mark the offsets. Draw a line at 7" from the top to denote the pommel.

Most cabriole legs have an ankle diameter that is half (or slightly less) of what the billet will turn to. In the case of my drawing on [page 29](#), 1 3/4" yields an ankle of 7/8". Properly proportioned, most legs will have the ankle at its narrowest between 1" and 2" above the floor.

Turn the Foot and Shaft

Turning your first cabriole leg will be intimidating. The first part is turning the foot and the shaft to the pommel round. To turn the top of the foot and the shaft, we chuck on the offset marks. Once the lathe is started, the final taper of the leg shaft will reveal itself when you study the ghost.

The hardest part is turning the half cove that forms the top of the foot. This can be scraped in mahogany, but even in this wood, you can obtain much better results by shear

cutting with a spindle gouge. I start by cutting a full cove well above where the final half cove will be. I widen the cove toward the top of the leg until the shaft comes round. By watching the ghost, you can see how much wood you have to remove. You can only know that the shaft is round by stopping the lathe and examining it.

Once round, the cove is gradually widened in the direction of the foot. The trick is to get a final light, shear cut across the top of the foot to the shaft in a gentle, pleasing curve. The shaft may now be brought to final taper with a large roughing gouge. I grind mine to 25° and hone it to a keen edge. The final detail is to turn a half cove at the edge of the pommel to lend an eye-pleasing curve that removes the sharp corners.

I sand and apply at least the first coat of finish in the lathe. The result is a stunning leg, hopefully with a well-turned ankle.

Now that you have the legs ready, you can put them to use in your projects. In my fortieth year, I cut a top, made some aprons and assembled a porringer table (from drawings found in *Queene Anne Furniture* by Norman Vandal, Taunton Press, ISBN 978-0942391077). A porringer is a shallow cup or bowl with a handle, so this may have been the dining table of the Colonial days. You, of course, could use yours for whatever you like!

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



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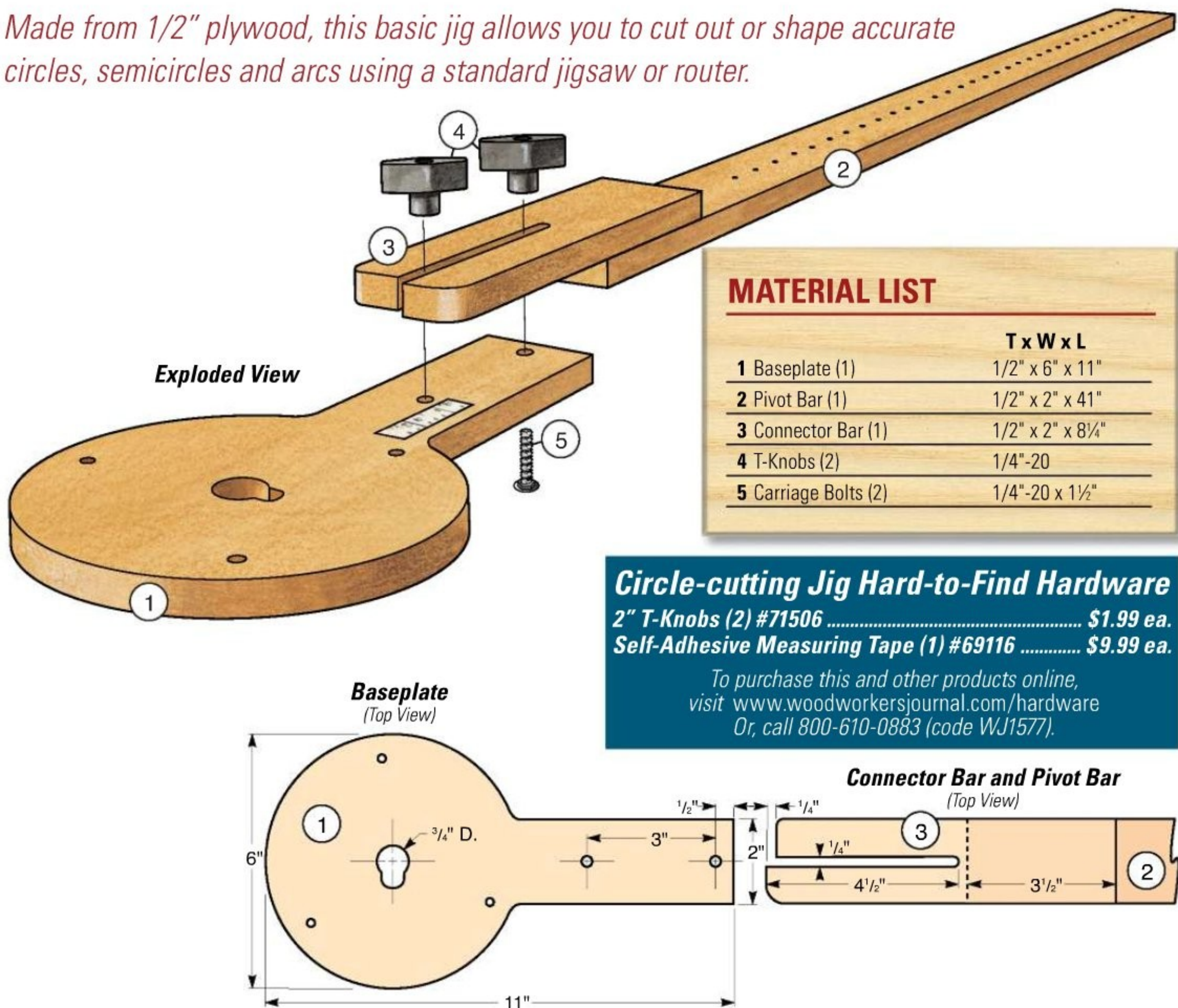


 **Lee Valley**

Circle-cutting Jig with Fine Adjustment

By Sandor Nagyszalanczy

Made from 1/2" plywood, this basic jig allows you to cut out or shape accurate circles, semicircles and arcs using a standard jigsaw or router.



MATERIAL LIST

	T x W x L
1 Baseplate (1)	1/2" x 6" x 11"
2 Pivot Bar (1)	1/2" x 2" x 41"
3 Connector Bar (1)	1/2" x 2" x 8 1/4"
4 T-Knobs (2)	1/4"-20
5 Carriage Bolts (2)	1/4"-20 x 1 1/2"

Circle-cutting Jig Hard-to-Find Hardware

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Or, call 800-610-0883 (code WJ1577).

MORE ON THE WEB

For a video of the author demonstrating his technique for setting and using the circle-cutting jig, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

Cutting a perfect circular disc out of solid wood or plywood isn't a particularly daunting challenge — if you use a good circle-cutting jig. This one is useful not only for sawing arcs and rounds up to a whopping four-foot radius, but the base also accepts a router, for curvy shaping work. The jig, shown in the *Drawing* above, consists of three parts: 1. A banjo-like-shaped base plate that mounts to the jigsaw or router. 2. A long pivot bar

with holes at regular intervals that serve as pivot points for different radius cuts. 3. A connector bar that joins the two parts with a sliding joint that allows fine adjustment of the jig's cutting radius.

All jig parts are made from 1/2"-thick high quality plywood, such as Baltic birch. Start by sawing out the jig's 6" x 11" baseplate. First, make two parallel cuts on the table saw to form a 5"-long, 2"-wide tongue on one end of

the rectangular piece (see top left photo, [page 33](#)). On the band saw, cut out the 6"-diameter round portion of the baseplate.

Moving to the drill press, bore a 3/4" hole through the center of the base's round part and a pair of countersunk holes in the tongue part for two short 1/4" carriage bolts. Now bore a series of countersunk mounting holes to attach the base of your router (with its subbase removed), as well



Using a table saw and rip fence, make two 5"-long stopped cuts to form a 2"-wide tongue that's centered on the jig's base, widthwise.



Next, using a band saw (or jigsaw), cut a 6"-diameter circle on the area of the baseplate opposite the tongue cut on the table saw in the last step.



Counterbored holes bored through the circle jig's round baseplate provide the means for mounting either a jigsaw or a router.



A short length of stick-on measuring tape allows fine-tuning of the distance between the jigsaw blade (or router bit) and the jig's pivot hole.

as holes for mounting a jigsaw (with its foot plate removed). For proper cutting action, the jigsaw should be positioned with its blade teeth centered on the round baseplate, with the saw's body perpendicular to the baseplate's tongue and facing to the left (for right-handed users). (See bottom left photo, above.)

From 1/2" ply, cut a 2"-wide, 41"-long strip for the jig's pivot bar as well as an 8 1/4"-long piece for the connector. Using a dado blade in the table saw, cut a 1/4"-wide, 4 1/2"-long slot in the connector bar. On one side of the slot, cut the bar back 1/4" and radius the outer edge of the other, then mark its tip with a black marker pen. The tip acts as a pointer, for fine adjustments. On the pivot bar, mark out 37 pivot holes 1" apart and drill them with a 1/8" bit chucked in the drill press.

Glue and nail the connector to the end of the pivot bar, positioning it as shown in the *Drawing*. Apply a short length of sticky-backed measuring tape to the top of the baseplate's tongue, as shown in the bottom right photo, above. As you'll use only the fractional graduations

on the tape for fine adjustments, you can use a scrap of measuring tape left over from another jig project. Now slide the slotted end of the pivot bar onto the carriage bolts on the base and secure the connection with a pair of T-style or other hand knobs.

Setting Up for Cutting

To use the jig to cut out a round tabletop, arch-top panel,

etc., set a scratch awl or nail into the pivot hole that's closest to the radius of the desired circle or arc. To set the exact radius, measure the distance from the pivot hole to the saw blade, then loosen the hand knobs and slide the connector bar in or out as necessary, then retighten the knobs. Starting with the blade/bit at the edge of the work, pivot the jig around smoothly as you cut.

It's best to take a trial cut and check the radius; if it's off, you can use the scale and cursor to tweak the setting. When used with a router, the circle jig is capable of accurately routing radius slots, creating curved recesses for line inlays, or for decorative shaping work.

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

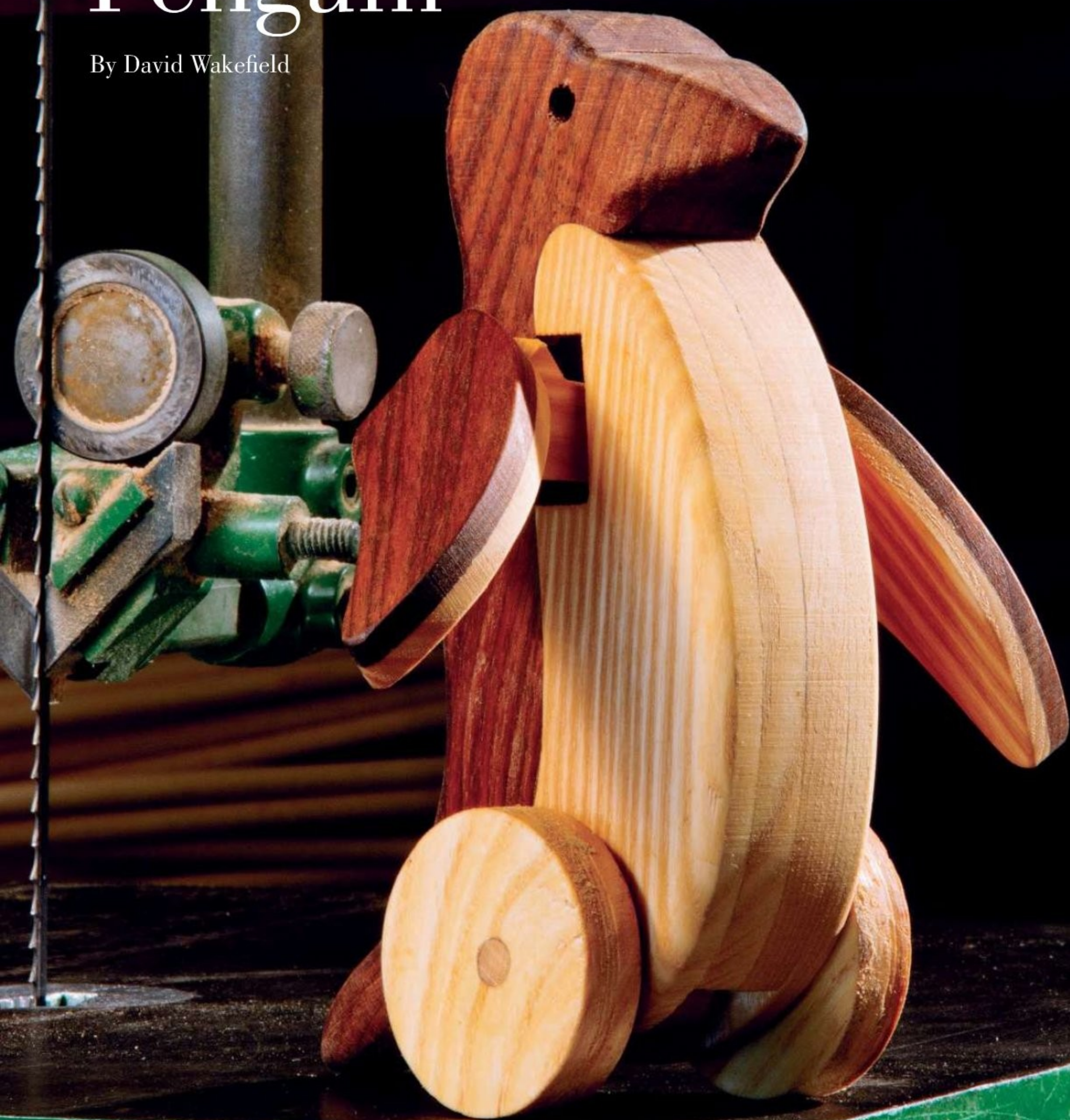


A scratch awl inserted in one of the pivot strip's holes acts as a pivot point, for either cutting or routing circles and arcs.



The Well-Tailored Penguin

By David Wakefield



Learn some helpful construction tips from a longtime toymaker when you build this waddling, flipper-winged penguin.



A penguin should be as close to black and white as you can get by way of contrasting wood species. Our author chose walnut and ash for the project shown here.

This fellow has been on my list of “to do” toys for the last year. I think he was worth the wait. I chose the Adelie penguin because of their simple, elegant lines, and the fact that they are flipper flappers unlike, say, the emperor penguins, who generally leave their flippers at their sides as they walk (waddle).

At any rate, this guy presented several challenges, the first of which was getting the black and white areas to work with the design and the mechanisms. It is only the second toy I’ve designed with different woods meeting like this, somewhat like intarsia (the first being a pileated woodpecker). I used walnut and ash here, but honestly, ebony and holly would be my preferred choices for an even stronger black-and-white contrast.

The other challenge was how to make the flippers “flip” as they should. My first attempt was two hinged flippers pivoting up as an arm was pulled down by a string attached to a cam on either side. It took a lot of space within the body, making it too wide, and it was just plain cumbersome.

Then John Hutchinson, a fellow toy designer, suggested the pivoting flipper arm idea. He had used this concept on a camel he designed years ago, and it worked perfectly. The last problem was how to assemble the guy with flippers and still be able to do a good job on the body (sanding, etc.). So I decided on a dowel through the back of the body to attach the flipper arm after the body was assembled.

The cam and drive dowel is a mechanism I have been using for years, as are the diagonally opposed wheels that produce a classic waddling motion. The result is this tidy little penguin toy that does everything a penguin should.

Creating the Back

The full-size pattern for the back of the body (see [page 39](#)) can be laid out on 6/4 (1½") stock if you have it; I used walnut.

I actually laminated three pieces of 1/2"-thick wood together. You could also glue up two 3/4"-thick boards to achieve 1½". Whatever you use, you want to end up with exactly 1½"-thick stock. If you are laminating, cut the pieces slightly large and make the final cut close to the line after the assembly is glued up. Be sure that the band saw table is at a right angle to the blade before cutting your parts. You can drill the eyehole now, too; back up the workpiece with scrap.

Now head to your edge sander. Make sure its table is at a right angle to the belt before you sand the silhouette back to the pattern line with 80- and then 120-grit belts. Don’t sand the front edge that will be joined to the belly. It’s best to edge-sand this after the belly assembly is complete to fit the back and

front together as you sand. Be careful to keep the defining characteristics of the silhouette intact, such as the transition of the beak to the forehead.

I have modified my edge sander to nicely sand inside curves. I bent the platen behind the belt to accommodate half of a 1" dowel that I screwed to the front of the platen (see Figure 1, next page).

I don’t taper the beak and tail until after I assemble the body halves.

Forming the Belly

The belly has to be made out of four pieces of 3/8"-thick stock, again adding up to a

Photocopy the full-size patterns shown on [pages 38 and 39](#), and adhere them to your workpieces with spray adhesive before cutting them to shape at the band saw.





Figure 1: The author bent the platen back on his 1"-wide edge sander and screwed half of a 1" dowel to it. It enables easier sanding of inside curves.



Figure 2: Organize the four pieces of the body carefully before gluing and clamping them together. Keep the front edges aligned.



Figure 3: Make a drum sander for tight inside curves if you don't have one. Just cut a slot in a dowel and wrap some sandpaper around the dowel, using the slot to hold it in place. Secure the paper with a strip of tape.



Figure 4: The author marked the top of the belly piece with a pencil line to avoid spreading glue too far forward on the front edge. The glue should stop just short of the penguin's beak.

perfect 1½" — the same as the back of the body. I used ash. The two outside pieces (pieces 2) are the same, with a notch for the fin arm, while the two center pieces (pieces 3 and 4) are slightly different. Both pieces accommodate the cam at the bottom, but piece 3 has the additional long missing area for the drive dowel channel.

Lay these pieces out with the grain running the long way. Once again, cut them slightly larger than the patterns — except for the bottoms and backs of the two center pieces, which you will not be able to get at after glue-up. Cut these exactly to the line. Don't drill the axle holes until after assembly either, when their alignment will be more accurate. Be sure to get the pieces in the correct location (remember, the drive slot is on the penguin's left). Try to get the pieces to line up closely as you clamp them together, especially the front of the body, as that will determine the location of the slot for the drive dowel. Watch for shifting as you tighten the clamps.

When the glue has set up, cut out the entire silhouette carefully to the pattern lines. This assembly should look like Figure 2 from the back. At this point you'll want to clean up the slot for the flipper arm, filing and sanding if necessary, to avoid any interference with free movement of the pivoting arm. You can locate and drill the 3/8"-diameter axle hole at this point, too. Now, edge-sand the front of the belly with 80-grit, going for a nice smooth curve.

You're now ready to edge-sand the mating edges of the back and belly pieces. Try to match these edges as closely as possible to produce a tight seam. You will need a small drum sander for the area under the head where the belly piece fits up into it. A dowel with a slot to accommodate sandpaper works fine if you don't have a small drum sander (see Figure 3). If you can't avoid a small gap along these parts, you can fill it with a putty of walnut dust and glue after assembly, if needed.

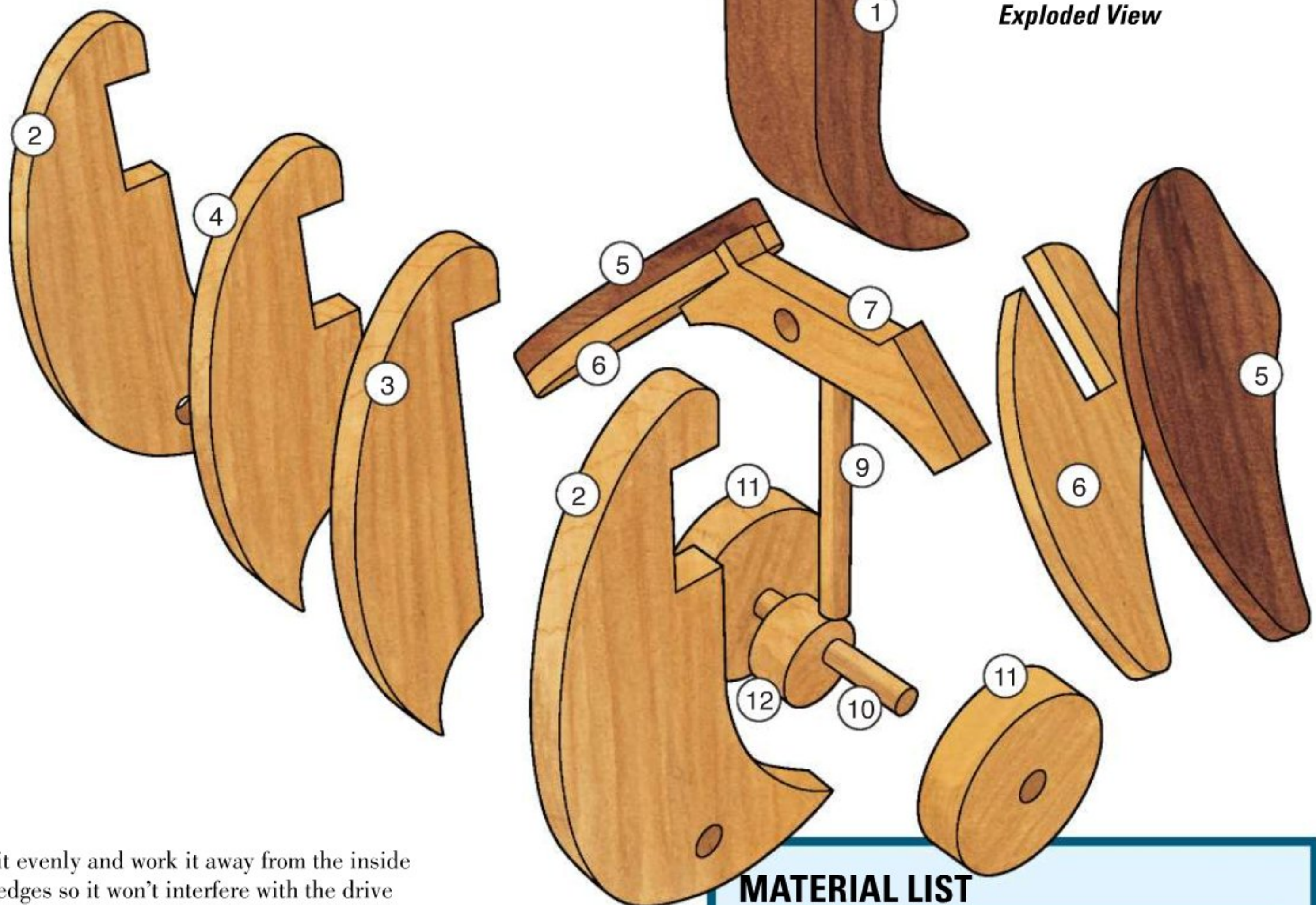
Assembling the Body

Make sure that the drive dowel channel in the body is clear of any dried squeeze-out before proceeding further. Chisel it clean, if necessary, then try a 5/16" dowel in the slot to ensure that it moves freely. I cut a piece of wood to help clamp the body parts together (see Figure 5, [page 38](#)). It will also be useful for accurately drilling the hole for the dowel that goes through the pivot arm. This clamping block is simply a piece of 1½"-thick wood cut to the shape of the outer belly. It should be made so that the slot for the pivot arm is held parallel to the bottom of the block when the belly is resting on it. This will hold the body in the correct position to drill the flipper pivot arm hole, later.

Mark a faint line just back from where the back piece joins the top of the belly to help in accurately applying the glue (see Figure 4). Brush glue onto the entire top of the belly where it fits under the head, and then put a little glue down the length of each outside piece of the belly. Spread



To buy the animated camel plan which inspired the penguin author, visit woodworkersjournal.com/WJ1516. Or, call 800-610-0883 (code WJ1516).



Exploded View

MATERIAL LIST

	T x W x L
1 Back of Body (1)	1½" x 4" x 7½"
2 Outer Belly Pieces (2)	3/8" x 3" x 6"
3 Inner Belly (With Drive Slot) (1)	3/8" x 2" x 5"
4 Inner Belly (No Slot) (1)	3/8" x 2" x 5"
5 Flipper Tops (2)	1/4" x 1½" x 3¾"
6 Flipper Bottoms (2)	1/4" x 1½" x 3¾"
7 Flipper Pivot Arm (1)	3/8" x 1½" x 4"
8 Pivot Arm Dowel (1)	1/4" Dia. x 1½"
9 Drive Dowel (1)	5/16" Dia. x 2⅞"
10 Axle (1)	5/16" Dia. x 3"
11 Wheels (2)	1/2" x 2" Dia.
12 Cam (1)	1/2" x 1" Dia.

it evenly and work it away from the inside edges so it won't interfere with the drive dowel and the flipper arm mechanism. Then apply clamps.

When the glue is dry, smooth the entire silhouette with 120-grit sandpaper. Flat-sand both sides with 80-grit until all the surfaces are flush. Now, fill any gaps with a walnut dust and glue mixture. Blend some sawdust with glue and work it into any voids between the front and the back. I wouldn't bother with the top of the belly. It doesn't really show and it will be hard to clean up afterward. Once this filler dries, sand the affected areas flat again with 80- and then 120-grits.

Next, chuck a 1/4" roundover bit in your router and ease the edges of the entire silhouette to further smooth the body and to eliminate the chance of splinters.

The last step on the body is to shape the tail and the beak. I do this freehand on a stationary belt sander. You could just as easily do it with a rasp, file and sandpaper. Practice on a scrap first if you

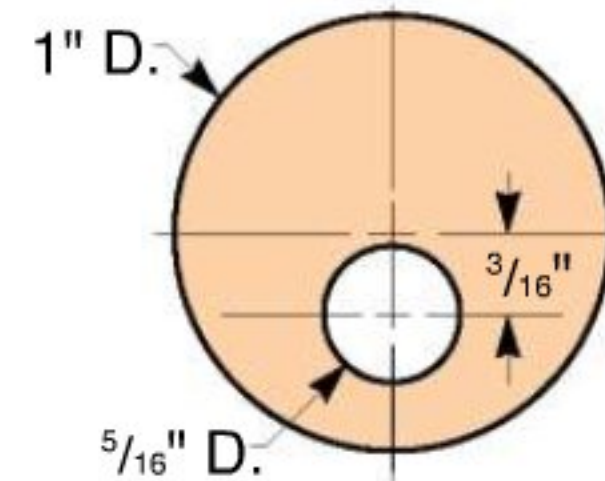
have any doubts. I just taper the beak on either side and then sweep (roll) from the tip of the beak to the side of the head to smooth out that transition. The tail also needs a gentle sweeping roundover on either side. Wrap up the shaping work by hand-sanding all the routed and shaped edges.

You may as well drill the 1/4" hole for the pivot arm dowel at this point. The hole should be in the center of the slot (top to bottom) and 1/2" from the right side. Use an awl to punch a starting hole. Rest the toy in the block you made for gluing the body halves together. Clamp the work against a simple right-angle

jig on the drill press table (see Figure 5 again). The accurate location of this hole is rather critical, so use a brad-point bit or a Forstner bit so the bit's spur tip will keep it from wandering. Drill this hole 3/8" deep into the belly piece.

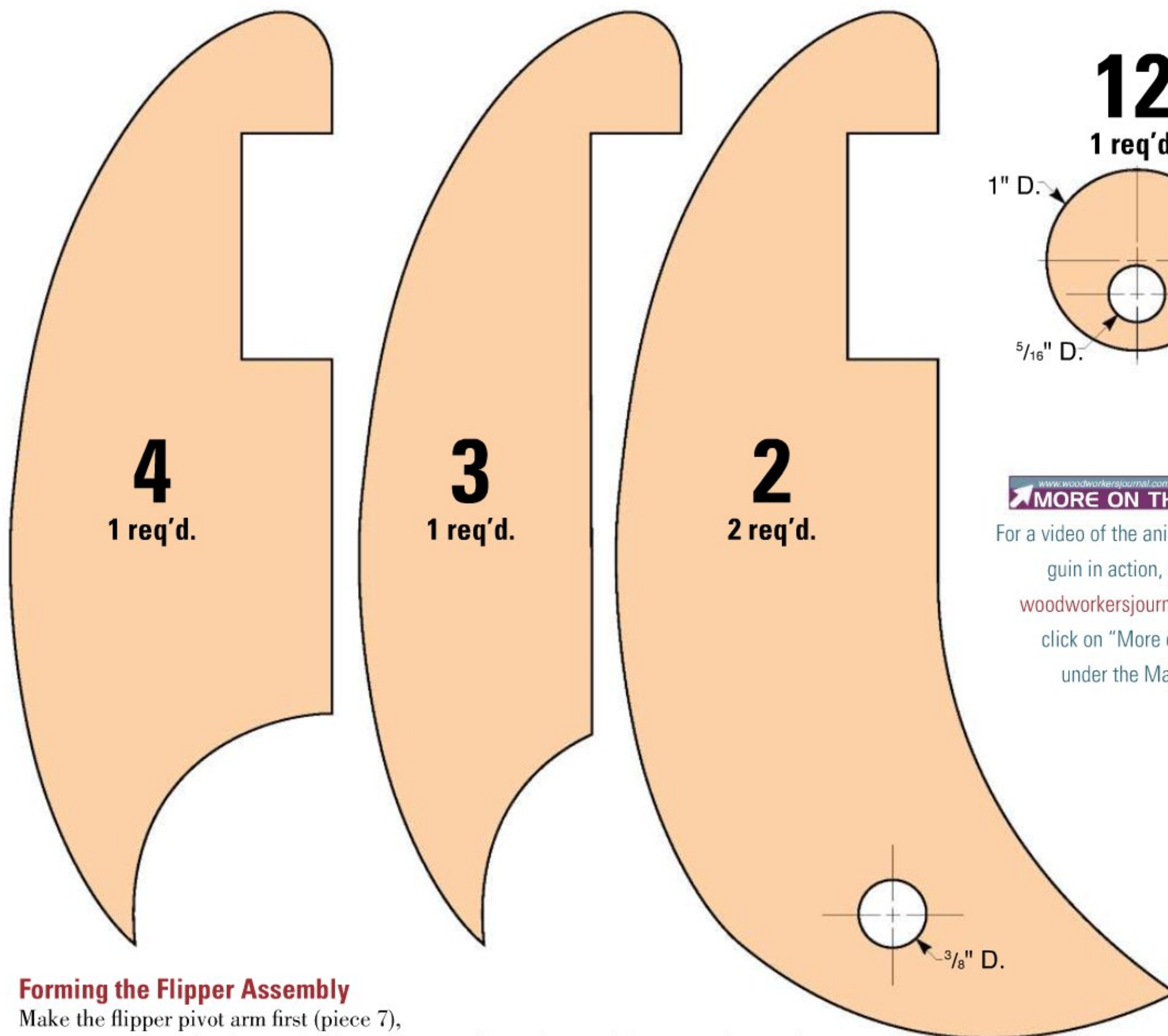
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MORE ON THE WEB

For a video of the animated penguin in action, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.



Forming the Flipper Assembly

Make the flipper pivot arm first (piece 7), so you can adjust the slots in the flippers to fit it before you glue this assembly up. Lay this piece out on 3/8" stock using the pattern. Make it from the same wood as the underside of the flippers and the belly. Drill the 5/16" pivot hole with a brad-point or Forstner bit to prevent wandering. Then cut out the pivot arm and

sand its edges and faces smooth. Break all the sharp corners with more sanding to complete it.

Now lay out the flipper halves (pieces 5 and 6) on 1/4" stock. I made the top (unslotted) pair from walnut and the two slotted undersides from ash. Cut the silhouettes slightly larger but the slots precisely. Adjust the slots (cutting, sanding or filing) so that the pivot arm fits snugly into both slots. This will make for a strong glue joint.

Glue the flippers into two sets, being sure to make them opposing so you have the correct one for each side. When the glue dries, sand the faces and edges up through the grits until they're smooth, and ease all of the sharp corners.

Creating the Wheels and Cam

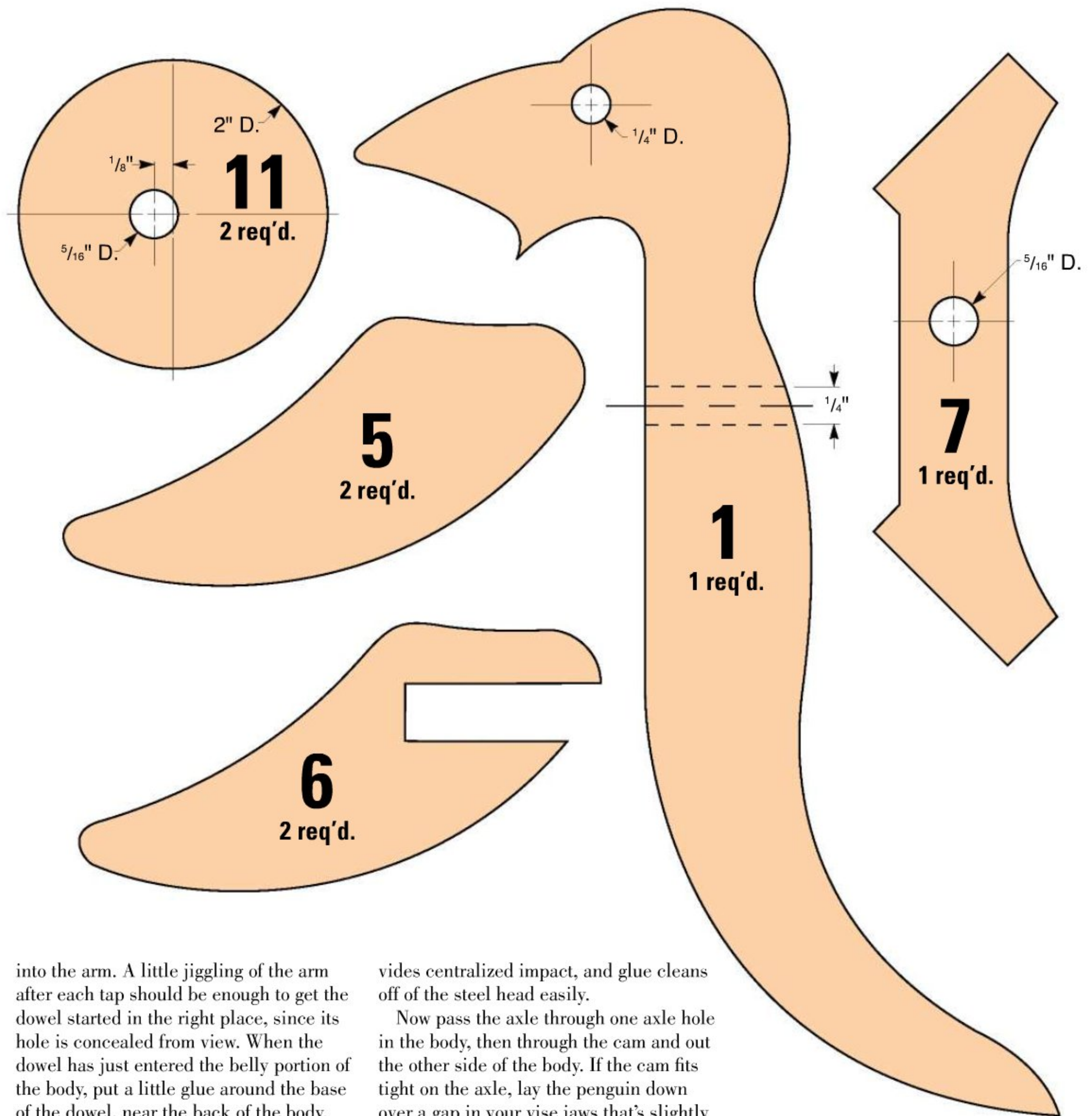
You could buy a couple of 2" wheels for your toy, or make them with a hole saw. A 2 1/4"-diameter hole saw has an inside diameter that's close to 2". It'll work just fine. Other options would be to trace a 2"-round object or draw the wheel shapes with a compass, then cut out a couple of wheels on the band saw or scroll saw. The same goes for the 1" cam. If you use hole saws for this process, plug the center holes and drill the offset holes as shown on the patterns. I suggest drilling the axle hole in the cam a little oversize (11/32" or even 21/64"), because the axle will slip through the hole without splitting the small cam. If you don't have these bit options, you may want to make several cams in case the axle splits during assembly. I've had a few fail in the past.

Putting the Pieces Together

Slide the pivot arm into place and gingerly tap the dowel through the body and



Figure 5: Support the penguin's body for drilling with a shaped block under the belly and a right-angle fence behind. The goal is to hold the body perpendicular to the drill bit and parallel to the drill press table for boring the flipper assembly's pivot hole.



into the arm. A little jiggling of the arm after each tap should be enough to get the dowel started in the right place, since its hole is concealed from view. When the dowel has just entered the belly portion of the body, put a little glue around the base of the dowel, near the back of the body, and tap it home. Wipe off the excess glue, saw off the extra wood and edge-sand this area lightly, or just do it by hand.

I'm sure that you can figure out some way to get the flippers clamped to the arm, but I fit them so snugly that generally clamping isn't necessary.

Cut the axle to length for the wheels and break the edges of the dowel ends with sandpaper. Glue one wheel on. I put glue inside the axle hole with a matchstick or a toothpick (or a handy-dandy squeeze glue applicator), lay the wheel on some wax paper on the workbench and drive the axle home. I use a standard nail hammer for this. It works much better than any mallet I've tried because it pro-

vides centralized impact, and glue cleans off of the steel head easily.

Now pass the axle through one axle hole in the body, then through the cam and out the other side of the body. If the cam fits tight on the axle, lay the penguin down over a gap in your vise jaws that's slightly larger than the axle diameter to support the work. Tap the dowel through the cam and the body until it sticks out the other side. You want the cam to be in the middle of the slot with the same amount of space on either side of the body. Spread glue inside the second wheel hole and rest it on your bench on wax paper. Tap from the finished wheel side carefully to drive the axle through the second wheel.

When the glue dries, sand the ends of the axle flush with the wheel faces.

Finishing Up

I use food-grade mineral oil for finish these days because it is nontoxic and really easy to apply. I dip my toys in a large drum of

oil and lay them in a trough to let the excess oil drain out. Or, you could just wipe the oil on with a rag. Apply it liberally and then let it soak in for a while before wiping off the excess. You may need to dry off the oil more than once if it bleeds out of open-pored woods like walnut and ash. Once the surfaces completely dry, your Well-Tailored Penguin is ready for a child's imaginative hands or a slightly grown-up adult's coffee table.

*David Wakefield is a toymaker living in Ohio. See more of his work at wildlife-toys.com or in his book, *Animated Animal Toys in Wood*, published by Fox Chapel Publishing.*

GREENE & GREENE-INSPIRED BED

By Chris Marshall

Appealing to the “softer” side of Arts & Crafts, this bed’s cascading cloud lifts, slatted construction and raised square pegs will help polish your templating and mortising skills.



This queen-size bedframe began as a conversation with my wife’s former boss, Jo Ellen, about two years ago. She loves the “softer” cloud-lifted details of Greene & Greene style that give it a more relaxed look than Stickley’s straight lines and stout proportions. And she’s not alone. Lately, it seems, woodworkers are churning out Greene brothers furniture with particular gusto. So, it didn’t take much convincing when I offered to build this first piece in her new bedroom set. Thanks to some excellent drafting by our senior art director, Jeff Jacobson, the bed was off to a great start. If you like what you see, gather up



Curves, shadow lines and the richness of stained mahogany contribute to Greene & Greene furniture’s enduring appeal.

The author experimented with several cloud lift layouts, finally arriving at the 3/16"- and 5/16"-radii shapes shown here. Draw each of them onto 1/4" plywood for use as "mini" templates.



some 6/4 mahogany and maybe some fancier figured 4/4 stock for the bed's center panels. Buy a sheet of quality plywood, too: you're going to need it to make a stack of templates and jigs.

Starting with Four Big Templates and Two "Minis"

Look closely at the photo on the facing page, and you'll see that this bedframe has two sizes of "S"-shaped cloud lifts: tiny ones at the crests of the top rails, then a series of larger repeats that ripple down the top and bottom rails and the legs. These larger ones match one another. The smaller size is based on a pair of 3/16"-radii circles with centers that are spaced 3/8" apart. Their opposing curves meet two horizontal lines that are 1/4" apart (vertically), and the circles' circumferences just touch. The larger cloud lifts start as 5/16"-radius circles with centers that are 3/4" apart. Their edges intersect two parallel lines that are 1/2" apart, vertically. A short diagonal connects the curves. Draw each of these cloud lifts onto squares of 1/4"-thick scrap (see top photo, right). Cut them out and sand the shapes carefully on a spindle or drum sander. These "mini" templates will serve as tracing and routing guides for making the bed's larger templates.



Make four templates for the bed: a half template for the top and bottom rails and a full template for each of the two leg sizes. Use 1/2" or 3/4" void-free plywood or MDF to make them.

And that is your next task. I made four primary templates for the project: two half templates for the top and bottom rails, plus full templates for the two leg sizes (see center photo, right). They're necessary for tracing the actual project parts to shape, then template-routing them to final size. I also plotted the various mortise locations on my templates so they would perform double-duty as "story sticks" for the joinery. Draw your full-size templates, making the top and bottom rail templates at least half the total length of the rails. Then cut them out at the band saw and use your mini cloud lift templates, stuck in place with carpet tape, to template-route the "S" shapes onto the larger templates. That way, all the cloud lifts will be precise and consistent from here forward. One other note: as you shape the bottom edge of the top rail template and the top edge of the bottom rail template, do your best to make their edges mirror opposites so the templates can literally fit together. What's most important is that their flat surfaces are straight and parallel with one another.



Shaping and Mortising the Rails and Legs

Head to the jointer and planer to surface enough 6/4 mahogany down to 1 3/8" thick for the top rails and legs. From there, adjust the planer to 1 1/8" and mill stock for the bottom rails and the headboard's frame rail. When you crosscut the parts to rough length, allow an extra couple inches on each end of the top rails; you'll cut that off after mortising them. Rip these blanks to final width, and use your templates to trace the parts to shape.

There's an urge I sometimes get once parts are drawn, to cut

Trace the template shapes onto mahogany blanks for the rail and leg workpieces. Leave a few extra inches of material at the ends of the top rails to reinforce them for mortising, later.



Once you've cut the inside edges of the top rails to rough shape, attach the template with double-sided tape and rout away the excess with a long piloted flush-trim bit. Shape the top edges of the bottom rails the same way.



Mark the stile and slat mortises on the rails, transferring their locations from the templates. Since these mortises are differently sized, it's a good idea to draw a complete mortise layout for each one (see inset photo).



them all out. If you share that impulse, stuff it down deep for this project. Making these rails and legs should happen in stages that involve cutting, template-routing and mortising — and not always in that order — with the goal of keeping flat reference edges as long as possible. They're needed for stable mortising.

Start by band-sawing just the *inside* edge of the headboard and footboard top rails and the top edges of the bottom rails to about 1/16" from your layout lines. Now stick your templates along the traced lines with double-sided tape, and use a piloted flush-trim bit to mill the excess off at the router table. Be careful of reversing grain direction here at the halfway point of these

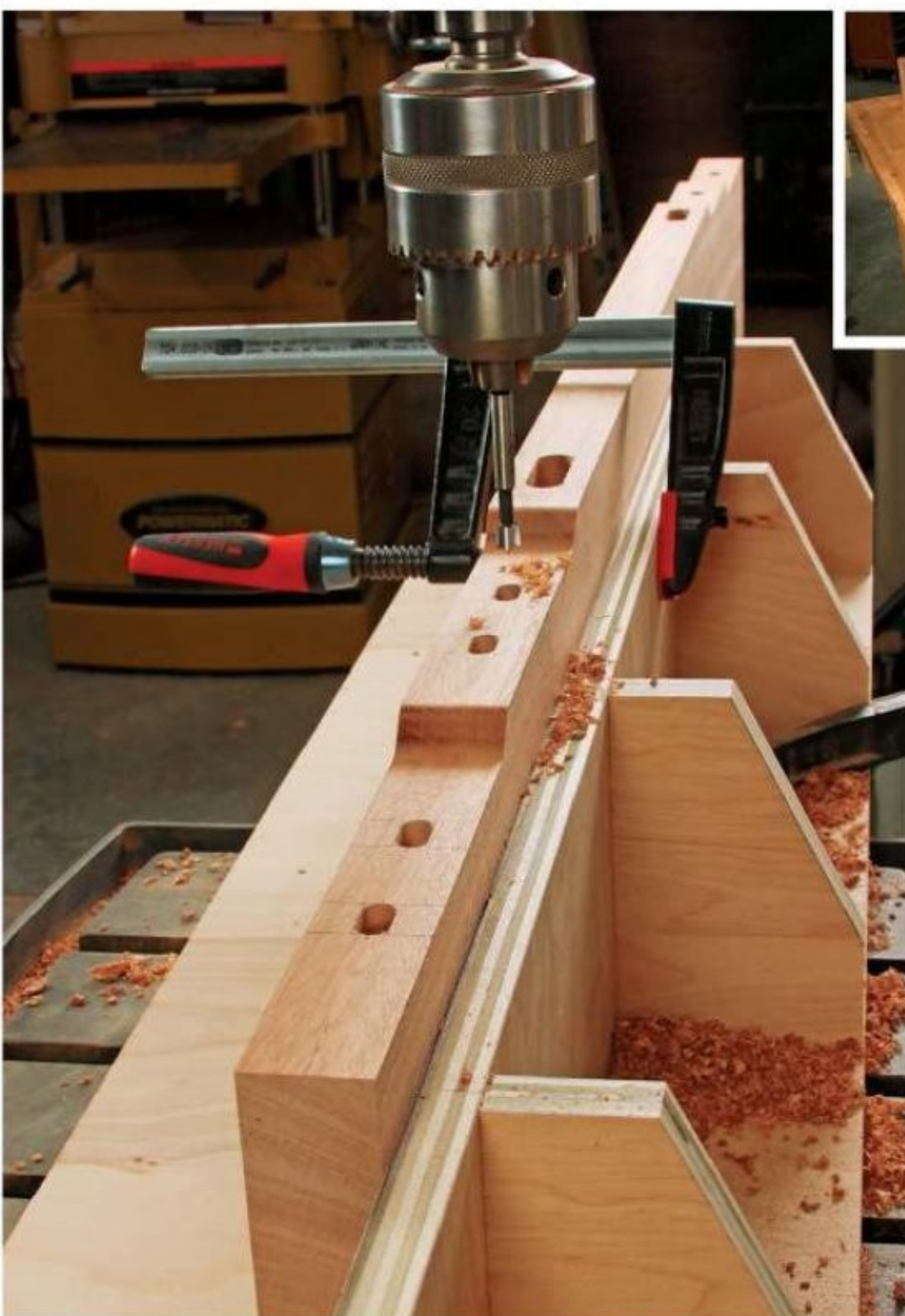
project parts; I flipped and re-taped the templates to the opposite part faces in order to always keep the bit cutting "with" the grain: avoid tearout at all costs.

With these selected edges now shaped, lay out all the slat and stile mortises, centering them on the rail thicknesses. See the *Drawings* for mortise lengths.

I deliberated at length about my mortising tool options: Festool Domino, mortising machine, router with edge guide or drill press and Forstner bit. Because of the close proximity of the slat mortises to some of the cloud lifts, that eliminated the Domino.

The author settled on a drill press and Forstner bits to cut the bed's many mortises. Given their various stepped elevations, set and check your drilling depth carefully as you proceed. Then square their ends with a mallet and chisels.

A handheld router on these part edges might have been teetery, and the wide bottom rails exceeded my mortiser's "bite." So, the drill press, outfitted with a 4-ft. straightedge fence and support table I made (see photo, left), was the best choice for machining these long, heavy workpieces. Bore the mortises 1" deep for the stiles and 3/4" deep for the slats, using a series of side-by-side plunges with your Forstner bits. Make the leg mortises at the ends of the top rails 7/8" deep — the extra stock you've left here prevents the mortise end walls from breaking. If you repeat the drilling sequence several times over, you should be able to remove nearly all the waste so you're left with assembly-ready mortises. Now clamp the rails upright and chisel their mortise ends square. Once that work is done, the flat reference edges of the top rails are no longer needed. Rough-cut, then template-route, these remaining edges into their cloud-lifted shapes.



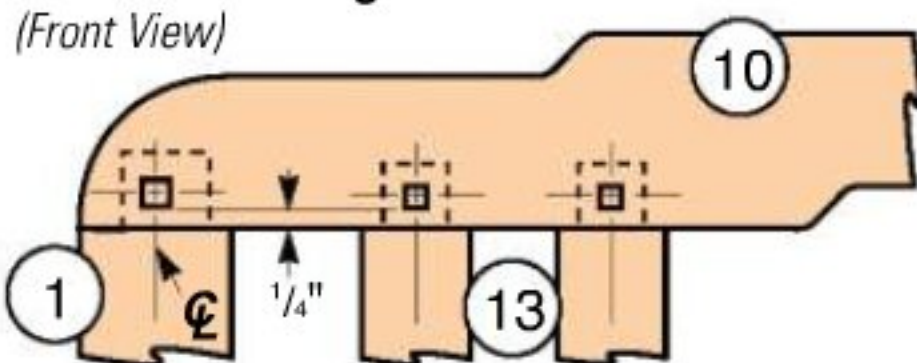
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Footboard Plug Locations

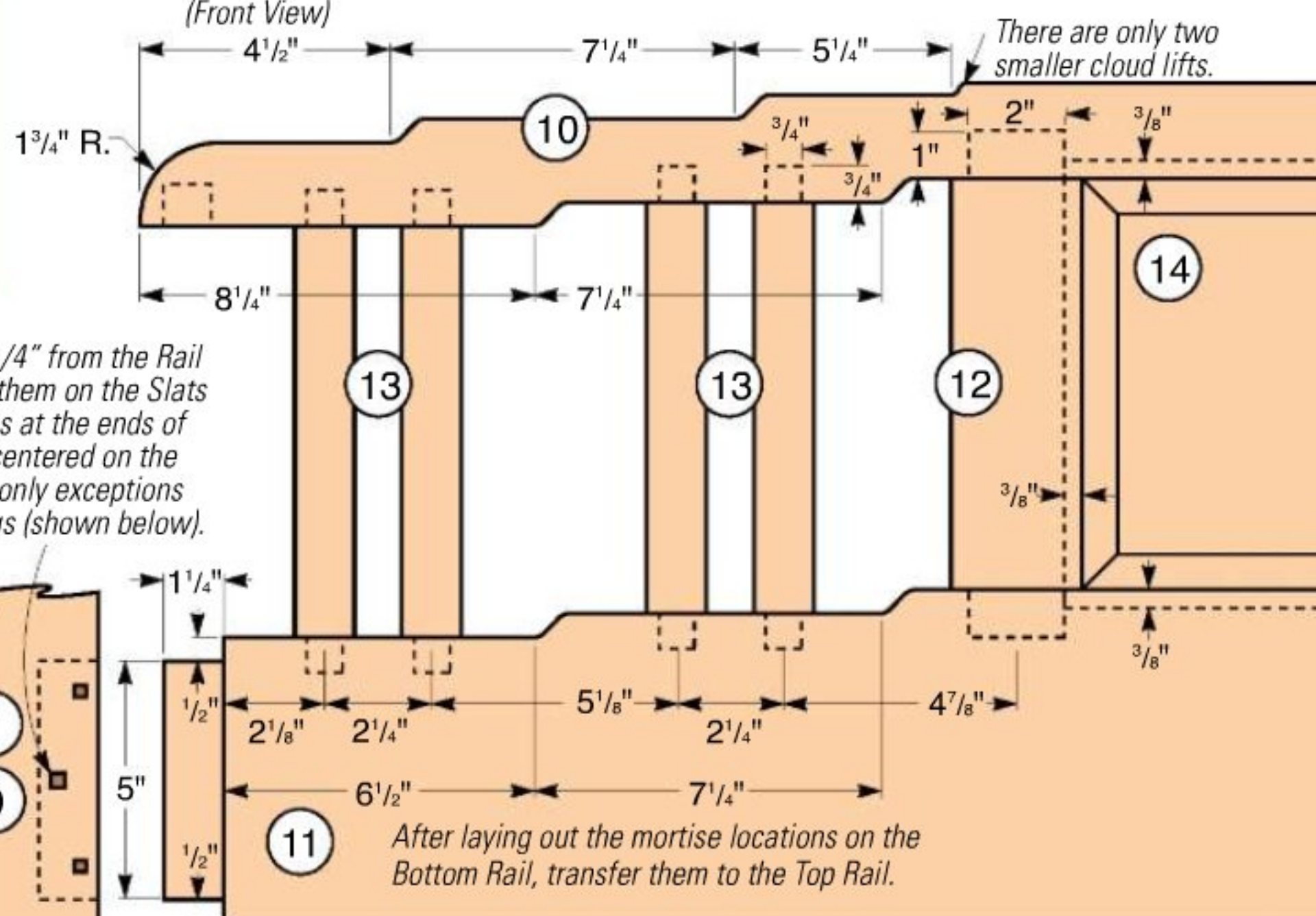
(Front View)



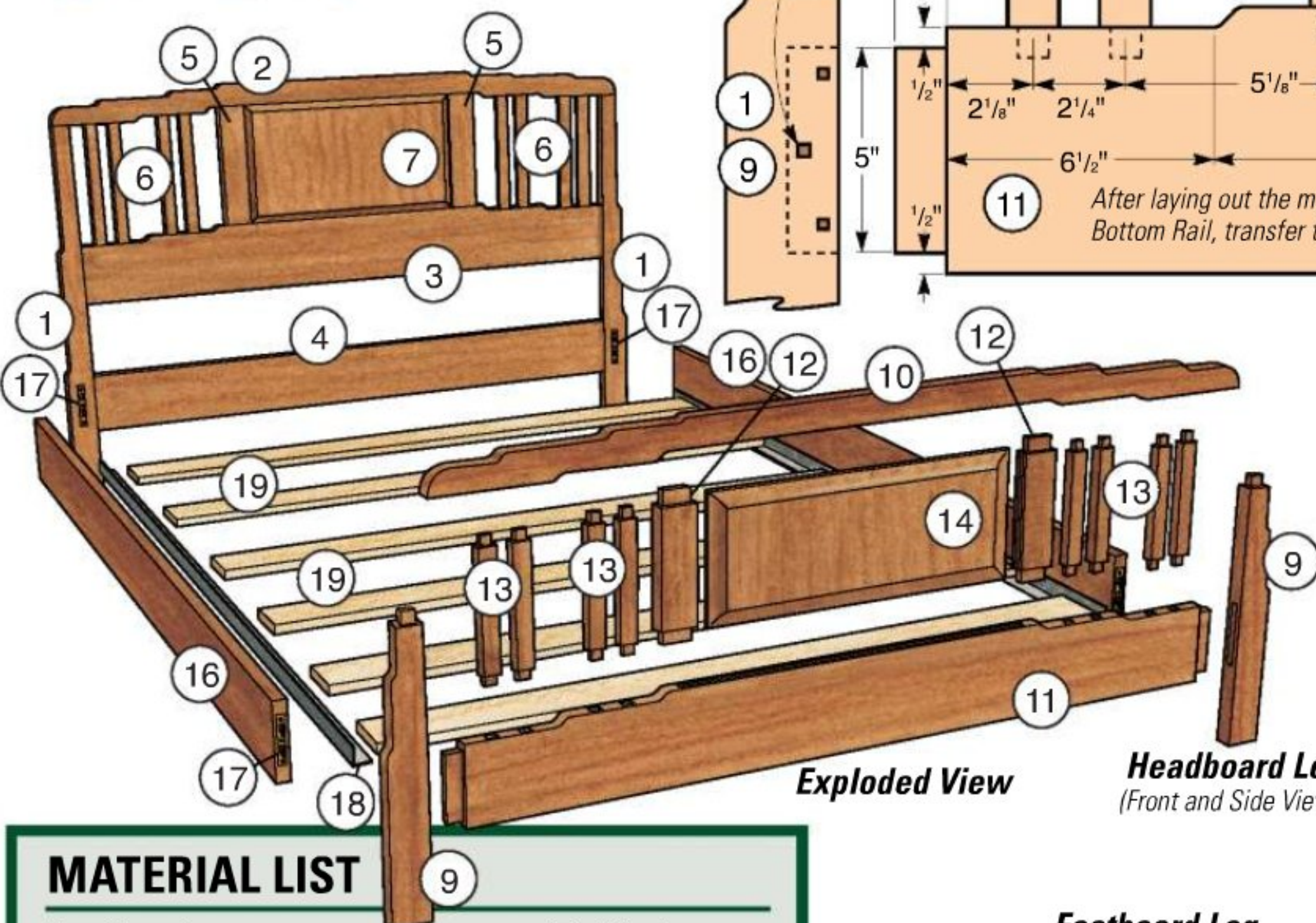
Locate the Plugs 1/4" from the Rail edges and center them on the Slats or Stiles. The plugs at the ends of the Top Rails are centered on the Legs (at left). The only exceptions are the larger plugs (shown below).

Footboard

(Front View)



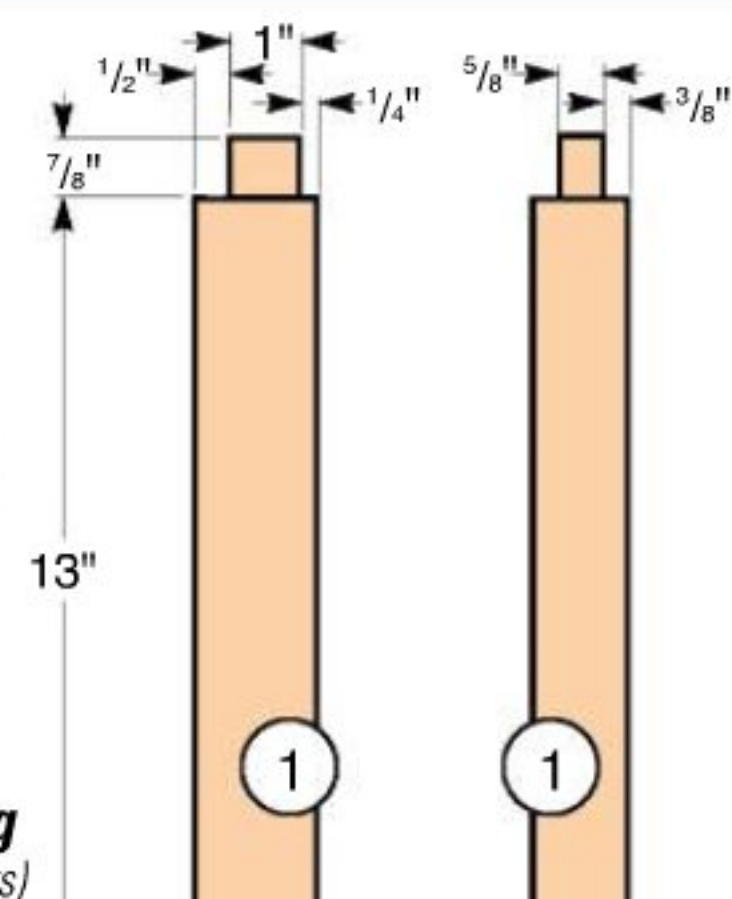
After laying out the mortise locations on the Bottom Rail, transfer them to the Top Rail.



Exploded View

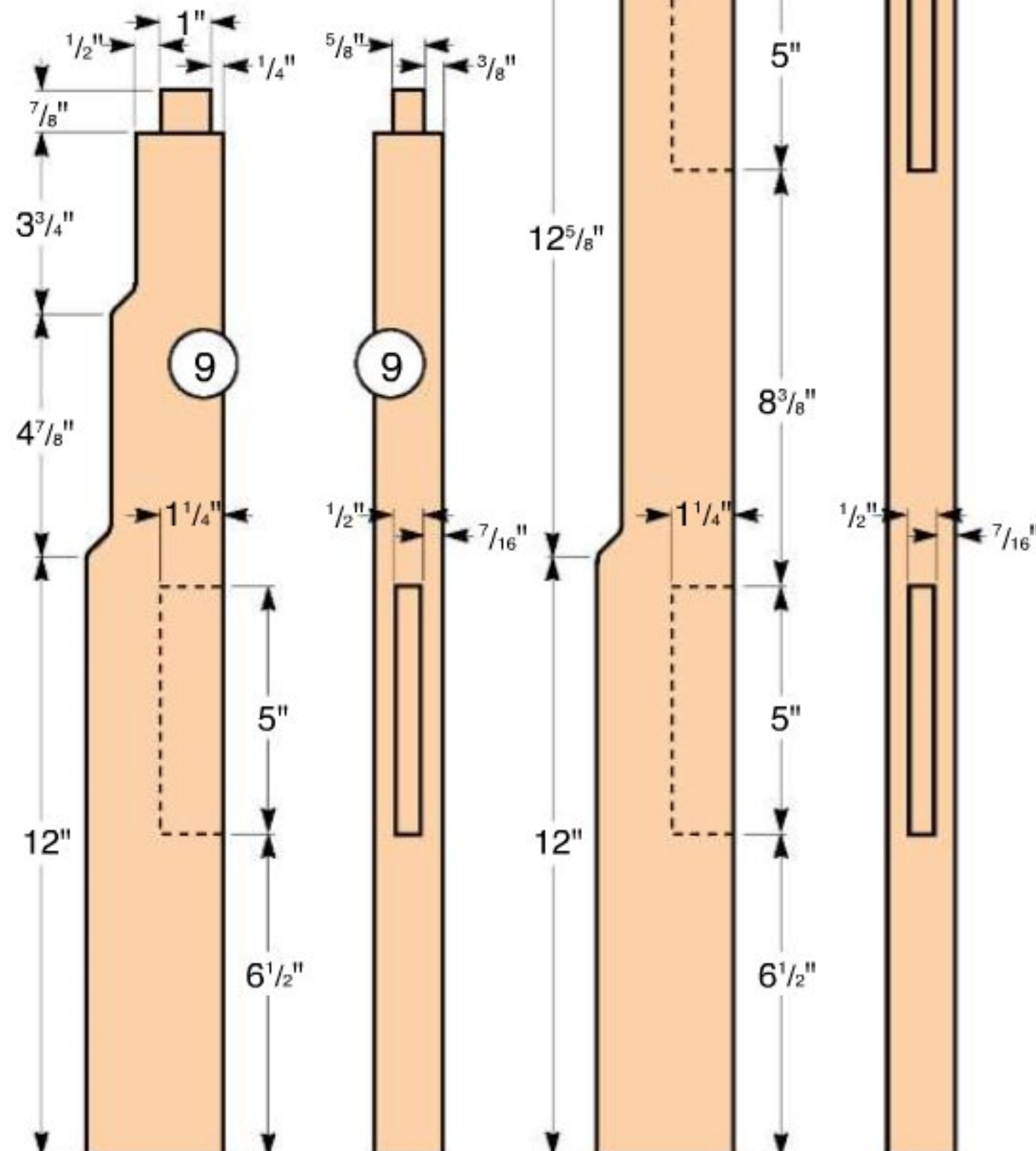
Headboard Leg

(Front and Side Views)



Footboard Leg

(Front and Side Views)



MATERIAL LIST

Headboard

	T x W x L
1 Legs (2)	1 3/8" x 2 3/4" x 38 1/2"
2 Top Rail (1)	1 3/8" x 3" x 62"
3 Bottom Rail (1)	1 1/8" x 7" x 61"
4 Frame Rail (1)	1 1/8" x 6" x 61"
5 Stiles (2)	1 1/8" x 2 3/4" x 14 1/4"
6 Slats (8)	7/8" x 1 1/4" x 13 3/4"
7 Panel (1)	7/8" x 13" x 23 1/4"
8 Square Plugs (8, 20)	5/16" and 1/4" x 3/8"

Footboard

9 Legs (2)	1 3/8" x 2 3/4" x 21 1/2"
10 Top Rail (1)	1 3/8" x 3" x 62"
11 Bottom Rail (1)	1 3/8" x 7" x 61"
12 Stiles (2)	1 1/8" x 2 3/4" x 10 5/8"
13 Slats (8)	7/8" x 1 1/4" x 10 1/8"
14 Panel (1)	7/8" x 9 3/8" x 23 1/4"
15 Square Plugs (8, 20)	5/16" and 1/4" x 3/8"

Frame

16 Side Rails (2)	1 1/8" x 6" x 81"
17 Bed Rail Fasteners (4 pr.)	4" Rockler #28589
18 Angle Irons (2)	1 1/2" x 1 1/2" x 80"
19 Cross Supports (6)	3/4" x 4 1/2" x 60 3/4"

For a video of the author sharing tips on making the bed's tracing and routing templates, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab..



Raise tenons on the top ends of the legs before you cut their contoured edges, while the workpiece edges are still flat. A dado blade, miter gauge and stop block make this process quick and accurate.



Once the rails have shaped edges, their length, weight and contour makes tenoning them on the table saw more difficult. A "wraparound" jig and a handheld router with guide collar offer a good alternative for this task.



Turning to the Legs and Tenons

You can employ the same drill press setup now to drill 5"-long mortises into the legs' inner edges for the rails — two in each headboard leg and one in the footboard legs. Make these slots 1/2" wide and 1 1/4" deep, centered on the leg thicknesses. But, before you head to the band saw to cut cloud lifts into the outside edges of the legs, stop! Mill their top tenons first. These 5/8"-thick, 1"-wide tenons are offset on the ends of the legs (see the *Drawings*). The shoulders that face the cloud-lifted edges are 1/2" wide, while the opposite shoulders are just 1/4" wide. I cut them at the table saw with a dado blade, backing up the long leg workpieces with an auxiliary fence attached to my saw's miter gauge (see top photo, left). Because of the various shoulder sizes, definitely make these cuts on scrap first, so you can adjust your saw settings carefully. Once you've cut them, check for a friction fit of the leg tenons in their top-rail mortises. When you're satisfied, band-saw and template-rout cloud lifts into the outer leg edges, then file or sand their bottom corners to 1/4" radii.

Take some time now to touch up all the cloud lifts on the rails and legs before proceeding. I used a 1/2"-diameter, 120-grit sanding sleeve in my spindle sander to remove any burn marks and rough-grain areas that resulted during routing, then switched to finer-grit papers wrapped around a dowel to go over them all by hand. It's tedious work, but necessary nevertheless.

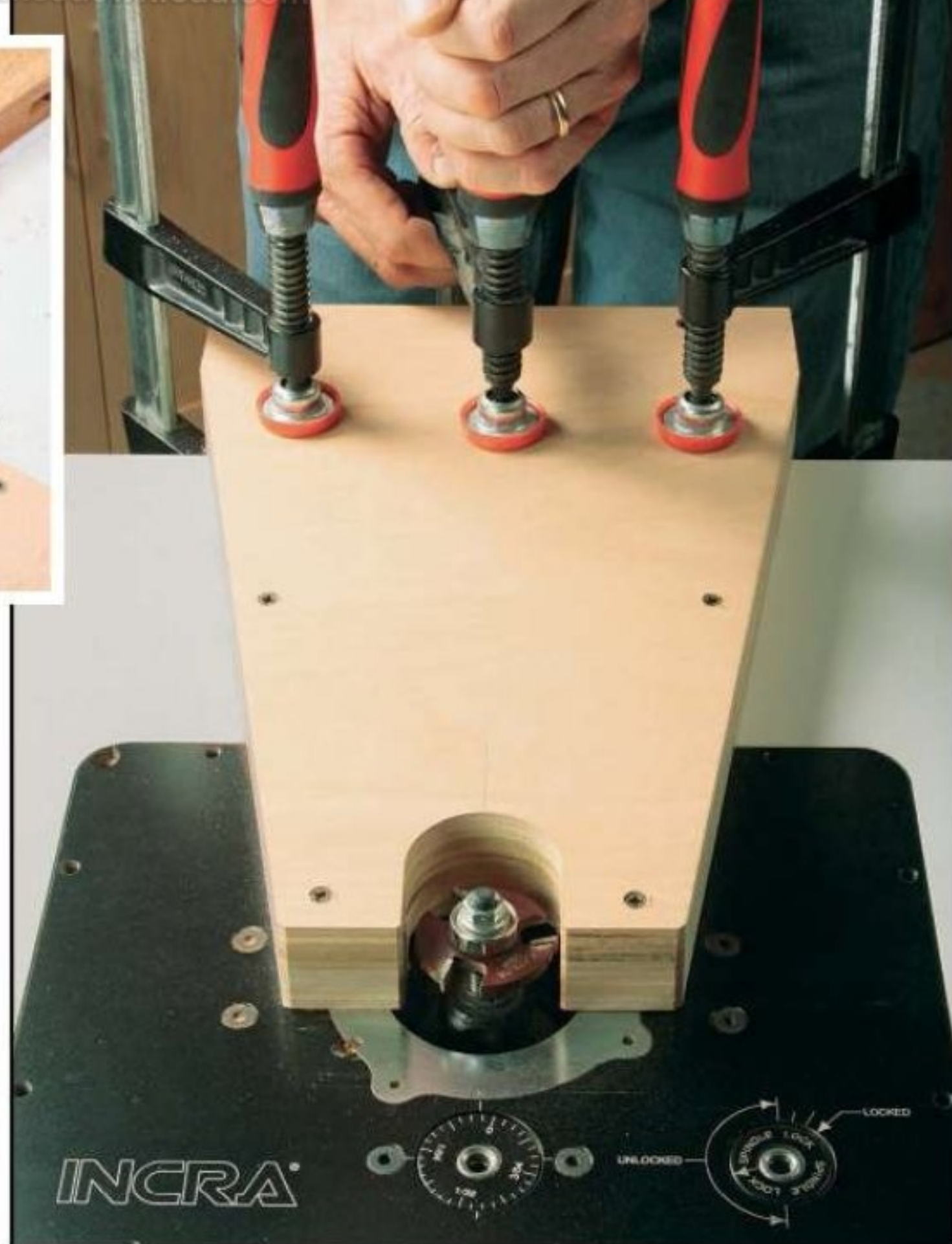
With the leg mortises made, there's still the matter of cutting

matching tenons into the ends of the bottom and frame rails to fit. Since these rails are now shaped, and no longer suitable for tenoning on the table saw, I milled the tenons with a handheld router and a slip-on, "wraparound" style jig (center photo, left). A 1" O.D. guide bushing followed the edges of the jig, and a 3/4"-diameter straight bit made the cuts. I milled the tenons in stages, routing the 3/8" shoulders into each face, then shifting the jig back to expose more area for routing. Cut the end shoulders with a hand saw.

You may need to take a few shavings off of the slat and stile tenons so they fit their mortises well. Then carry out a full dry-assembly of the headboard and footboard. Label the parts to help keep their arrangement clear.



This "short" fence jig made it possible to cut panel grooves along the inner edges of the top rails where a long, straight fence couldn't work. It also allowed the slot cutter to be projected in stages for making deeper cuts.



The author used a coved panel-raising bit with its top cutter removed to introduce depth and shadow lines into the bed's large center panels. Or, if you prefer, you could leave these panels flat, and make them 5/8" thick.

Forming the Stiles and Slats

Dry-assemble the rails and legs so you can verify the exact length of the 16 slats and four stiles you need to make, next. Once you've milled stock for these parts — the slats and stiles are 7/8" and 1 1/8" thick, respectively — rip them to width and cut them to length. Switch to a stacked dado blade in your table saw and raise all their tenons. Once those are made, try them in their mortises, and pare them down, if needed, with a shoulder or rabbeting plane to achieve a nice, friction fit. Then dry-assemble the slats, stiles, rails and legs to check your progress.

Next, it's time to mill the 5/8"-wide, 3/8"-deep grooves that will house the headboard and footboard center panels. You can cut these along the full inside edges of the stiles, and between the stile mortises on the bottom rails, with a slot cutter or straight bit at the router table. Feed the workpieces along the fence in the usual way, centering the grooves on the part thicknesses. But, these grooves also must be cut along the inside edges of the top rails between the stile mortises ... and a standard router table setup won't do. That's because the innermost cloud lifts will interfere with a long fence. So, I took a different tack (see top two photos, this page). I made a "short" fence jig from doubled-up plywood. It gave me bearing surfaces on either side of my slot cutter that were short enough to allow the cutter to reach the mortise termination points. It also enabled me to adjust the bit's projection out from the fence so I could cut these grooves in several deepening passes. The jig worked just as I hoped it would for this job.

Panel-making and Pre-finishing

Glue up a couple of attractive center panels for your headboard and footboard. You can make them 5/8" thick for a flat-panel style, but I thought some dramatic

A blend of two General Finishes water-based dye stain colors produce this warm brown tone. After you've raised the grain with water and sanded it smooth again, flood stain onto the bare wood, and wipe off the excess.





The author clamped a shop-made, slotted mortising jig to the legs, then used two different guide collars and bit sizes to rout the bed rail hardware mortises and prong slots. Chisel the shallow mortises square.



While the rest of the wooden parts are stained and topcoated, leaving the top rails and legs bare until after final glue-up allows you to refine the corner joints as needed. Sometimes finishing in stages is the best plan.



shadow lines would look great here. So, I opted for 7/8"-thick panels and scooped out a 1 1/8"-wide, 1/4"-deep cove all around with a panel-raising bit in the router table.

Before you can do some permanent assembly, make a slotted routing jig (see top photo, left) so you can cut the shallow mortises in the bed legs for metal connecting hardware (see Hardware box, [page 43](#)). My jig consists of a top plate with a 3/4"-wide, 4 1/4"-long slot in the center and a fence screwed underneath for clamping. I was able to cut both the large mortises for the metal plates of this receiving hardware, plus deeper grooves for the hooked "prongs" of the mating hardware, using the same routing jig. For the shallow 1/8" mortises, I outfitted my router with a 3/8" O.D. guide collar and a 5/16" straight bit; I cut the deeper prong slots into these mortises without repositioning the jig by switching to a 3/4"-diameter O.D. collar and a 1/4" straight bit.

With this done, ease the edges of all the bed parts with a 1/8"-roundover bit in a trim router, but stop just short of where the stiles fit into the bottom rails and where the tops of the legs will fit into the top rails. Sand everything up through the grits to 220, and go ahead and glue the stiles into the bottom rails.

To approximate the color of many original Greene and Greene pieces, I followed a finishing recipe recommended by Darrell Peart, a published expert who specializes in this style. He mixes seven parts orange water-based dye with four parts medium brown dye to produce a beautiful, warm brown tone. Raise the grain of the bed parts before staining by wiping them down with water. Knock off any roughness and raised fibers after the wood dries with 320-grit sandpaper. Then flood dye onto the rail/stile assemblies, slats and panels, and wipe off all the excess immediately. Go ahead and topcoat these parts, too. I applied three coats of General Finishes Enduro water-based satin varnish.

When the finish dries, glue up the complete footboard and headboard with the slats and panels installed. The reason not to pre-finish the legs and top rails is so you can scrape and sand their corner joints flat now, when these assemblies come out of the clamps. Once that's done, dye and varnish this bare wood.

Making the Side Rails

The side rails begin as two long planks of 1 1/8"-thick lumber with bed rail mortises cut into their ends. My handy slotted routing jig



Routing mortises into the ends of the long bed rails required clamping them on-end in a bench vise. Double them up to provide better support for the mortising jig. Adding a 1/4"-thick shim and stop block (inset) enabled the same leg mortising jig to produce the rail mortises, too.



Greene & Greene furniture is accented with square plugs. Their faces should be gently pillowed. It's easy to accomplish by spinning them against finer and finer sandpaper on a soft pad, using a drill. Dye them black, if needed, and buff them to a low luster (inset).



worked here, too. I just tacked a 1/4"-thick spacer to the fence to offset it for centering the jig correctly. A 3/8" guide collar and 5/16" straight bit took care of the mortising work again. Cut these mortises 3/16" deep instead of 1/8", so the pronged hooks will pull the side rails tightly against the headboard and footboard once assembled. Stain and topcoat the rails, then fasten the hooked connectors with #10 x 3" flathead wood screws. Attach the headboard and footboard hardware with #10 x 1 1/4" screws.

The bed's box spring rests on two lengths of 1 1/2" x 1 1/2" angle iron, positioned flush with the bottom edges of the side rails. Prepare the irons by drilling eight to 10 counterbored holes for #10 x 1" flathead wood screws, then cleaning the metal and spray painting them a dark color. Fasten the irons to the rails.

Adding the Signature Square Wood Plugs

Pillow-topped wood plugs, made from a darker hardwood, are classic Greene & Greene details wherever two parts intersect at a joint. I made 5/16"-square plugs for the "major" joints (leg/rail, stile/rail) and used 1/4"-square plugs for the slats and on either side of the larger plugs on the bottom rails. The pillowing effect was easy to do by spinning the ends of my plug "sticks" in a drill/driver against sandpaper of various grits. The hardwood I chose for the plugs — an ebony alternative called katalpa — wasn't dark enough, so I dyed the plugs black and sprayed them with satin lacquer.

After several hours of pounding and drilling each of the bed's 56 plug mortises 3/8" deep, I glued in the plugs. All that was left was to fabricate a half dozen pine slats to span between the irons.

Jo Ellen and her husband Rick are pleased with the style and sturdiness of their new bed. I'm sure the recipient of your Greene and Greene masterpiece will love it, too.

Chris Marshall is senior editor of Woodworker's Journal.



The author cut holes for the plugs using two sizes of square punches. Hollowed in the center, they accept a drill bit for waste removal. The drill bit's centerpoint also serves as a way to center the punch: drill a pilot hole, slip the punch over it, remove the bit and pound the punch in.



Continuous lengths of angle iron stiffen the side rails and offer full support for the box spring. Attach them with #10 x 1" flathead screws driven into countersunk holes in the iron. Use eight to 10 screws per side rail.



Tap the bed rail hardware together with a deadblow mallet, and add six cross supports to assemble this sturdy frame.

Router Table Extension with Dust Collection

By Bill Wells

Customize your table saw by replacing one wing with this convenient and floor-saving router table. It features a unique internal dust collection system for cleaner operation.



Most table saws come with an extension wing on the right-hand side of the saw table. Replacing this wing with a router table is an excellent modification to your saw. It is convenient, saves valuable floor space, and it's inexpensive to build. When I decided to add a table-mounted router to my small shop, adding it as an extension to my saw was my best option. I also wanted effective dust control, but none of the commercially available dust control systems appealed to me. So I decided to design my own.

The concept I came up with is a dust collection system built right into the table-top itself. An internal chamber connects the router bit opening on the top surface with a shop vacuum connection on the bottom. Dust and chips are vacuumed away down the bit opening as soon as they are cut.

The table is made in three layers: a top surface of durable countertop laminate, a middle layer of 1/4" MDF and a bottom layer that includes the dust conveying chamber, made of 3/4" birch plywood. There's no special fence with vacuum openings and no hoses on the table.

Measure the distance between your saw's fence rails first before cutting any of the project parts to size. The table frame must fit snugly.

Careful Measurements Come First

Remove the extension wing of your saw and determine the size of your new router table extension. The most critical dimension is the width — the distance between saw fence rails; mine was 27 1/8".



1 *Install ledges inside the table framework to support the bottom plywood layer. Use a scrap depth gauge to locate the ledges accurately.*



2 *The author dabbed black paint on the hole locations of his saw table to mark the router frame for drilling matching holes.*



3 *Bolt the frame to the saw table and rip fence rails to check its fit. The bolt holes should be large enough to allow for some fine-tuning.*



4 *Cut a piece of 3/4" birch plywood for the table's bottom layer. Once set into place, its top surface should be flush with the top of the frame.*



5 *Notice that initially, the plywood layer will block access to the bolt holes when resting on the ledges.*



6 *Mark and cut clearance areas in the plywood at each bolt hole location. Check to make sure your wrench has enough access.*

The depth of the extension is somewhat arbitrary. I chose mine to extend to the end of the fence rails, which on my saw is 16½". If you want an even deeper table, you can extend a bit farther, but no more than about 6" past the end of the rails.

Building the Frame

Bolting your completed extension to the saw can be the trickiest part of the project. So build the frame first; that way you can deal with unique mounting requirements and interferences from the get-go.

Build the frame from 1x4 solid wood to the dimensions determined in the previous step. The width is critical; the frame should fit snugly between the saw rails. Butt-joint the frame pieces using 2" screws and yellow glue. Then add a ledge inside the frame to support the top; this ledge should be at a depth equal to the thickness of the bottom plywood layer. I used a piece of 3/4" scrap as a gauge.

Now fit the frame into position on the saw. Since the middle and top layers will rest on top of the frame, set the top of the frame about 5/16" lower than the cast-iron saw surface and mark this location. Then mark the location of the bolt holes for attaching the frame to the saw table. I dabbed black paint around the bolt

holes, then pressed the frame against the top. The transferred paint clearly shows the hole location on the wood frame.

Drill these holes and elongate them, and all others, for later height adjustment. Now bolt the frame to the fence rails. You may not be able to use the original fasteners that came with the saw. Leave the frame in place for now; you will be making minor adjustments to subsequent components for access to the fasteners you just installed. Better to do these now than later!

Making the Bottom Layer

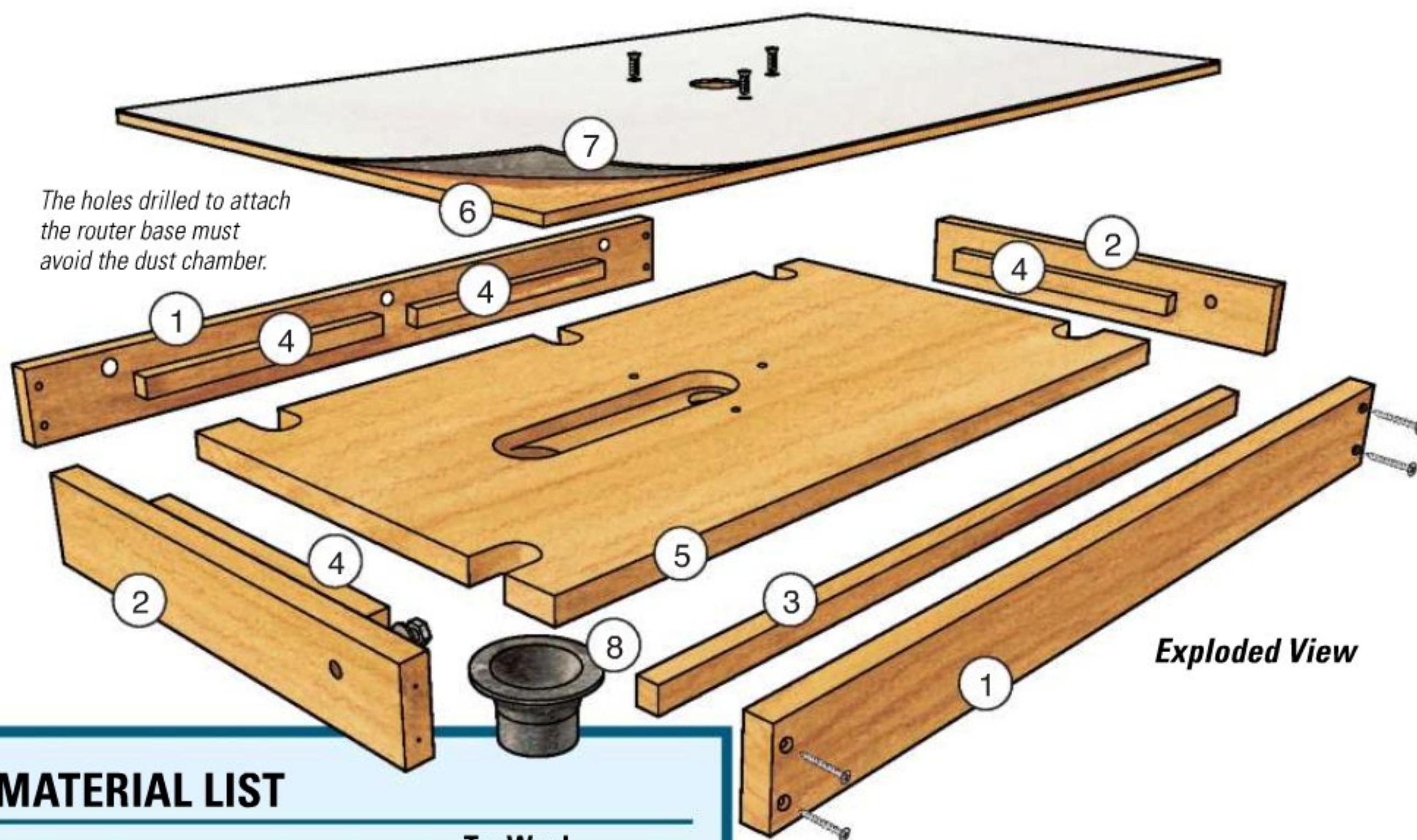
This layer fits inside the frame, so measure the inside dimensions and cut a piece of 3/4" birch plywood to fit. Go ahead and set this plywood panel into the frame.

Looking from below, you will see that the plywood has likely blocked access to the fasteners.

Rout an elongated recess into the top of the plywood layer to form the dust chamber. The author attached temporary guides to limit the router's travel for this task.

Mark the location of all fasteners, and turn the plywood layer over. You can now cut away small areas of plywood so that you have room to get a wrench onto the bolt heads. I used a 1¼" hole saw and hand saw. Don't worry about the holes you have





Exploded View

MATERIAL LIST

	T x W x L
1 Long Frames (2)	3/4" x 2 1/2" x 27"
2 Short Frames (2)	3/4" x 2 1/2" x 14 1/4"
3 Long Ledge (1)	5/8" x 3/4" x 25 1/2"
4 Short Ledges (4)	5/8" x 3/4" x 9 1/4"
5 Bottom Layer (1)	3/4" x 14 1/4" x 25 1/2"
6 Middle Layer (1)	1/4" x 15 3/4" x 27"
7 Top Layer (1)	3/32" x 15 3/4" x 27"
8 Dust Port (1)	2 1/2" Dia.

Note: The dimensions in the Material List may need to be adjusted to fit your table saw.

Bottom Layer
(TopView)

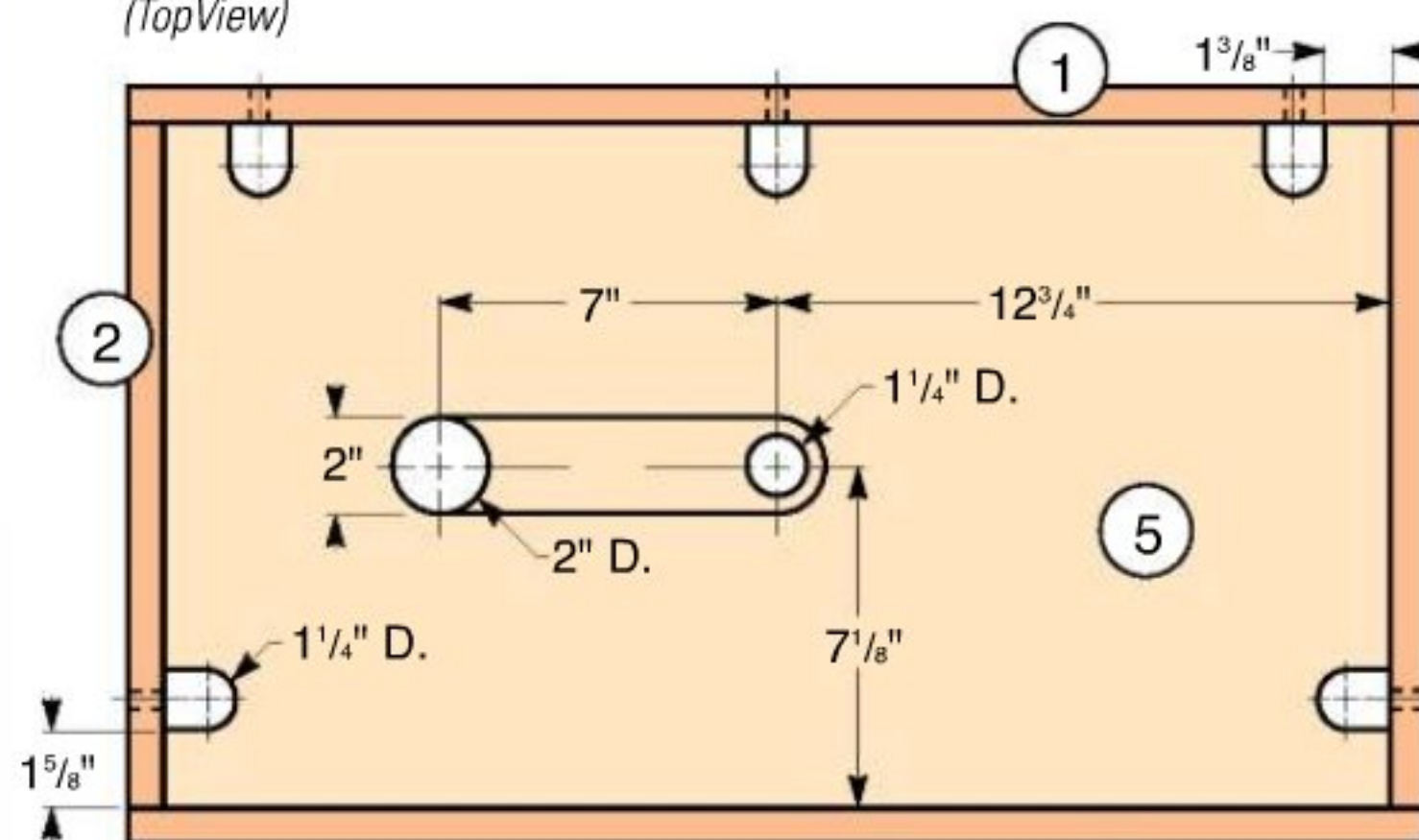


Table Extension Hard-to-Find Hardware

2 1/2" Dust Port (1) #42137 \$5.99 ea.

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Or, call 800-610-0883 (code WJ1577).



Cut a large access hole for a shop vacuum dust port into one end of the dust chamber, and bore a second smaller hole to fit your router's collet into the other end of the chamber. A pair of hole saws and a drill make this easy work.

left in the plywood; there will be a sheet of MDF covering this area. Place the plywood back into the frame and check your wrench access to the fasteners.

Next, it's time to rout a recess in the top of the plywood layer that will become the internal dust conveying chamber and to drill a hole for the vacuum connection. You can leave the layer in the frame if you wish; just be sure the frame is securely bolted to the saw. Assuming you will be connecting the vacuum hose from the back of the saw, the routed recess and drilled hole will look like the photo at left. Note the diagonal cross lines that mark the table's center point.

Route a 1/2"-deep recess as shown in the *Drawings* and drill the 2"-diameter vacuum outlet hole with a hole saw. I tacked four temporary guides to the plywood to help me rout

the rectangular portion of the recess, then routed the rounded ends freehand.

The diameter for the bottom bit opening will depend upon the size of your router's collet. Measure the largest diameter of the collet; the bit opening in the plywood layer should be slightly larger, but not more than about 1/8". My collet measured slightly less than 1 1/4", so I drilled the bit opening at the center with a 1 1/4" hole saw. I drew crossed lines on all layers to mark center points.

With the frame still in the saw, dry-fit the plywood into the frame. The plywood should be flush with the top of the frame, with the vacuum outlet oriented to the back side of the saw. Remove the frame.

Moving Up to the Middle and Top

As I said earlier, the middle MDF layer and top laminate layer sit on top of the frame. Cut them both oversized to begin with — you'll trim them down later. Measure the outside dimensions of the frame and add an inch to that length and width, so that there will be 1/2" overhang on all sides of the frame. Using contact cement and a roller, glue the laminate work surface onto the MDF layer. Once the layers are bonded together, use a 1 1/2" hole saw to drill the top bit opening at the center of the combined laminate/MDF layer.



Bond the top laminate to the middle MDF layer with contact cement. Dowel spacers make it easier to position the laminate accurately.



Trim the laminate and MDF layers even with the outside edges of the router table frame using a piloted flush-trim bit.

The next step is to glue the top layers onto the plywood bottom layer. It is critical to position the top bit opening directly over the bottom bit opening in the plywood layer. To do this, I first chucked a bit into the router I intended to install under the table; placed the router, bit up, on a work table; and then set the frame and plywood assembly onto the router. This way, I could position the top work surface layer so that the bit opening was concentric with the router bit. Once the layers are in correct arrangement, clamp them together and remove the router. Now carefully mark the position, and glue the top layer to the plywood layer. Avoid getting glue in the vacuum chamber area. When you clamp the layers together, be sure they don't slip out of position! After the glue dries, fit the layers into the frame, with the vacuum outlet positioned toward the back. Now glue them into the frame, and clamp.

Trim and Complete the Table

There are a few tasks left to complete before bolting the table to the saw. First, trim the laminate and MDF with a flush-trim bit and file or sand the sharp edges smooth. Next, turn the table over and place the router over the bit opening. This is the time to decide how you want the router positioned, in order to reach the On/Off switch easily and to provide access to the motor clamping mechanism in the router base. After deciding these details, you can drill the holes for the router mounting screws. There are two important issues here: 1) the holes must not go through the internal chamber, and 2) the router must be positioned so that the bit is dead center in the top bit opening. A good way to mark the screw locations is to use the router's subbase as a template. After the holes are drilled, turn the table back over and countersink the holes. I mounted my router with flathead socket head screws. Now attach the 2 1/2" dust port connection, and the table is done.

Bolting the Table to the Saw

Since you built the frame to fit your specific saw, and you provided access to the mounting bolts, this step should be pretty easy. When you get the table loosely attached, place a straightedge on the table surface of the saw, and check



Your router's baseplate makes an excellent template for determining where to drill the attachment screws for the router base.



Orient your router on the table so you'll have easy access to its On/Off switch and depth-setting controls once it's installed.



The internal chamber allows a shop vac to draw debris away from close to the router with no hose obstructions above the table.

that it is level and well aligned. You may have to ream out a bolt hole or two in the frame to get the router table flush and level with the saw table. Then bolt the project tightly in place on the saw. With that, you're finished building this project. Now you're ready to put it into service by making some test cuts! I hope your new router table is as convenient and dust-free as mine has turned out to be.

Bill Wells is a frequent provider of workshop tricks to Woodworker's Journal. This is his first project article for the magazine.



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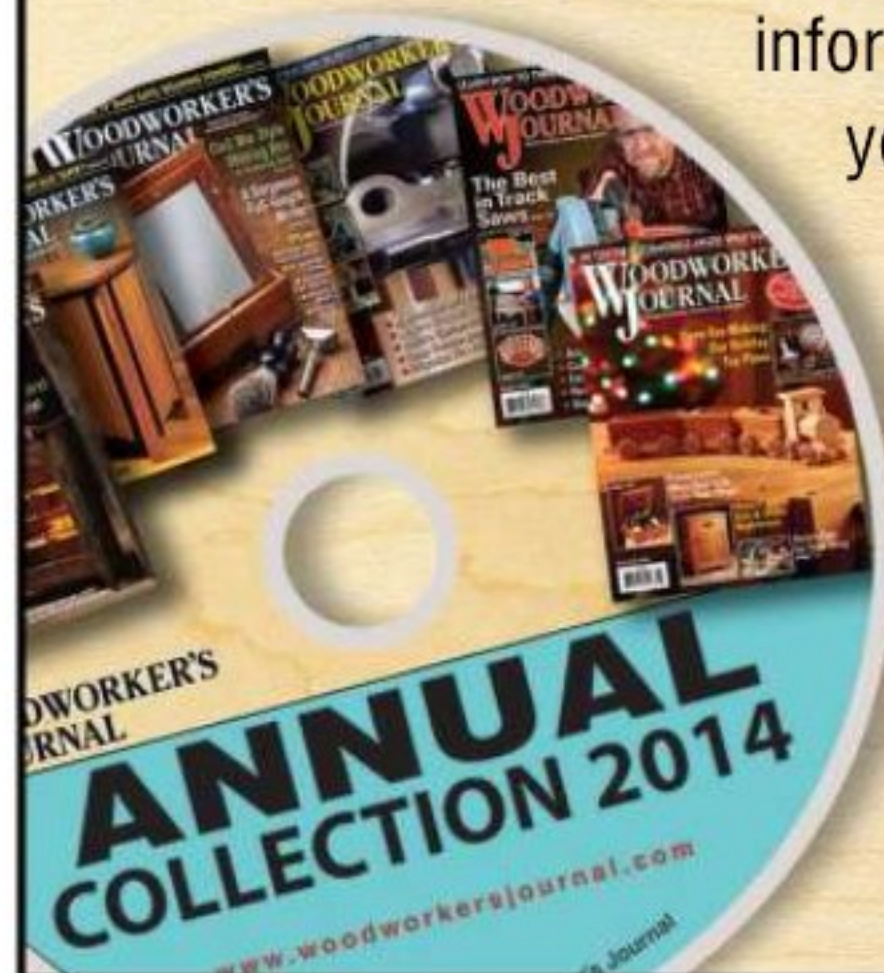
The year 2014 might be past, but it's not forgotten: all of the year's great projects live on inside the **Woodworker's Journal Annual Collection 2014 CD**. Everything from every issue of the year is on the CD, from a Limbert Bookcase to a Desk/Bed Combo; a 19th Century Shaving Box to a Toy Train.

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- **"Signature Line" Chop Master** for quiet, precise cutting and less splintering. Has 90 teeth, a -5° hook for feed rate control, and re-designed angles.
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Easy Wood Tools 4" Easy Chuck

By Ernie Conover

This four-jaw scroll chuck for woodturners saves you time both when you change jaws and when you adjust their grip on your project.



The 4" Easy Scroll Chuck is a novel new chuck with two time-saving features: quick-change jaws and a Zoom Ring which facilitates speedier gross movement of the jaws.

www.woodworkersjournal.com **MORE ON THE WEB**

For a video of the author demonstrating the quick-change jaws and Zoom Ring features, plus jaws for reverse chucking bowls, visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

I recently spent a week testing the 4" Easy Chuck™, an innovative new four-jaw scroll chuck from Easy Wood Tools that is aimed at woodturners. Made entirely in the United States, it's not just a pretty new face, but rather offers some innovative features, the first being the ability to change jaws very quickly. (The biggest annoyance in using most scroll chucks is changing the top jaws. Eight cap screws have to be unscrewed, the top

jaws swapped, and the screws replaced and torqued. This can take up to 15 minutes — and I do not answer the phone for fear of not tightening all the screws to full torque.)

Scroll chucks, be they for metal or wood, have bottom jaws with racks on the underside that engage the scroll plate. The scroll plate is a screw thread in the flat that is buried inside the chuck body. It can be visualized as a vinyl record with a ridge running

outward from the center in a spiral. The scroll plate turns in the same manner as the record would on a turntable, but instead of playing music, it moves the jaws in and out in unison, bringing whatever is held to accurate centering.

Chuck manufacturers offer an assortment of top jaws shaped to different turning needs. I use 3" general purpose jaws and spigot (or tower) jaws the most. Bolting and unbolting is enough



of a hassle that I have two identical chucks with these respective jaws.

The Easy Chuck ends this time sink. A small hole in the periphery of each of the top jaws allows insertion of a 1/8" ball tip hex key (supplied). This action trips a latch paw, and the jaws spring out of the chuck. Yes, the jaws are spring-loaded. Simply insert the new top jaw in the keyway of the bottom jaw until the pawl latches it in place with an audible click. The jaws are changed quicker than you can sharpen your bowl gouge.

The second novel feature of the 4" Easy Chuck is what they call a Zoom Ring™. A die-cast aluminum ring at the back of the chuck turns the investment cast stainless steel scroll plate directly, allowing coarse movement of the jaws very fast. A 5/16" hex key is then inserted into one of two bevel gears in the periphery of the chuck body to facilitate final and secure tightening. This gives the speed of a lever chuck with the gripping power of a gear-driven scroll.

The 4" Easy Chuck is very well-made, with the body turned from a tough steel alloy. It is also nickel-plated, which gives corrosion resistance and lubricity for the moving jaws and scroll plate. Top and bottom jaws, latch paws and bevel gears are investment cast steel that is carburized

Inserting the supplied ball tip hex wrench in a hole in the periphery of the top jaws trips a latch and it springs free. Slide the new jaw in until you hear a distinctive click, and you are ready to go.

(surface hardened), which adds toughness and wear resistance. A final thoughtful feature is that the outside corners of the jaws have generous radiuses to ameliorate injury if you accidentally touch them. I would put the Easy Chuck in the pantheon of fine scroll chucks.

A great danger of using a scroll chuck is one of the jaws going ballistic on startup because too large of a hold was attempted. The scroll loses its hold on one or more jaws, starting with number 4. An ironclad chucking rule is to never work with the jaws more than one-third of the way out of the chuck body. All woodturning chucks today are safety chucks. A safety chuck has a mechanical block that prevents the jaws from being extended further than the grip of the scroll. The 4" Easy Chuck accomplishes this with a 1/8" roll pin in the number 4 keyway.

The 4" Easy Chuck is offered in 1" x 8, 1 1/4" x 8, M30 x 3.5 and M33 x 3.5 spindle sizes. Easy Tools also offers adapters to other spindle sizes. I recommend the Easy Chuck highly.

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



Turning the Zoom Ring (top photo) allows coarse movement of the jaws very quickly. This is particularly time-saving when capturing the screw that turns it into a screw chuck (inset photo). Final tightening is done with a 5/16" hex key inserted in one of two bevel gears.

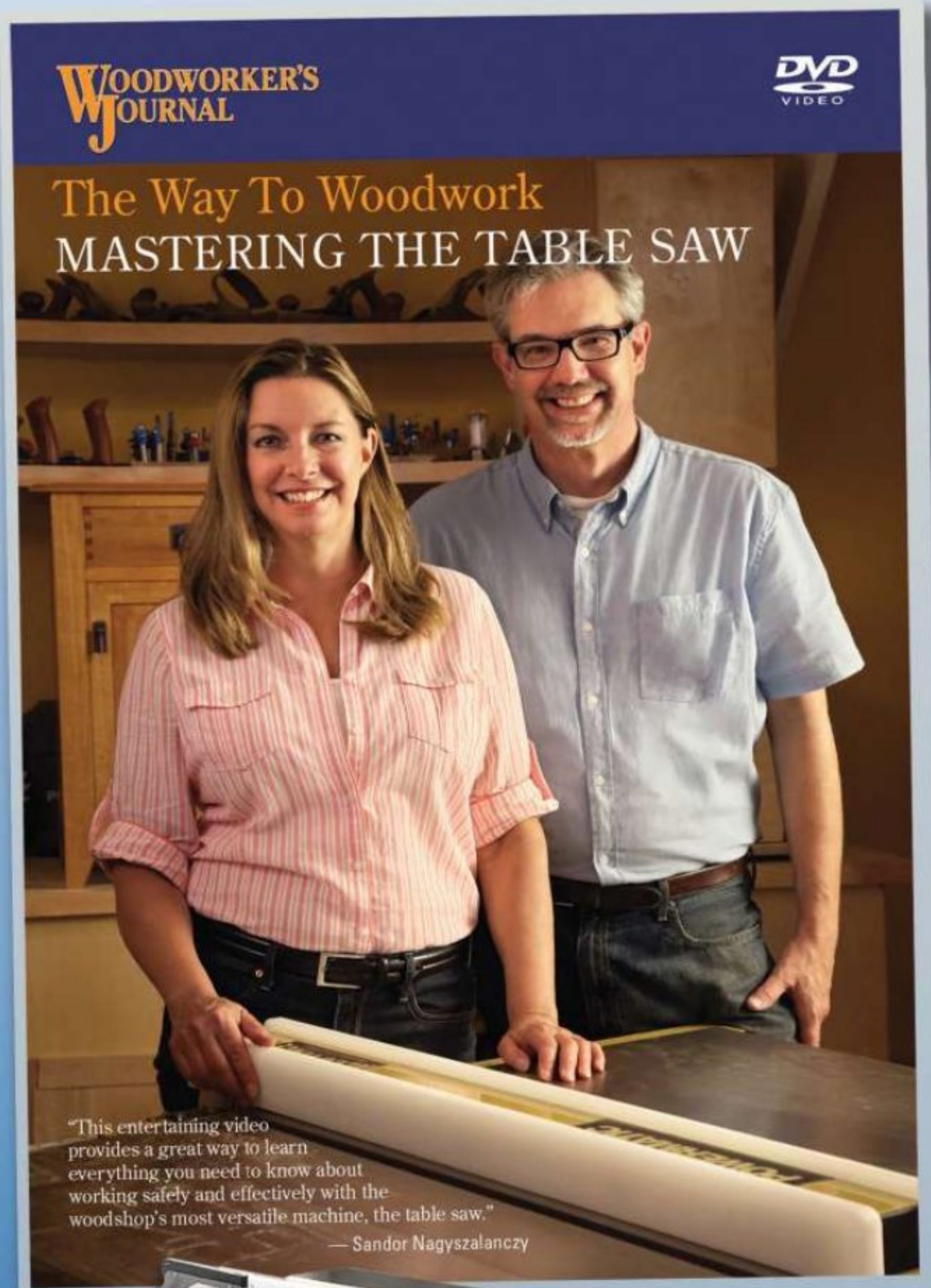


Easy Wood Tools offers an impressive lineup of jaws for their new chuck. The jaws the author uses most are the standard set that come with the chuck and the CJ210 Easy Reach Dovetail Jaws™ (a "tower" style).

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Reader's Survey

Readers' Choice Awards

In each issue of 2014, we presented a wide array of tools and often bestowed a Woodworker's Journal Best Bet award in the process. But, we asked ourselves, what if we gave our readers the power to choose which tool they think is best? So that is just what we did. We put all the tools featured in our pages during 2014 in front of our online survey group and asked them to give us their top picks. Here, with a few editorial comments from Woodworker's Journal, are their Readers' Choice selections.

Stationary and Benchtop Tools

Laguna's 14-Twelve band saw resaws wide boards and brings the benefits of European styled band saws into the 110-volt world of the home woodworker. The tool is priced to sell — something which might surprise long-time Laguna watchers — and the groovy industrial-looking worklight add-on? Well, that might just be what pushed this tool to the top of our readers' list.



**JET JWBS-14SF
Band Saw**

**2nd
Place**



**3rd
Place**

**Bosch CM8S 8" Single
Bevel Sliding Compound
Miter Saw**

Contenders

General International 90-170B Band Saw
JET JWBS-14SF Band Saw
Laguna 14-Twelve Band Saw
Oliver 4620 Band Saw
RIKON 10-325 Band Saw
Steel City 50155G Band Saw
Bosch CM8S 8" Single Bevel Sliding Compound Miter Saw
RIKON 10-351 14" Band Saw
RIDGID R1500 15" Drill Press
RIKON 25-010H Planer/Jointer
JET 14" 3HP Steel Frame Band Saw
Craftsman 10" Jobsite Table Saw



**Laguna 14-Twelve
Band Saw**

Bits, Blades and Cutters

The patent-pending “Fusion Trio” tooth geometry on the Freud Premier Fusion general purpose saw blades is the attention-getter on this winning blade. The top, sides and face of each tooth get a special grind to improve feed rate, reduce amp draw, and allow for a more controlled cut. Readers found these blades, also available in thin-kerf, to be a cut above the rest.



**Freud Premier Fusion
General Purpose
Saw Blades**

Freud SD508 Dado Blade

**2nd
Place**



Contenders

Rockler Edge V-groove Bit
Olson Saw All Pro® PGT Professional Series Band Saw Blades
Spyder Products Skeleton™ Jigsaw Blades
Freud Premier Fusion General Purpose Saw Blades
Freud SD508 Dado Blade



Olson Saw All Pro PGT Professional Series Band Saw Blades



Honorable Mention

Olson has been making ultra dependable and reasonably affordable band saw blades for a long time, and their All Pro® PGT Professional Series continues the tradition. Strike up the band (saw) for blades with a computer-controlled raker tooth set that creates straighter and more precise cuts with less waste.

Wagner Power Painter Plus



Handheld Electric Spray Guns

Spraying paint at home is a task whose time has come, in part because of the new affordable technology (like these spray guns) that has come on line. Wagner's Power Painter Plus incorporates the two-hole spray tip — and its clean, wide fan pattern — also found on the company's lower-priced model, plus adds more power and an easy-to-operate push-and-release cup. The multi-position “stain/paint” switch on the back gets rid of guesswork when dialing in the settings for heavier or lighter material flows. It's not hard to guess why this topped our readers' choices for handheld electric spray guns.

Graco TrueCoat Pro II Fine Finish Cordless



2nd Place



Graco TrueCoat Pro II Electric

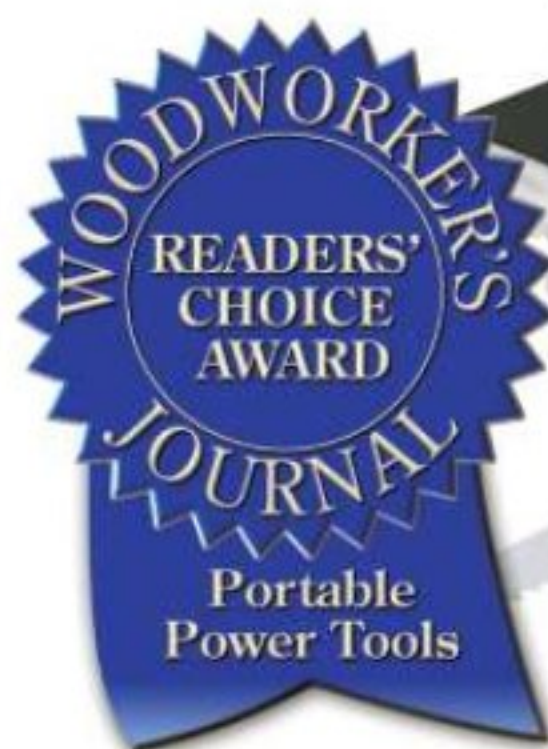
Contenders

HomeRight Heavy Duty Sprayer Titanium Series
Wagner Power Painter II
Wagner Power Painter Plus
Graco TrueCoat® Pro II Electric
Graco TrueCoat® Pro II Fine Finish Cordless
Black & Decker 2-Speed Quick Clean™ Sprayer

Portable Power Tools

Four tools for one price is almost always a good deal, especially when three of them are among the newer tools in the line.

The 6½" Circular Saw, Reciprocating Tiger Saw® and Pivoting Flashlight join a 1/2" Drill/Driver for this set that works interchangeably with a 4.0 amp/hour battery, or 1.0 amp/hour battery. For our survey respondents, that just works. Are these tools pure woodworking tools? The answer is no ... but while all DIYers are not woodworkers, we've found that all woodworkers are, in fact, DIYers.



PORTER-CABLE 20V MAX* Lithium Ion Four-Tool Combo Kit

Festool TS 55 REQ Track Saw



DeWALT DWS520K Track Saw

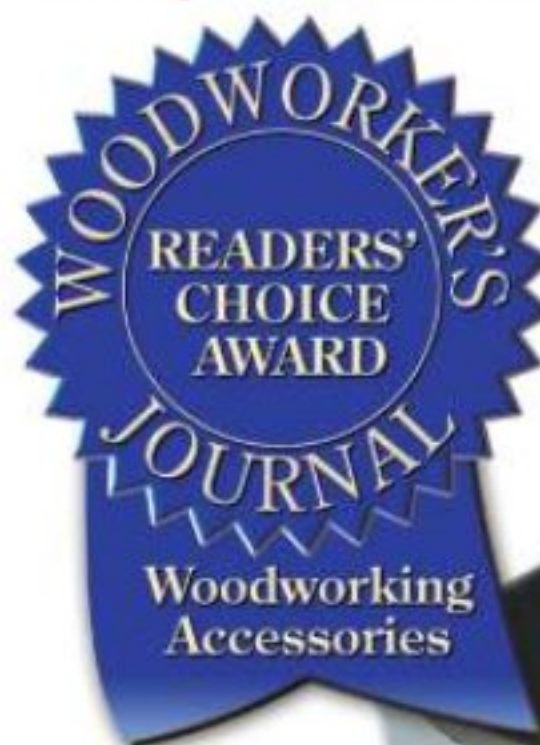
Contenders

Festool Carvex 420 Jigsaw
 Bostitch® 15 Amp 7¼" Circular Saw Kit
 Next Wave Ready2Rout
 FEIN ASCM 14QX Drill
 RYOBI® 18V ONE+™ P360 18 gauge Narrow Crown Stapler
 Black & Decker 1/2" Drill Driver
 Handibot® Smart Power Tool
 PORTER-CABLE 20V MAX* Lithium Ion Four-Tool Combo Kit
 Black & Decker 20V MAX* Lithium Cordless Drill with AutoSense
 Makita XSH01X/Z Cordless 7¼" Circular Saw
 DeWALT DWS520K Track Saw
 Festool TS 55 REQ Track Saw
 Grizzly T25552 Track Saw
 Mafell MT 55 cc Track Saw
 Makita SP6000J1 Track Saw
 Triton TTS1400 Track Saw
 Dremel Ultra-Saw™

Woodworking Accessories

Woodworker's Journal readers chose the Tormek TS-740 Sharpening Station, with its user-friendly adjustment feature, as the winner of the Woodworking Accessories category. Its height can be set between 29½" and 32", allowing your shoulders to relax when you're sharpening, while you're still applying the right amount of pressure. The TS-740 might have a small footprint at 22¾" wide by 15" deep, but it stands tall when it needs to.

Tormek TS-740 Sharpening Station



BESSEY K Body Clamps



Rockler T-Track Stops



Honorable Mention

Rockler's T-Track Stops come in short, inline or long versions and are handy helpers to hold down workpieces for various operations, even allowing you to work in different directions without moving the board or stops. These shop assistants do what's needed, without getting in the way: that's the kind of helper that gets a special mention.

Contenders

Carter Products Perfect Sphere™
Rockler 24" Shop Stand Apron
Tormek® TS-740 Sharpening Station
BESSEY K Body® Revo™ and Revo Jr. Clamps
Kreg Tool Company True-FLEX™ Featherboards
Rockler Silicone Glue Brush
Portamate PM-7500 Deluxe Miter Saw Stand
Rockler T-Track Stops
Blackfire® CLAMPLIGHT
IRWIN Impact Performance Series™ Double-Ended Power Bits
General Tools Precision Multi-Species Wood Moisture Meter

Continues on page 64 ...



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—Greg, Montana



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Workshop Accessories

Dust collection is definitely one of a shop's dirty jobs, which makes handing it over to a premium dust extractor like the Festool CT 26 very attractive, the survey group says. Compatible with lots of power tools from its own brand and others, the CT 26 has a dizzying array of accessories, a self-cleaning filter bag and a wheel brake to prevent unwanted movement. This quiet, efficient shop servant made a top-notch impression.

Festool CT 26 HEPA Dust Extractor



Contenders

Bosch VAC090A Dust Extractor
Craftsman 125.12007 Shop Vacuum
DeWALT DWV012 HEPA Dust Extractor
Festool CT 26 HEPA Dust Extractor
Milwaukee 8955 Shop Vacuum
RIDGID WD1851 Shop Vacuum
Shop-Vac 5873410 Shop Vacuum
WORKSHOP WS1100CA0 Shop Vacuum
FEIN Turbo 1 Dust Extractor



Craftsman 125.12007 Shop Vacuum

RIDGID WD1851 Shop Vacuum



WORKSHOP WS1100CA0 Shop Vacuum

Keep your eyes on this new kid on the block: we are predicting big things from WORKSHOP.



Continues on page 66 ...



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Workshop Solutions

An innovation in adhesive, Nexabond 2500 Instant Wood Adhesive offers the quick cure of a cyanoacrylate with the longer assembly time of a PVA wood glue. Add that together with a durable bond, no swelling around the joint (and hence no waiting before machining), and it's easy to see why the sum total of our readers' reactions made this new entry into the glue market a winner in this survey.

Contenders

Bloxygen®
 Nexabond™ 2500 Instant Wood Adhesive
 Milwaukee M18™ Jobsite Radio/Charger
 DeWALT Heated Jacket
 Rockler Koostik Kit
 Diablo Universal Sanding Discs
 Rockler Barn Door Hardware Kit
 Veto Pro Pac Cargo Totes™
 DMT® DiaSpray®
 Milwaukee Tool Inkzall™ Jobsite Marker
 Bosch BAT621 5.0 Ah FatPack™ Batteries
 Gorilla Glue Company Self-Standing Bags
 Orion Products Group Sandits™
 Rockler Laser-cut Inlay Pen Blank Kit

Bosch BAT621 5.0 Ah FatPack Batteries



Diablo Universal Sanding Discs



Gorilla Glue Self-Standing Bags



Any trash bag that helps you clean your shop deserves a special mention. Did we mention it stands up on its own?

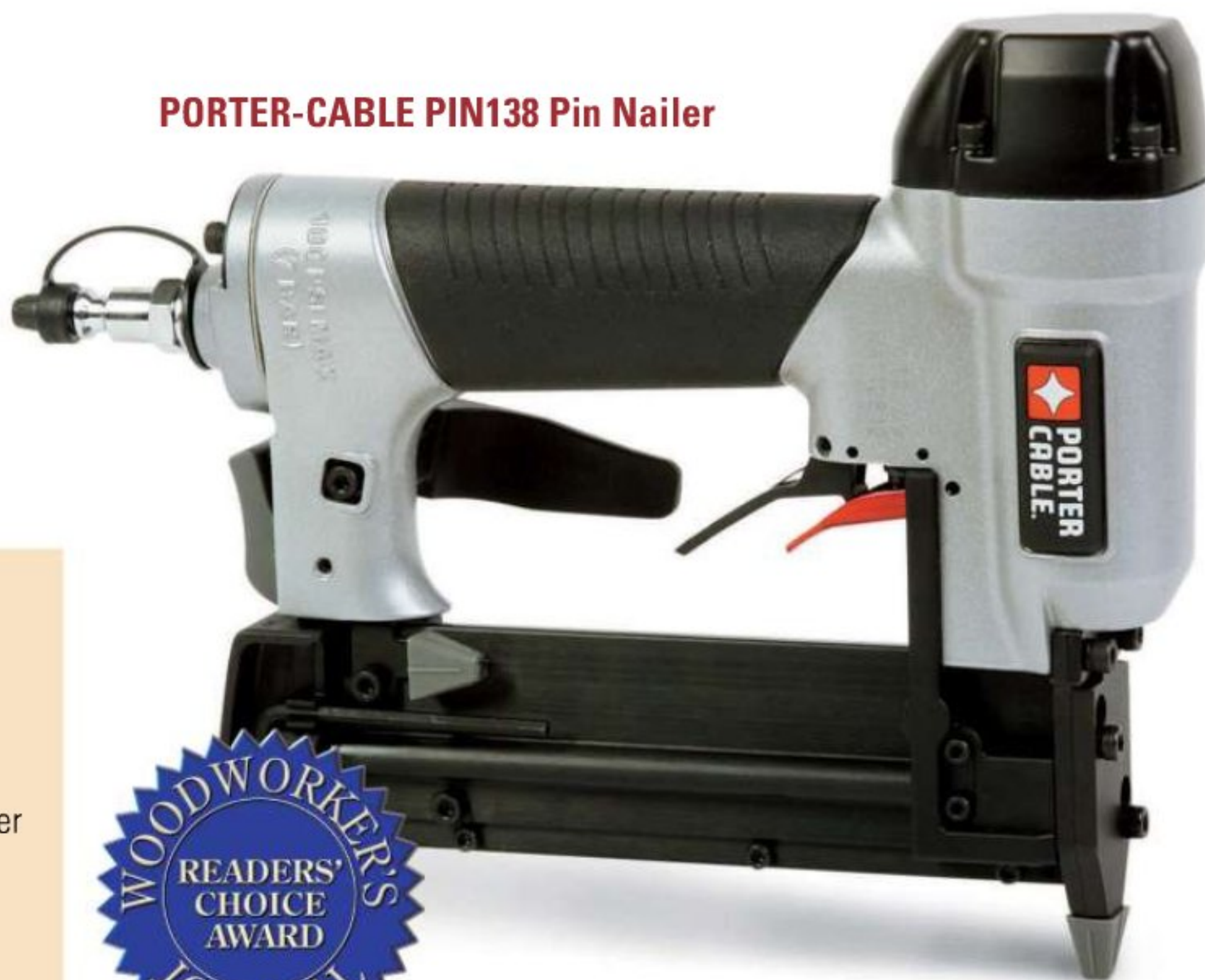
Pneumatic Tools

The dry-fire lockout on the PORTER-CABLE PIN138 23-gauge pin nailer protects you from yourself, in a way: it prevents the gun from firing when you're within a few pins of emptying the magazine — and prevents damage to the workpiece from firing without a nail. An oil-less, maintenance-free design also adds to the ease of use for this reader favorite among pneumatic tools.

Contenders

Bostitch HP118K 23-gauge Pin Nailer
 Cadex CP23.30 23-gauge Pin Nailer
 Hitachi NP35A 23-gauge Pin Nailer
 PORTER-CABLE PIN138 23-gauge Pin Nailer
 RIDGID R138HPA 23-gauge Pin Nailer
 Rotek RPN0635 23-gauge Pin Nailer
 Cadex CPB23.50 23-gauge Pin Nailer
 Senco FinishPro 23LXP 23-gauge Pin Nailer
 GREX P650 23-gauge Pin Nailer
 Spotnails SP2340 23-gauge Pin Nailer
 Surebonder 9710CB 23-gauge Pin Nailer
 Senco FinishPro 21LXP 21-gauge Pin Nailer

PORTER-CABLE PIN138 Pin Nailer



Bostitch HP118K Pin Nailer

2nd Place



GREX P650 Pin Nailer

3rd Place

SENCO 21-gauge FinishPro 21LXP Nailer

Honorable Mention

This innovative Senco nailer fills a "sweet spot" between the big-dude 18-gauge finish nailers and more diminutive 23-gauge brad nail guns. When compared to 23-gauge pins, 21-gauge offers extra holding power but still makes a small entry hole — a great new option on the market.



The survey results for this article were collected from the Woodworker's Journal Online Survey Group. The group consists of several thousand opt-in woodworkers who volunteered to answer woodworking-based questions on a regular basis. Want to join the survey group? Subscribe to the Woodworker's Journal eZine (it's free) and watch for updates.

Spice Rack

By Kimberly McNeelan

Here's a solution if you or someone you know faces the dilemma of disorganized spices (just where did that oregano go?).



The multitude of forms a spice rack can take on is pretty much endless. (You can see me talk about the design aspect and coming up with your own options on the online video.) I decided on a tree silhouette as the inspiration for mine — it seemed like the obvious choice for someone who is a self-proclaimed tree-hugger. Also, the idea of taking part of a dead tree and making it back into a tree shape seems appropriately ironic.

Since my goal was merely to give the sense of a tree, I used only part of the tree form: the canopy is blatantly manipulated and cut off in a straight line. This design choice not only gave the spice rack a clean line across the top, it also gave a metaphorical nod to the harvesting and manicuring of trees. For the wood, I used mahogany salvaged from a door maker.

To get started building your spice rack, establish your template and create a cut list for your own design, or use the ones I came up with if you want to follow my lead (see [page 70](#)). Next, mill your wood. (Remember to check that all your tools are set up square. “Squares” might be boring, but squares are a woodworker’s close friend.)

My side pieces are book-matched even though the grain is straight and only has slight variations. Per the usual milling rule for a smaller project like this, I left



A stop block clamped to the miter gauge fence enables the shelf dados to be cut accurately. Our author held the sides in alignment to cut both dados at once, but you could cut one dado at a time if you prefer.



Stacking and securing the side pieces together with double-sided tape, the author could make the open-ended branch cuts at the same time on the band saw.

all of my pieces one to two inches longer than the final dimensions to make sure I had plenty of material. After milling all the wood, I lined up the two side pieces and traced my pattern directly onto the top piece in line with one of the long edges. Next, I crosscut both side pieces to final length at the same time.

Using a dado stack, I set up to cut a 5/8"-wide dado to house my shelves. I laid the two side pieces against my miter gauge fence and together with the inside faces down, then set up a stop to ensure my pieces would stay aligned for cutting each of the grooves. You can see my setup in the photo above. Then I used double-stick tape to adhere the inside faces of the side pieces together for cutting and shaping. (You could also use masking tape or blue tape and tape them together.)

Since I had already drawn my shape on the outside of the side pieces, I went straight to the band saw to cut the organic shapes of the outline. While the pieces are still aligned and taped, drill the holes for your steel rods. I drilled through one side and only halfway into the other so that I could easily slide the bars in through one side after glue-up.

For creating the interior shapes of the branches, I drilled holes in the side pieces so I could use the scroll saw to cut those shapes according to my template. (If

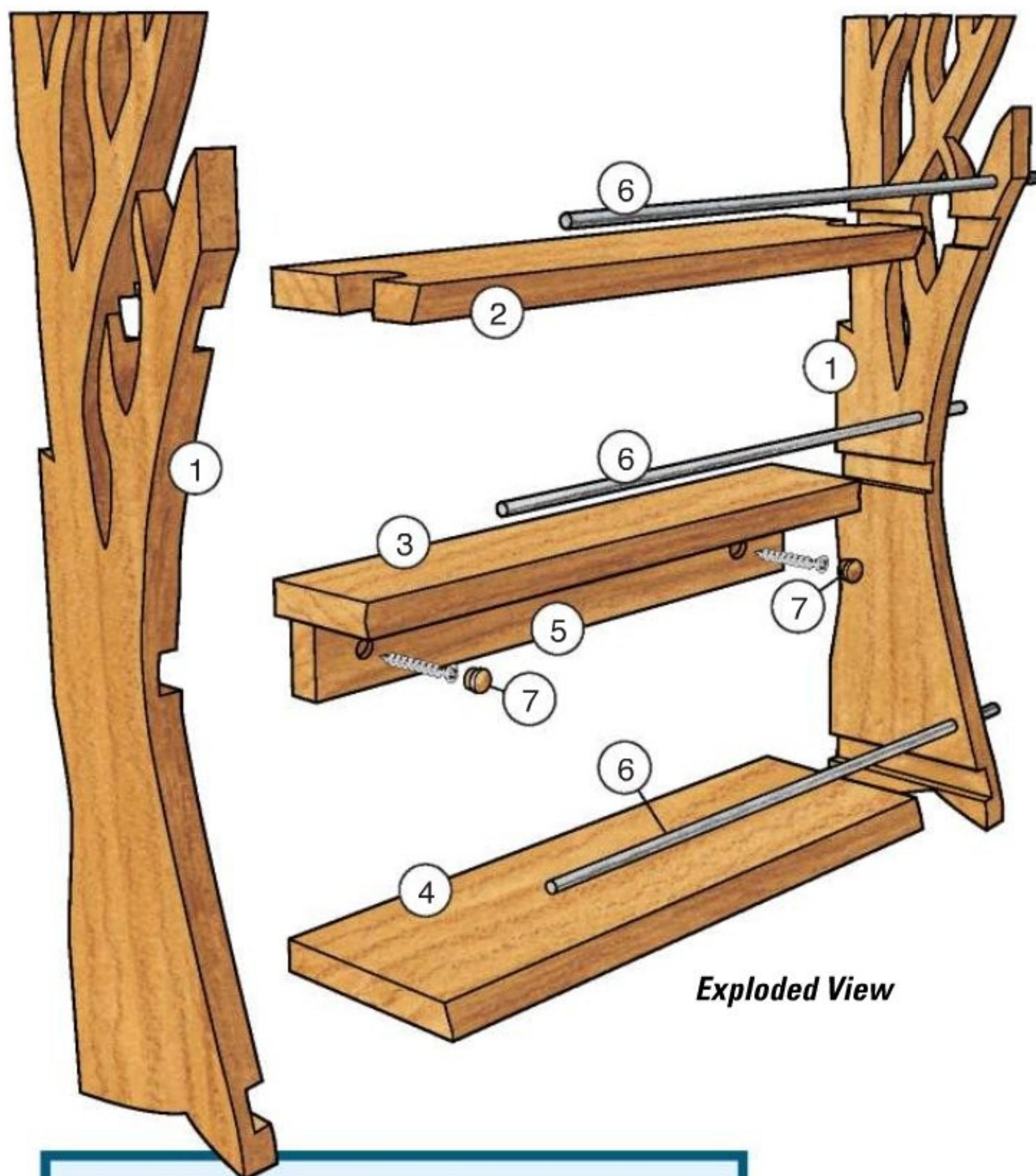
I hadn't had a scroll saw, careful cutting with the jigsaw or a coping saw would've worked, too.) I took the side pieces apart before using the scroll saw. The thickness of the two stacked together would be too much for that tool.

Next you will rip your shelves to width. The dimension provided for the shelf depth is a little bit deeper than it needs to be, so you can get the right angle on the shelf fronts to match the sides. At this point, assemble the shelves and side pieces. Then, using a pencil, mark the angle you need to cut in order to match it up. On the top shelf of my tree, I cut out two relief spots to ensure that the negative space of the branches wouldn't get lost with the intersection of the shelf. The angle of the branches made this tricky. Make sure

to mark the top and bottom intersection of the shelf and branches because it will be angled. Cut out the smaller shape on the band saw and use your hand tools to shape them flush.

A scroll saw is ideal for removing the "captured" areas between the branches. Or, you could make these cuts with a jigsaw instead. Either way, drill a pilot hole to start the cuts.





Exploded View

MATERIAL LIST

	T x W x L
1 Sides (2)	5/8" x 4 1/4" x 17"
2 Top Shelf (1)	5/8" x 4" x 13 3/8"
3 Middle Shelf (1)	5/8" x 2 7/16" x 13 3/8"
4 Bottom Shelf (1)	5/8" x 4 1/4" x 13 3/8"
5 Mounting Cleat (1)	5/8" x 1 1/2" x 12 3/4"
6 Steel Rods (3)	1/4" Dia. x 14"
7 Button Plugs (2)	3/8" Dia.

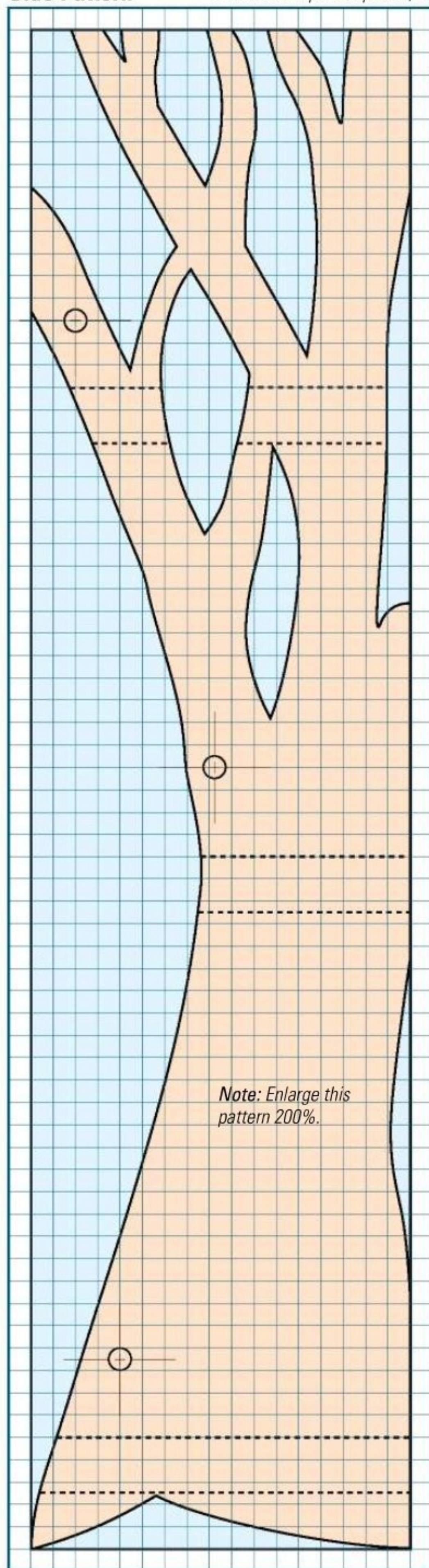
Go ahead and rip and crosscut the wall mounting cleat, and drill two countersunk holes 1 1/2" in from the ends for mounting the rack. I countersunk these holes 1/4" deep so I could plug the screw heads.

Now the fun really begins! Using a variety of hand tools (rasps, files, chisels, spokeshave, sandpaper with thin sanding blocks, etc.), I shaped the tree branches, got rid of the saw marks, and chamfered

all the edges to varying degrees to accentuate the tree shape on the outside of the side faces. You can form the tree as much or as little as you like. Maybe you want to take the edges to a full roundover or carve it to be closer to a true tree. It's up to you. Although, with hand-shaping, it is very important to be mindful of short grain, weak spots and grain direction in general. Use smart

Side Pattern

Note: Each square equals 1/4".

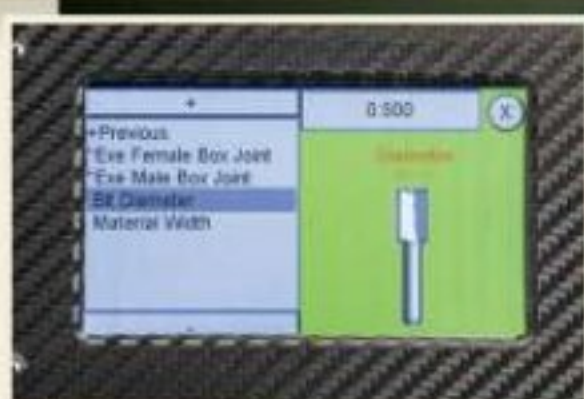


Continues on page 72 ...

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For a video of the author discussing spice rack design options, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.



Bevel-rip the the front edges of the shelves with the angle you marked in your first dry assembly, even it is only very slight. Leave the shelves about 1/16" wider than they need to be. You'll plane or sand their edges perfectly flush later.



Working from both directions, the author used a chisel to chamfer the side edges. She finds it is quicker and makes for crisper results than hand-sanding.

clamping to support your piece, too. Now sand the front and back faces of the sides, top and bottom of your shelves, and the mounting cleat, up to 220-grit either using a sanding block or by cupping your sandpaper. Don't sand the front edges of the rack until you have glued it up.

My shelves fit into the dados almost perfectly, with a nice friction fit. Therefore, when I sanded the shelf faces before glue-up, I was careful not to hit the part that would go into the dado. I did not sand the front edges of the shelves before gluing: I left them a little big to make sure the edges of the shelves matched the organic shape of the sides.

At this point, it is time to glue things together! Use just enough glue in the dados so as to not have squeeze-out on the shelves. I used three bar clamps (one for each shelf). They clamp up nice and square, and they aren't hefty to haul around the shop.

After ample drying time (overnight), shape and sand the front of the shelves to match your side

pieces. Everything should be sanded to 220-grit now, and you are ready to finish!

For the clear coat (I rarely stain wood), I used Minwax® Aerosol Lacquer in semi-gloss. I needed something quick drying, so this was the right choice. I do hate using aerosol cans, but sometimes convenience wins over ecological sense. I did three spray-on coats. Start in the hard-to-reach spots in between the branches. Make sure you flip the rack over to get all the different angles, too. I recoated after about 20 to 30 minutes, and following the final coat I let it sit a couple of hours before I put the steel rods in. I didn't glue the rods into their holes in order to make them easier to remove for occasional cleaning. If you choose to, use epoxy.

I'm pretty satisfied with the results of the spice rack. The mahogany is beautiful. There is enough room for about 30 average-diameter spice bottles. There are lots of beautiful specialty bottles available online that you could fill your rack with if you want to further customize the look. Happy cooking! And enjoy the ease of your spice organization.

Kimberly McNeelan is a woodworker, artist and woodworking teacher. Her website is kimswoodfurniture.com.



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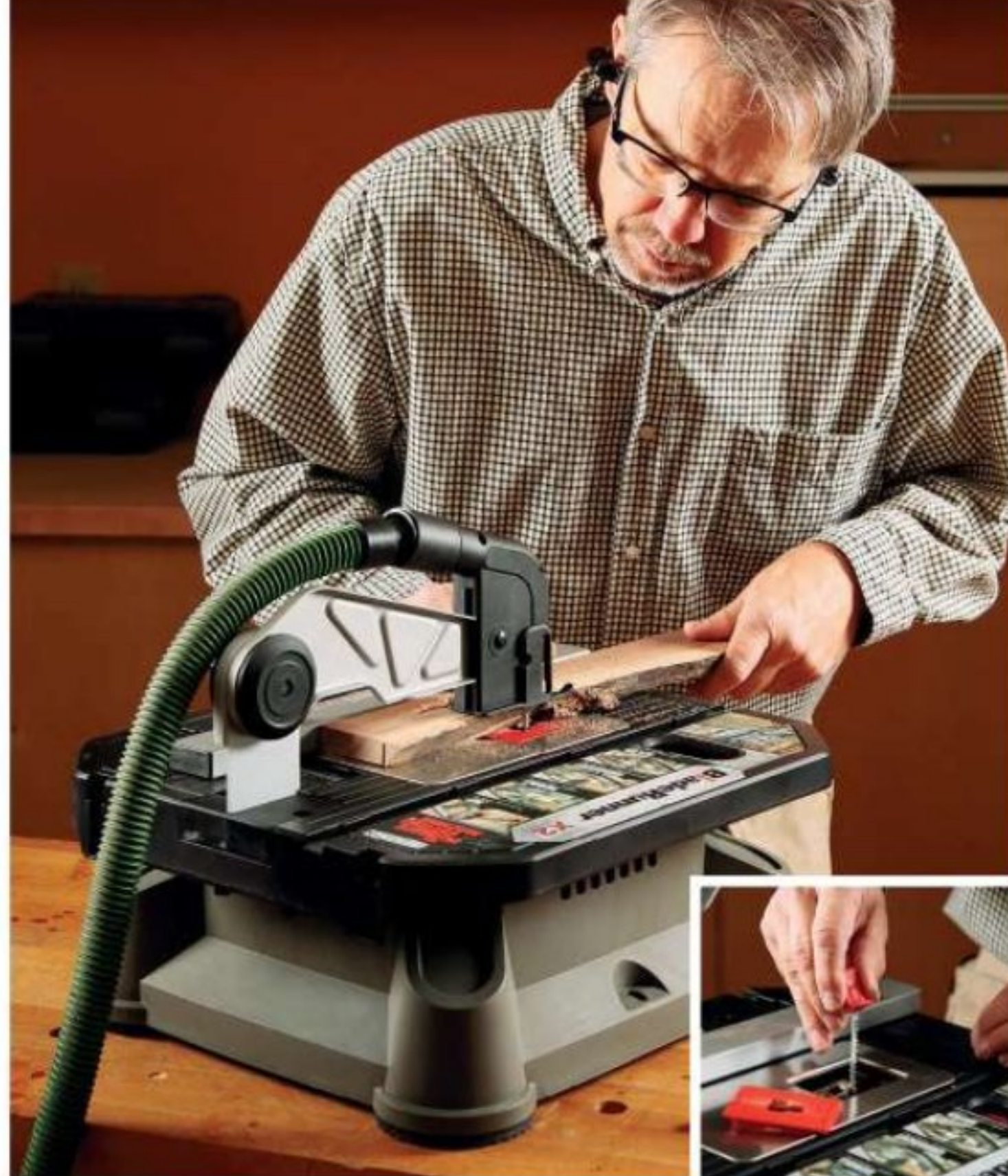
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Rockwell® has launched the *BladeRunner™ X2*, the newest version of their benchtop saw. On the BladeRunner X2 (Model RK7323), the control arm assembly now sits at the back of the tabletop to accommodate longer and wider workpieces for ripping and crosscutting. The new blade guard assembly incorporates a splitter to help keep straight cuts on track. A lower height profile of 6¾" is designed to create a comfortable working position when the saw is on a workbench or other flat surface. The BladeRunner X2 has a 5.5-amp motor and provides 3,000 strokes per minute. Instead of a saw blade, it uses standard 4", T-shanked jigsaw blades of varying profiles to cut wood, aluminum and ceramic tile and mild steel. The BladeRunner X2 has a cutting capacity of 1½" in wood and a blade stroke of ¾". The BladeRunner X2 has a suggested price of \$119.99.

Rockler Woodworking and Hardware has introduced *Loox LED lights and accessories*, including puck and bar lights, for installation under cabinets, inside glass and on walls for highlights. These lights offer a simple plug-n-play assembly, compact sizes, and a soft illumination, for task lighting or accent lighting. Steve Krohmer, Rockler's vice president of product marketing, states, "[the] LED lighting can be installed almost anywhere in a short amount of time." Installation is via surface mounting with screws. Loox lights can be purchased individually or as part of a kit.

Rockler Loox LED lights



Rockwell BladeRunner X2

Puck Lights are 2½" in diameter, and the LED Bar Lights are available in 10", 16", 22" and 34" lengths. Pricing for the Loox lights and accessories ranges from \$5.99 each to \$59.99 each. The kits range from \$129.99 to \$169.99.

RYOBI's new *ES3000 Phone Works™ Moisture Meter and App* works with your smartphone and tracks moisture content between 6% and 44% in wood, drywall, cement and other building materials. The pinned moisture meter displays the results on your phone screen. You can compare your results to acceptable humidity ranges based on your geographic location, capture high quality images and share

results through email and social networks. A data-charting feature measures and plots your readings over time. The ES3000 Moisture Meter and App is priced at \$29.97 and is part of Ryobi's Phone Works line, which also includes seven other measuring tools, such as a laser distance measure, laser level, stud finder and more. All of the tools in the Phone Works line are controlled by the free Ryobi Phone Works Mobile App. Phone Works is compatible with iPhone (OS 6.0 or later) and most Android phones (version 4.0 or later).

Continues on page 76 ...



RYOBI ES3000 Phone Works Moisture Meter and App

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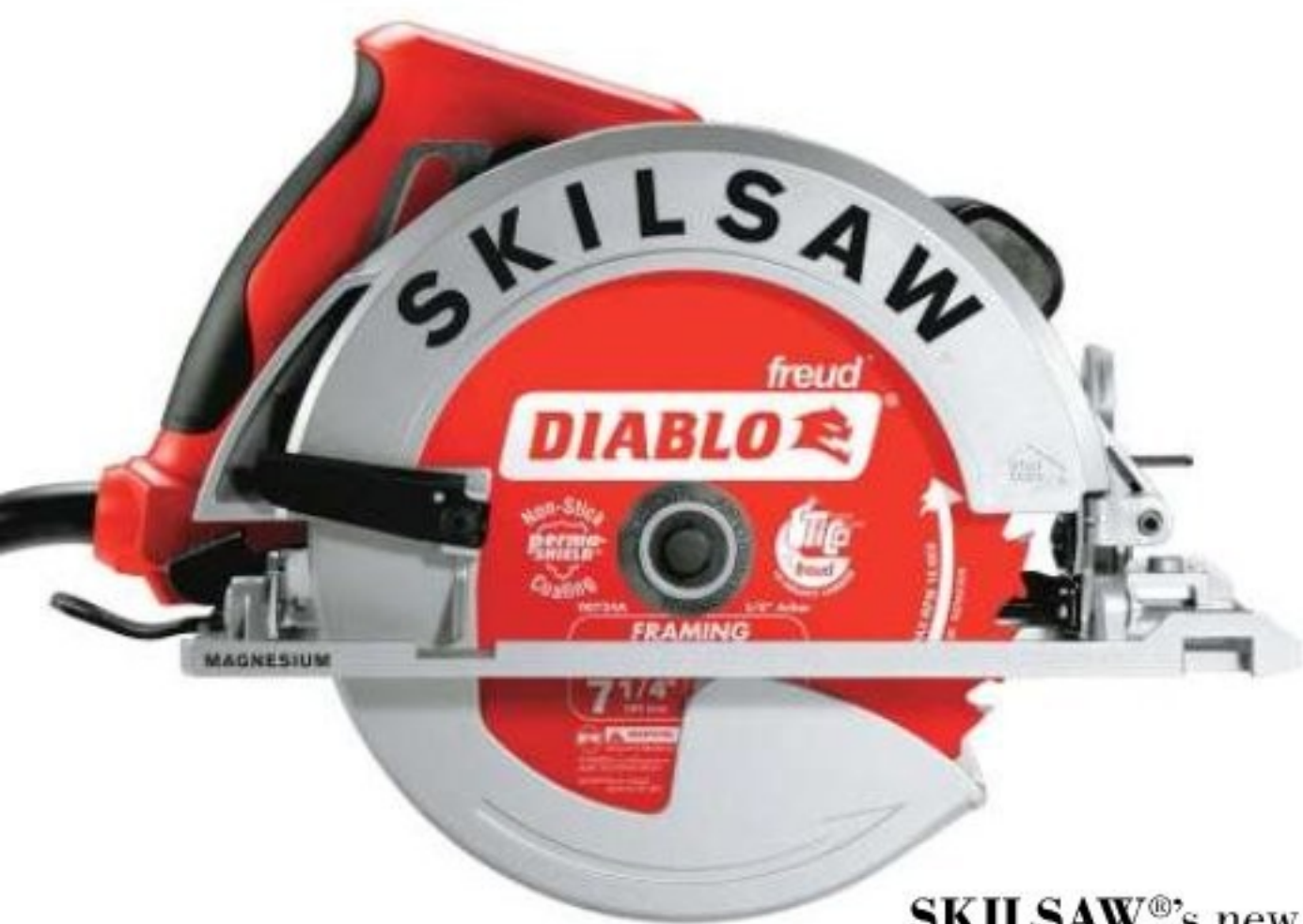
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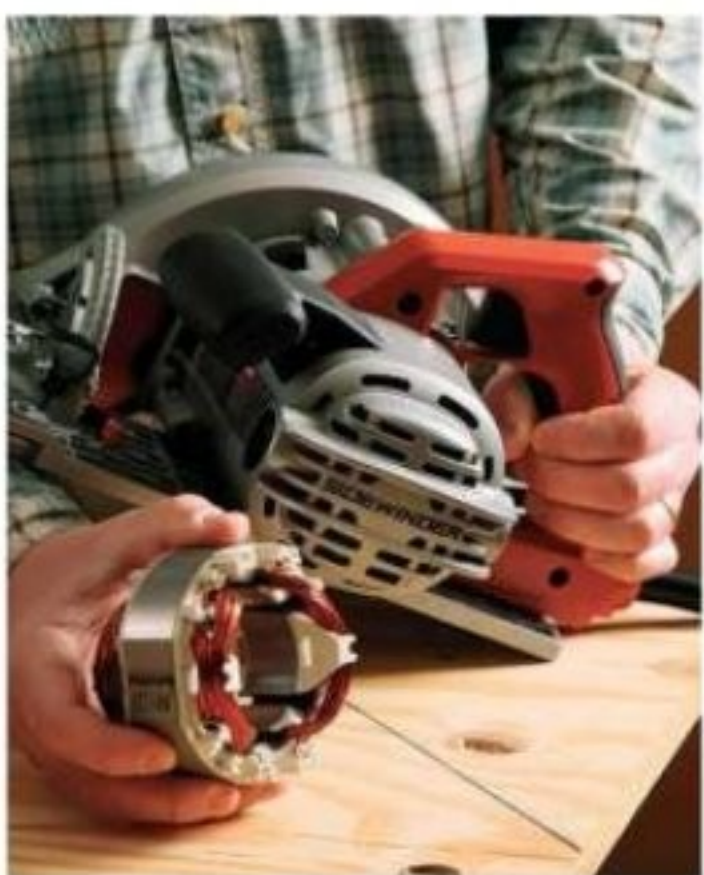
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SKILSAW SPT67WM SIDEWINDER



SKILSAW®'s new *SPT67WM SIDEWINDER™* saw is the market's only all-magnesium circular saw. Both the guards and the foot are magnesium, as is the motor housing. The magnesium motor housing is designed to dissipate motor heat, which in turns maintains strength and increases durability. The 15-Amp Dual-Field™ Motor uses a unique copper winding system specifically designed for circular saws that increases the surface area of the copper windings and allows the motor to stay cool. The worm drive technology is incorporated into the motor, handle design and motor housing. The SPT67WM SIDEWINDER comes with a Freud Diablo® 7¼" blade and has a suggested price of \$129.

JET has a new 14" x 40" Variable Speed Woodworking Lathe. The floor-standing



JET 14" x 40" Variable Speed Woodworking Lathe

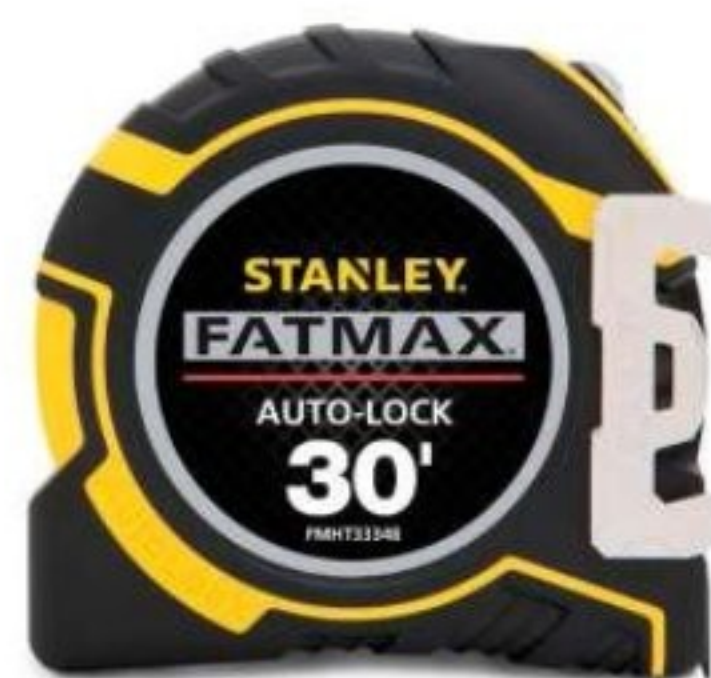


LENOX Gold Power Arc Curved Blades

JWL-1440VSK (Model 719400K) has a 14½" swing and 40" between centers, with a sliding headstock that pivots 360° and seven positive locking positions (at 0°, 30°, 60°, 90°, 120°, 180° and 270°). Powered by a 1hp, single-phase TEFC motor, the JWL-1440VSK delivers variable spindle speeds from 400 to 3,000 rpm, with an rpm display on the front of the headstock. A pivoting head allows you to rough out large objects like bowls and platters in an outboard position, and the positive locking tool-rest features redesigned clamping for greater control at the point of contact to reduce slippage. An optional extension bed can be mounted in three separate positions for larger outboard turnings; the extension bed increases the lathe's capacity to 60" between centers. The JET JWL-1440VSK Woodworking Lathe is priced at \$1,599.99.

LENOX® has introduced a curved reciprocating saw blade, the new *Gold® Power Arc Curved Blades*. The curved design is meant to optimize the cutting angle, allowing the blade to cut aggressively and, LENOX says, more efficiently versus a straight blade. According to LENOX brand manager Matt Savarino, "These blades last up to twice as long as standard straight LENOX recip blades." The Gold Power Arc Curved Blades also incorporate T2™ Technology and a precision applied titanium

coating to help disperse heat, allowing the blade to last longer. (LENOX's T2 Technology features optimized tooth geometry for each unique tooth per inch specification.) Suggested retail price for the LENOX Gold Power Arc Curved Blades starts at \$17 for a pack of five blades.



Stanley 30' FatMax Auto-locking tape

Stanley® has added 16' and 30' FatMax® auto-locking tape rules to its line. Both the 16' FatMax tape (Model FMHT33316) and the 30' FatMax tape (Model FMHT33348) have blades that automatically lock at the length to which they are extended. When the release button is depressed, the blade retracts. The tape also features a manual mode, enabling it to become a traditional retractable tape. A detachable hook system lets you connect the over-sized hook attachment for framing applications or remove it for standard applications. The 16 foot FatMax tape rule is priced at \$19.99, and the 30 foot FatMax tape rule is priced at \$29.99.

Continues on page 78 ...

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DeWALT
Trigger Clamps

DeWALT® has introduced a new line of *Trigger Clamps*, with Extra Large, Large and Small clamps that do double-duty by converting to a spreader. A quick-change button on the Large and Extra Large clamps allows the user to easily switch between clamping and spreading applications with the press of a button. Removable jaw pads help reduce marring, and reinforced nylon bodies and heat-treated steel bars add strength and durability to the Trigger Clamps. The Extra Large Trigger Clamps are available in four bar lengths, ranging from 12" to 50" and exert 600 pounds of clamping force. The Large Trigger Clamps deliver 300 pounds of clamping force with four bar lengths ranging from 6" to 36". The 6" and 12" Medium Trigger Clamps deliver 100 pounds of clamping force, and the 4" Small Trigger Clamp delivers 35 pounds of clamping force. Suggested prices range from \$5.99 for the Small Trigger Clamp (item DWHT83191) to \$39.99 for the 50" Extra Large Trigger Clamp (item DWHT83188).

Craftsman 3.0AMP
Random Orbit Sander



The **Craftsman 3.0AMP Random Orbit Sander** (Model 39592) features an LED pressure control indicator: the red, yellow and green LED lighting system that indicates when you are applying the right amount, or too much, pressure to your project. This sander weighs four pounds and has a low profile design and Vibra Shield® grip for control and comfort in use. The 5" hook-and-loop sanding pad fits standard 5" sanding discs. The 3.0AMP Random Orbit Sander comes standard with a micro-fine dust box and has an integrated vacuum adapter. An LED worklight illuminates your work surface. The sander comes with 60-, 120- and 220-grit sanding discs and is priced at \$59.99.

Arbortech™'s new *Contour Sander* is designed to fit any standard angle grinder with a 5/8" arbor. While the Contour Sander is a random sander, it is not an orbital sander: the sander pad does not spin, but vibrates instead. It does flex at the edges, in order to sand

shaped and sculpted forms, without burning or digging in at the edges. The Contour Sander comes with a backing pad, adapter nut and sanding discs in a variety of grits and has a suggested price of \$89.

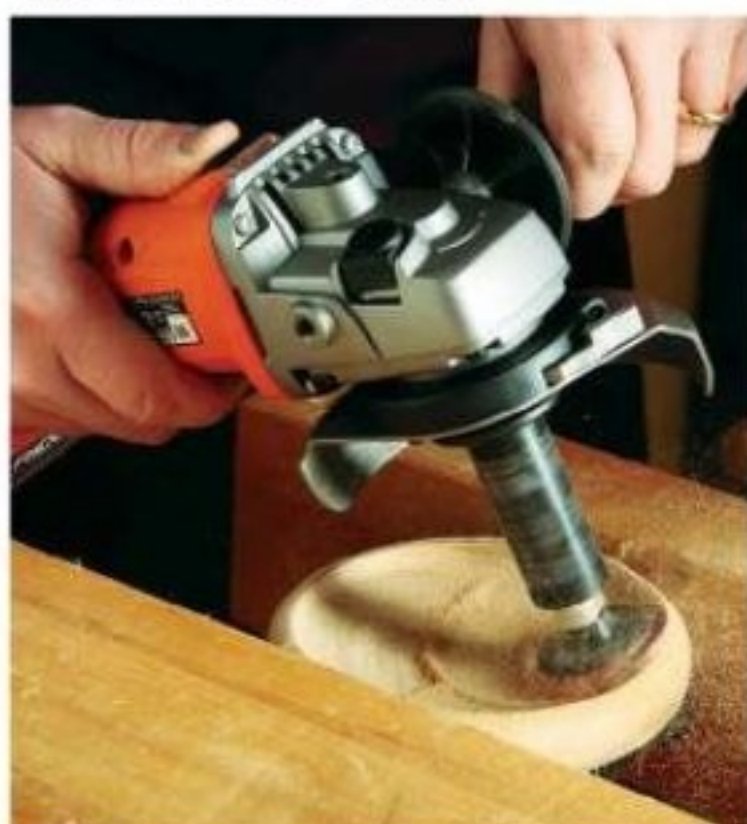
The new *Mesh Mask™* from **RZ Mask LLC** is made of lightweight mesh material designed to increase airflow and breathability in warmer climates. The mask is designed to fit easily under glasses and goggles and is made of an abrasion-resistant fabric. A replaceable active carbon



RZ Mask LLC Mesh Mask

filter in the mask filtrates up to 99.9 percent of particulates sized .1 microns and greater, while a one-way airflow vent expels condensation to prevent moisture buildup. The mask is offered in extra-large, regular, medium and youth sizes; the company recommends purchasing a size larger than normally worn due to the tight fit of the mask. The Mesh Mask is priced at \$29.95.

Arbortech Contour Sander



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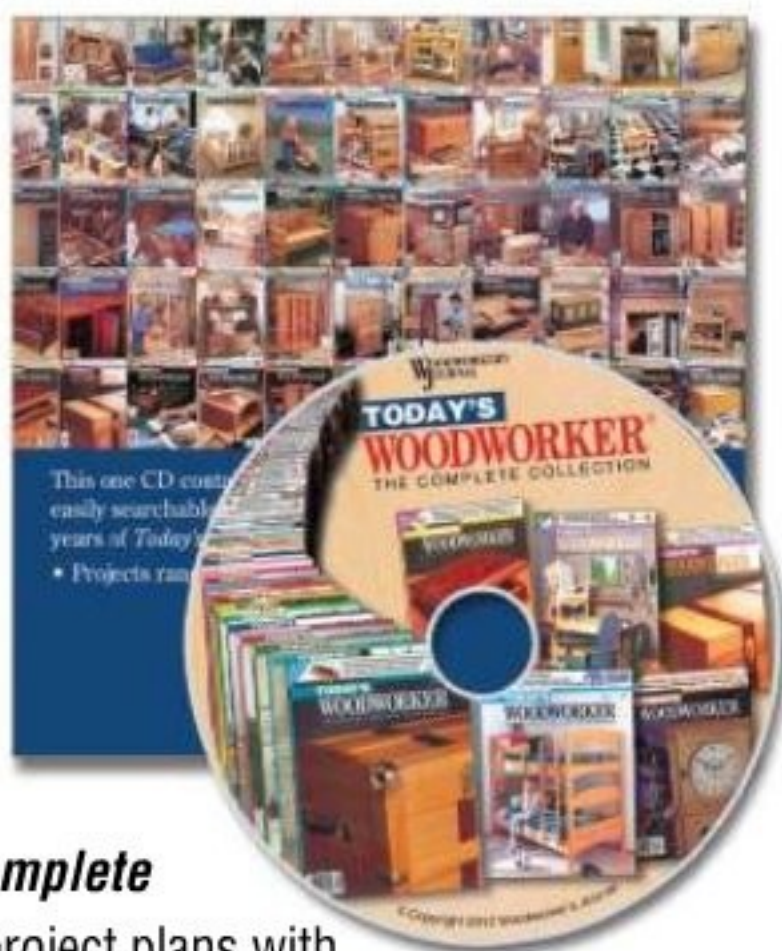
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Finishing Thoughts

"I Hate Sanding" Playbook

By Michael Dresdner

Yes, you can spend less time and less effort on sanding — and you'll still get great results!



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.

MORE ON THE WEB

For a video clip from the *Step-by-Step to a Perfect Finish* DVD demonstrating the correct power sanding process, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.



The author's tips on improving your sanding technique are applicable whether you are sanding by hand or using a random orbit sander. When you use these techniques, it will be easy to see — and get rid of — your previous sanding scratches. (And you'll know when to stop!)

Everyone loves the silky feel of finely sanded wood. No one loves the tedium of sanding. If only there was a way to get the results without the grind.

There is. Yes, there's a secret to making sanding go quickly, easily and painlessly, and if you keep reading, I'll tell you what it is.

You're welcome.

Overview

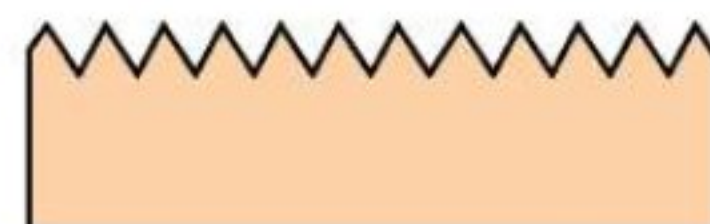
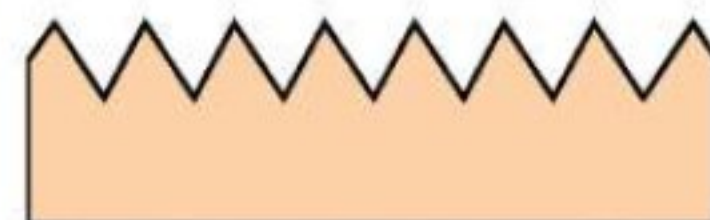
To be perfectly honest, most folks sand way too much. The goal is to sand very little, yet still get great results. That's entirely possible, but in order to do that, you need to know a few things; which paper and grits to use, when to switch grits or papers, how to use sandpaper efficiently, and most importantly, the object of each

sanding step. After all, if you don't know what each sanding step is meant to accomplish, how can you know when to stop sanding?

The Steps

The first round of sanding has two goals: flatten the wood and remove tool marks. That's all you need to do, and you want to do it as quickly as possible. Therefore, use the coarsest paper that's practical: usually, 80-grit. Using a harsh grit does this job quickly. If 80 doesn't do it fast enough, go down a grit to 60, then back to 80, but remember, the goal is to get it flat and remove tool marks quickly.

Once the wood is flat and free of tool marks, you move on to the second, third and all other sanding steps. They all share just one goal: to replace the sanding scratches from the previous grit with finer scratches. You do that by sanding with a grit close to the last one. For instance, go from 60 to 80, from 80 to 120, from 120 to 180, and from 180 to 220.



Don't skip grits. Each finer grit removes previous scratches.



Skipped Grits

A Different Angle on Sanding



First, sand in a direction diagonal to the grain. Then switch grits, and sand diagonally in the opposite direction. Stop when the sanding scratches from the previous grit disappear. Repeat.

The Paper

When sanding raw wood, I prefer aluminum oxide grit. It's sharp, cuts fast and because it is usually friable, it fractures as you use it so that it continues to present a sharp cutting surface to the wood. However, that does not mean you should overuse it. Sanding with dull aluminum oxide paper is false economy; it makes you work harder, go slower and accomplish less. Switch to a fresh sheet frequently and never mind if you haven't worn away every single bit of grit on the surface.

Now for the tough part: how to tell when it is time to stop

sanding and move on to the next grit. I've explained what the objective of each step is, but to know when to stop, you need the best sanding techniques, both by hand and with a machine. That's because the technique itself will tell you when to stop sanding. This may sound hard to believe, but it is true. Bear with me and I'll show you what I mean.

By Hand

Wrap the sandpaper around a comfortable, hand-sized block lined with cork or rubber on the sanding face. Sand diagonally to the grain. Yes, I said diagonally, NOT with the grain. Diagonal sanding cuts the wood quickly and prevents "washboard-



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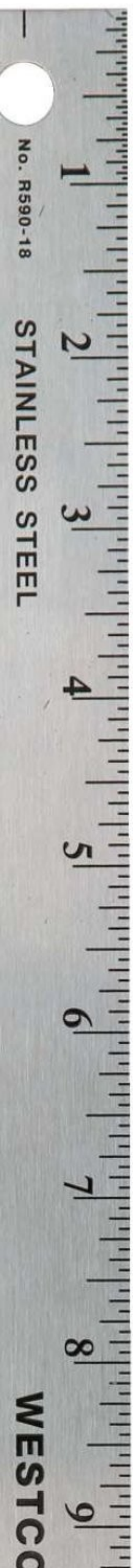


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Finishing Thoughts continued



This ruler is shown actual size. Start at the top and move your finger down the scale at one inch per second to get a feel for the speed you should be moving your random orbit sander.

ing,” which often happens, especially on soft woods, when sanding with the grain. Washboarding occurs when the softer early wood bands erode more quickly than the harder latewood lines.

Now for the clever part. Switch grits, and sand diagonally in the **OPPOSITE** direction. Conveniently, your new scratches will be at right angles to the previous sanding scratches. As soon as all the scratches from the previous sanding are gone, you are done with that grit. That’s easy to see, since they go in the opposite direction of how you are now sanding. Clever, eh? Now move to the next grit and, once again, change diagonals.

Random Orbit Sander

There’s a trick for random orbit sanders as well. You’ve heard “slow and steady wins the race?” With a random orbit sander, the seemingly contradictory trick is to slow down in order to speed up.

There are two rules: don’t press down on the sander too hard, and don’t move it faster than one inch per second. Pressing down will slow the orbital movement, and that means it’s less efficient and won’t sand as fast. Moving the sander too quickly will create “pigtails,” but worse, it will make it almost impossible to know when to stop sanding. You may find yourself scrubbing forever.

However, if you move the sander only one inch per



Moving a random orbit sander too quickly will create “pigtails” on the surface of your wood. They’re not cute — and you’ll never know when to stop sanding. Ack!

second, you only need to go over each area **ONCE**. At that speed, one pass will make the sander dwell about five seconds on each spot. Assuming you didn’t skip a grit, that’s just long enough to remove the previous sanding scratches. Hence, move the sander slower, and you’ll get done sanding faster. You’ll also know exactly when to move to the next paper.

Before you insist that you normally move the sander that speed, please take the speed test. See the scale on the left? Start at the top and move your finger to the bottom, but take a full 9.5 seconds to do it. Now be honest; is that really how slowly you usually move your sander?

I thought not.

An Extra-Special Step

One of my favorite sanding tricks is to follow my final grit, often 180, with the same grit, but in garnet paper. This time, sand by hand, going with the grain. The slightly dull garnet paper leaves a surface that

takes stain more evenly, and it even helps burnish end grain, limiting its stain absorption somewhat.

Why does this work? Although aluminum oxide paper is usually friable, garnet paper is not. As you use it, the grit quickly rounds over, leaving a

Aluminum Oxide

Garnet

Garnet paper’s U-shaped scratch pattern contrasts to aluminum oxide’s V-shaped scratches.

softer, U-shaped scratch rather than the harsher, V-shaped scratches typical of aluminum oxide. By using the same grit size, you quickly and easily align the scratches with the wood grain while softening them up at the same time.

Now that you know the time-saving sanding tricks the pros use, go on out there and sand, quickly and easily.



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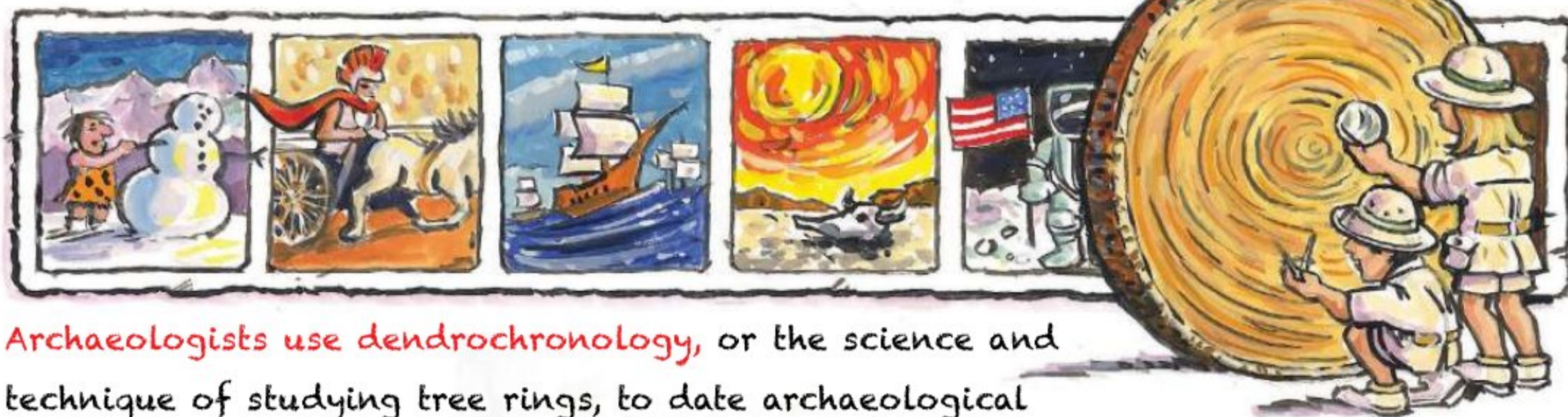
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HEY! Did You Know?

Woodworking trivia: the name game



Archaeologists use **dendrochronology**, or the science and technique of studying tree rings, to date archaeological sites and to study ancient climates.

What Does It All Mean?

A quick guide to terms from the world of woodworking.

Detent: A preset adjustment on a tool, usually set for common angles such as 45° or 90°; also called a positive stop

Earlywood: Young, flexible timber that forms early in the spring and lies directly beneath the bark; also called springwood

Mullion: A thin divider strip used to separate panes of glass or mirror within a multiple arrangement; sometimes called a muntin



vintage photo courtesy of fordimages.com

One good turn: **The eponymously named Phillips head screw** was invented by Henry Phillips. The square drive screw was invented by Canadian P. L. Robertson. Over 700 Robertson screws were used in production of the Model T Ford.

A rose by any other word: **True rosewood** belongs to the **genus dalbergia**, named for N. Dalberg, an 18th century Swedish physician. Among the over 300 dalbergia variants are some with non-rosewood names, including kingwood, ocelot's ear, tulipwood, African blackwood, cocobolo, sheesham and palisander.



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Your Trivia Test:

Q Which came first, square drive or Phillips?

Answer The Robertson, or square drive, screw was invented in 1908. It predates by 28 years the Phillips screw, created in 1936.



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