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Table of Contents

AMERICAN WOODWORKER

ISSUE NO. 74 AUGUST 1999

COVER STORY

42 Bandsaw Jigs

Get the most out of your bandsaw with these five ingenious jigs and techniques.

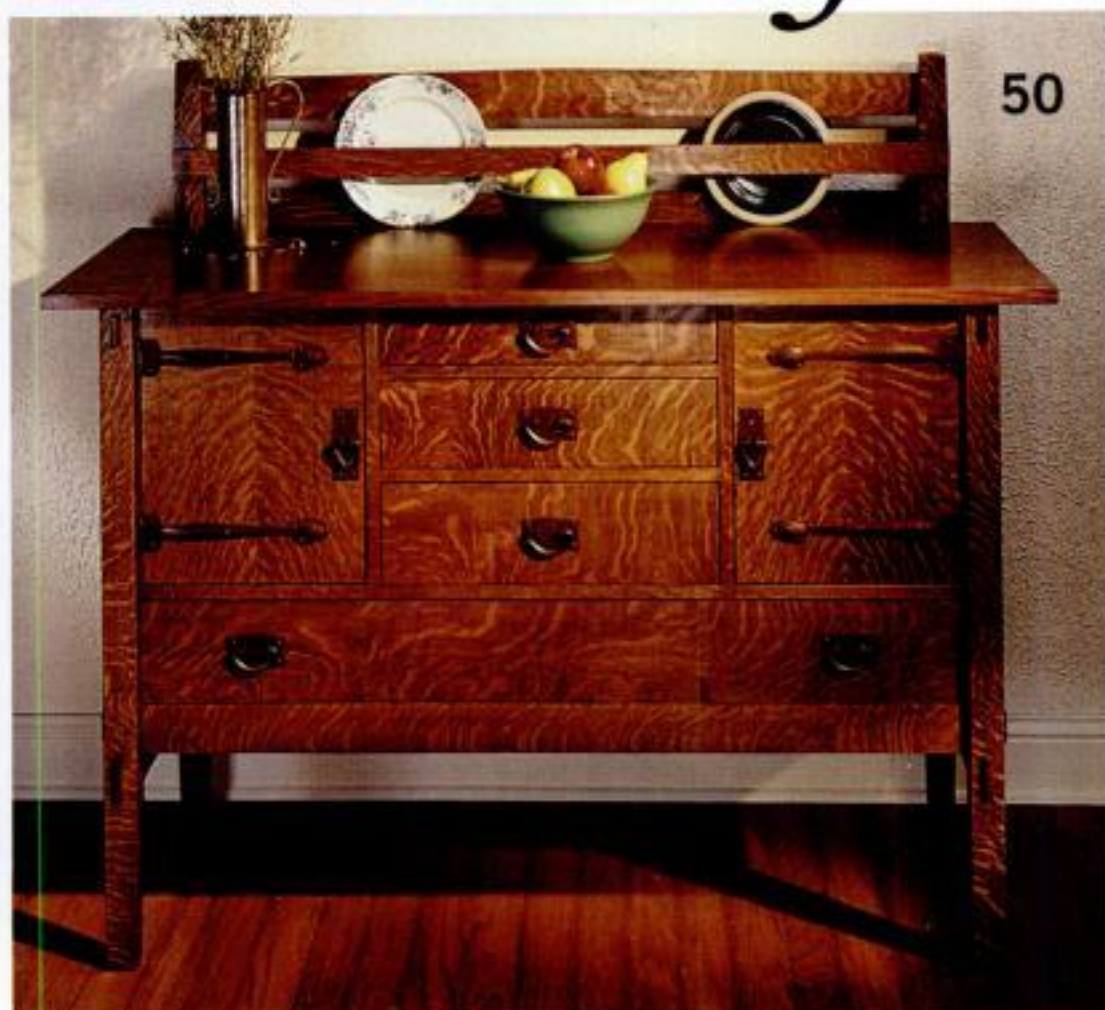


Cover photo by Bill Zuehlke



37

features



50

37 Treasured Board Table

One exceptional piece of wood—one gorgeous table.

50 Stickley-Style Sideboard

Build this crown jewel of the Arts and Crafts style.

58 Tips for Hand Tool Storage

A place for everything and everything in its place.

62 Appliance Garage

Park your toaster, mixer, and coffee grinder out of sight.

67 Hammer Your Own Copper Hardware

For your next Craftsman-style piece, make the hardware yourself.



This One

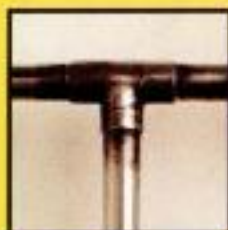


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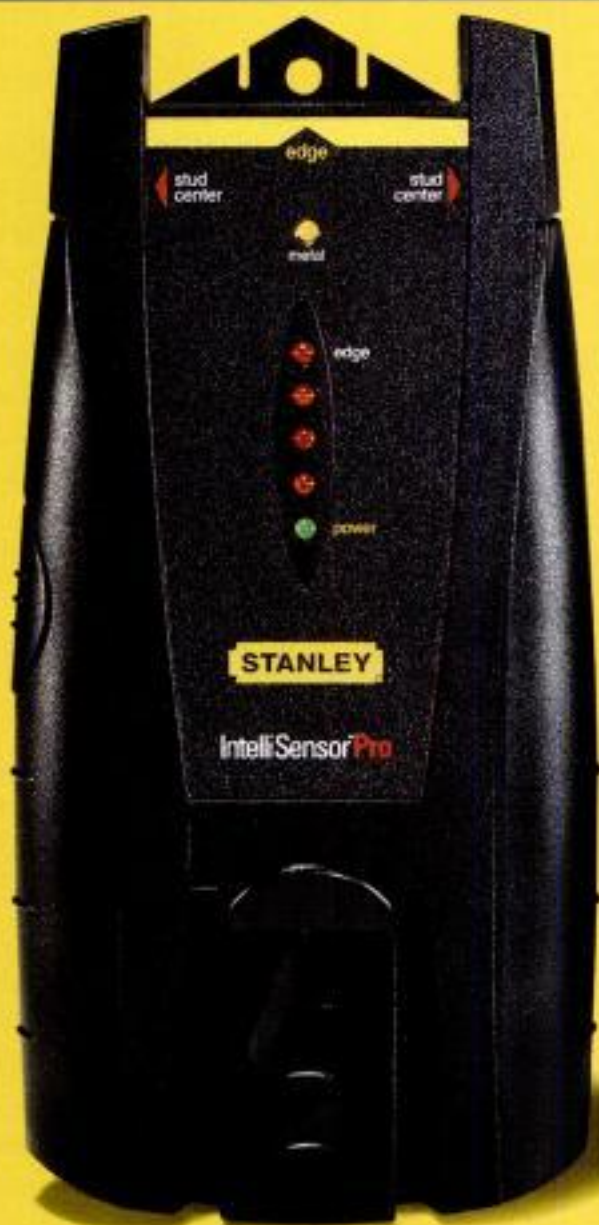


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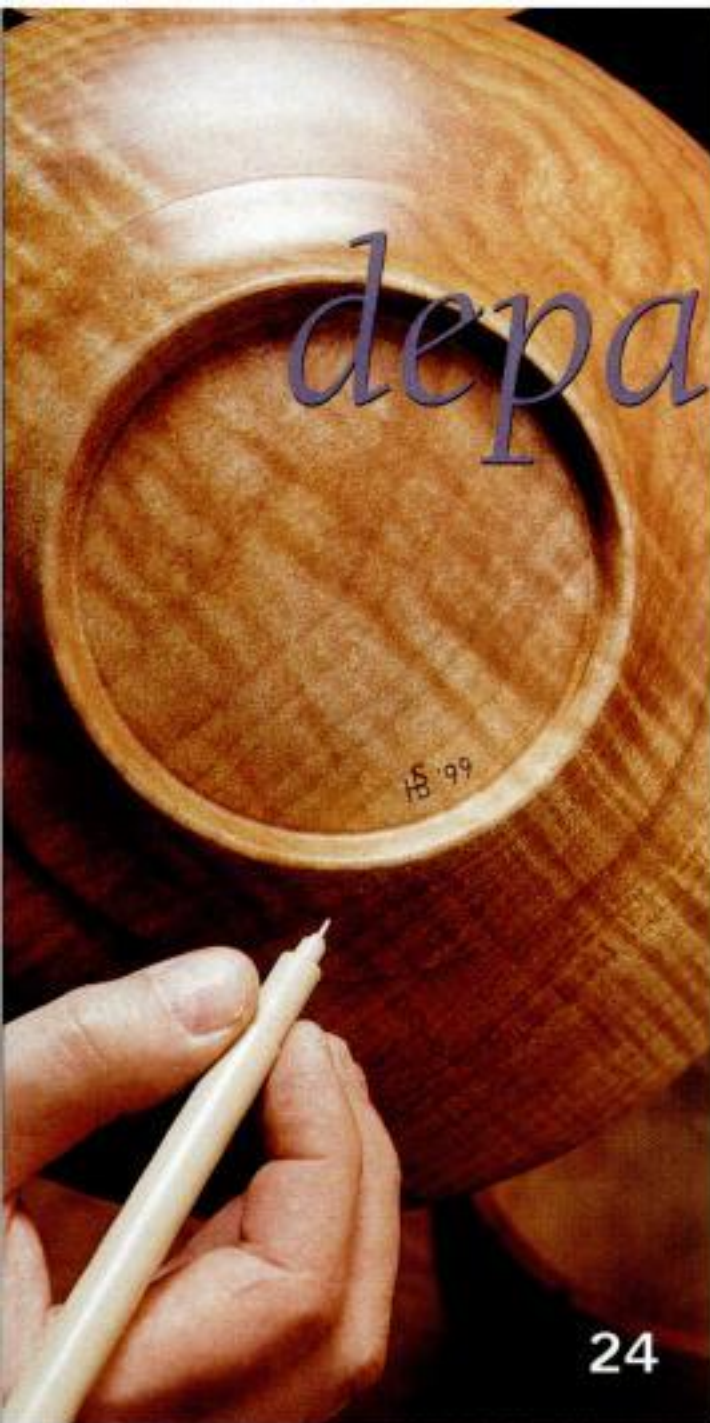


Table of Contents

departments

8 Question & Answer

Your questions—our expert answers.

16 Workshop Tips

A dozen of your clever ideas.

24 Woodturning

The secret of the flawless bowl base.

76 Practical Design

Composing a tabletop.

86 Just Finishing

Water-borne pore fillers.

82 Product Reviews

Delta's Sliding Table Attachment and much more.

96 Shop Solutions

Shop-built
3-jaw chuck.



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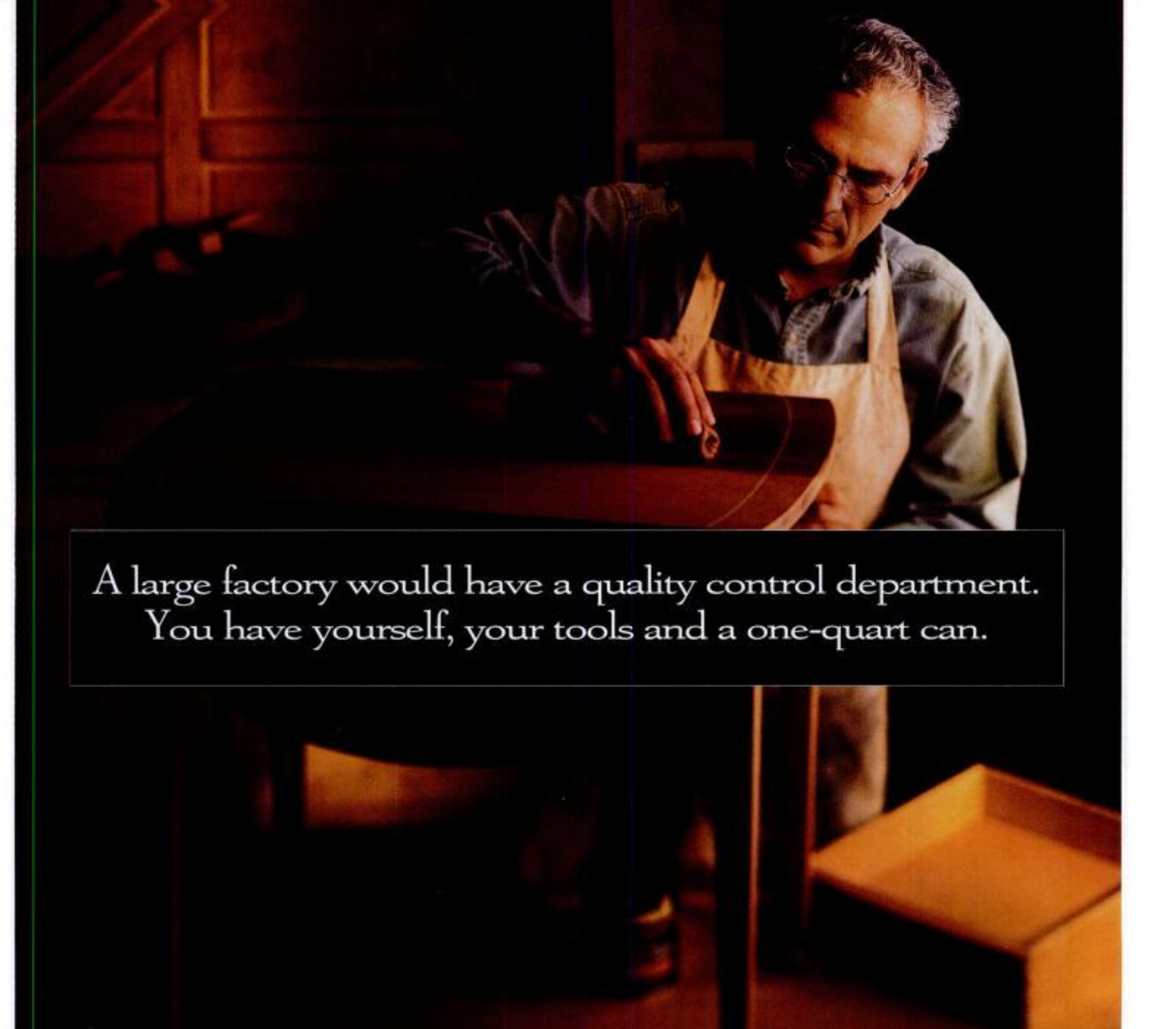
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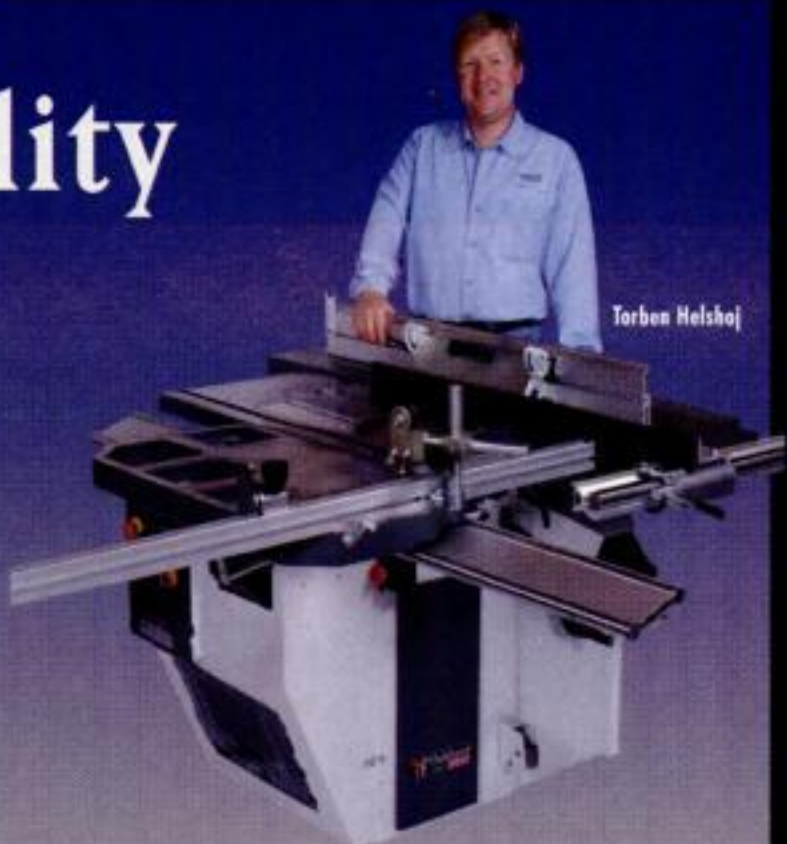
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Question & Answer

Old Brass From New

Q. How can I get new brass hardware to look old?

Mike Smith
Aurora, Ill.

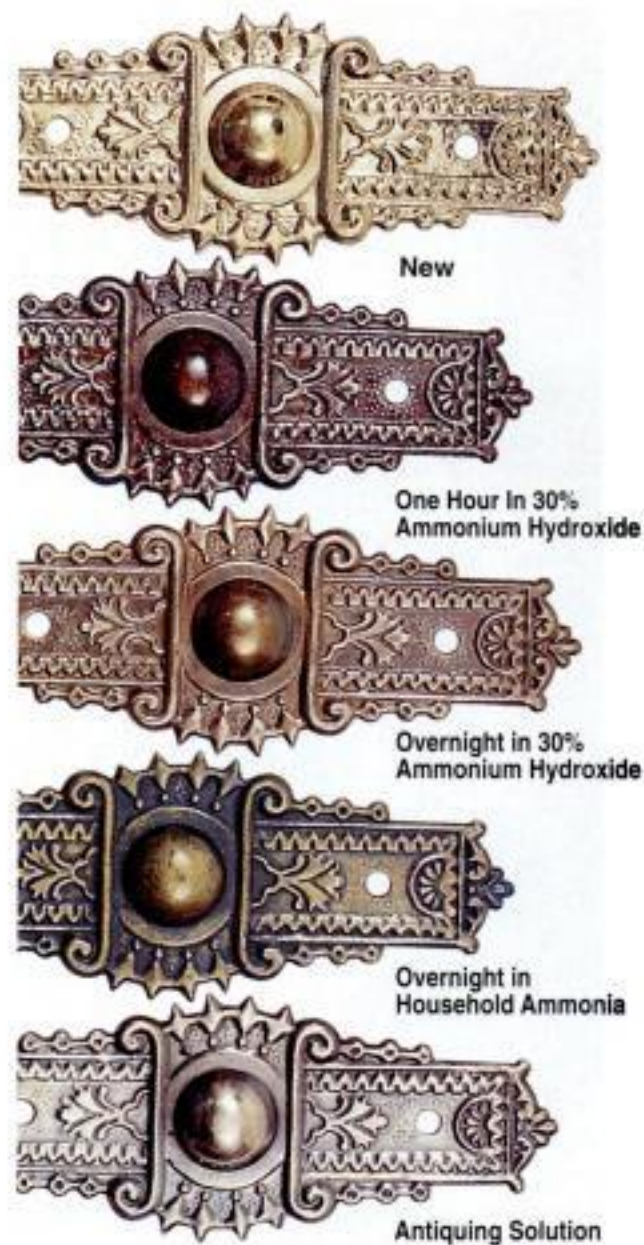
A. Fuming brass hardware with strong ammonium hydroxide (26 to 30 percent), is a tried and true method. Strong ammonia is a hazardous material and has become harder to obtain. We found ours at a laboratory and chemical supply company; commercial printer suppliers are another good source.

Use ammonium hydroxide only in a well-

ventilated area. Wear eye protection, rubber gloves and a respirator with cartridges designed specifically for ammonia fumes (look under Safety Equipment in the Yellow Pages or try Viking Safety Products, 800-328-6505).

First, remove any lacquer that may be on the hardware by soaking it in lacquer thinner and rinsing with water. Next, suspend the hardware over a small amount of ammonium hydroxide in a glass jar with a tight fitting lid. Attach string to the underside of the lid with duct tape. After about an hour the brass will turn a beautiful coppery brown color. For a darker color, fume the hardware longer.

We tried this process using household ammonia which is approxi-



mately one-fifth the strength of ammonium hydroxide and is readily available wherever cleaning supplies are sold. The weaker solution turned the brass a greenish yellow color, much different than the full-strength ammonia.

We also tried a brass antiquing solution sold through Constantine's (800-223-8087). Immerse the hardware in the antiquing solution (a mild acid) until the desired color is achieved (half an hour in this case). This solution left a shiny, black chrome appearance on the hardware. Not exactly an antique look, to our eyes.

For highlights you can burnish the hardware with a little 0000 steel wool after fuming.

Door Magnets and Computers

Q. Can I use magnetic catches on the computer hutch I'm building? I've been told that computers and magnets aren't compatible.

Tom McCune
Statesville, N.C.

A. Although magnetic door latches can be used in computer hutches, why take the chance? If a bullet catch or self-closing hinges will do the trick, choose them over magnetic catches.

Magnets can have damaging effects on computer hard drives, floppy disks and monitors. How much damage depends on

the strength of the magnetic field and the length of exposure.

Cabinet door magnets produce weak magnetic fields which can damage sensitive devices within 12 in. of the magnet. Play it safe. Computers are expensive, latches aren't.



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The right advice can help keep small projects, well, small.



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Folding Bandsaw Blades

Q. I once saw someone fold a bandsaw blade for easier storage—how was that done?

Franci Parno
Hillsboro, Ore.

A. Folding a bandsaw blade can be a bit intimidating when you first attempt it. Armed with sharp teeth and a spring-like tension, the blade deserves respect. At the same time it's an easy trick for entertaining your non-woodworking friends!

Be sure to wear leather gloves and eye-protection. Stand behind the open blade with the teeth pointing away from you. With one foot, gently step on the blade just enough to keep it secure to the floor (if your

floor is cement, use a piece of plywood to protect the blade). With the palms of your hands facing away from you, grasp the back of the blade at two and ten o'clock. Your thumbs should be pointed away from you (Photo 1). With a firm hold on the blade, roll your wrists inward so your thumbs end up pointing toward each other (Photo 2). At this point you will feel the resistance in the blade give way. Gently push the folding blade toward the floor as you lift your foot off the blade (Photo 3).

It may feel awkward at first but after a few tries you'll be folding blades with the best of them.



Restoring a Blued Chisel

Q. The first thing I did with my new grinder was to blue the edge of a chisel. Is there anything I can do to save it?

John Kirschner
Portland, Maine

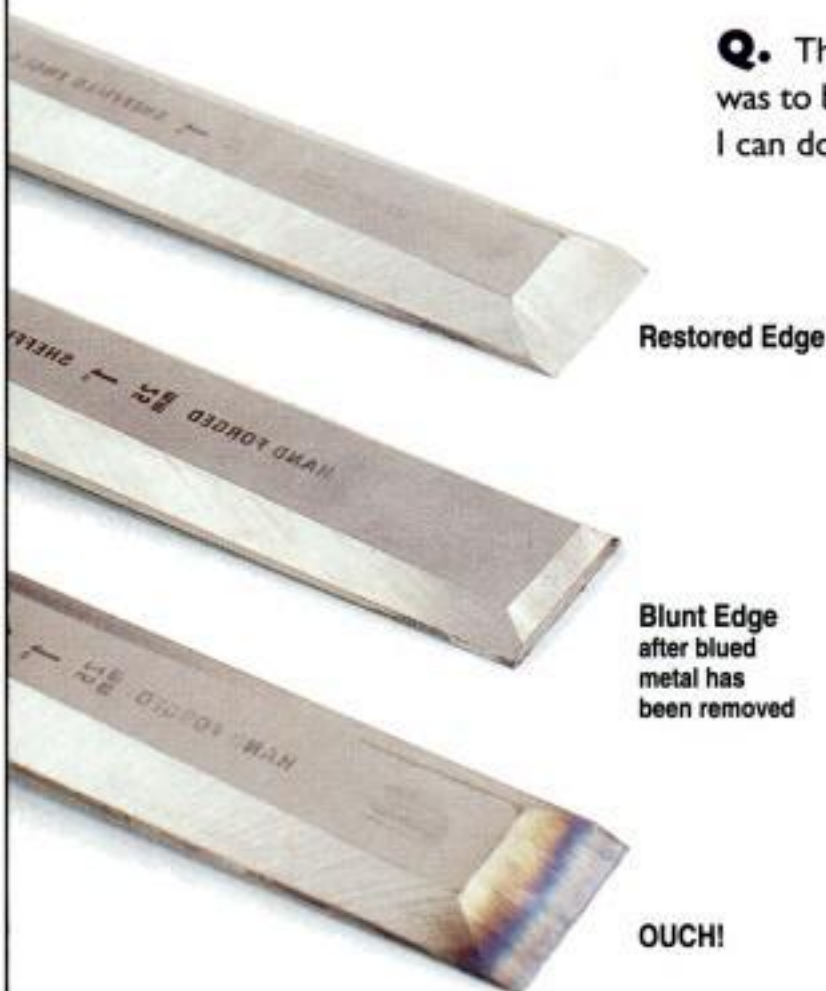
A. Most woodworkers have faced this problem at some point. The only practical solution is to remove the discolored metal and regrind a new bevel.

Set the tool rest at 90 degrees to the face of the stone and gently grind away the blued edge. Think of it as turning your chisel into a screwdriver (see photo at left). The advantage to flat grinding the end is that it leaves a thick edge to dissipate the heat generated when regrinding the bevel. Be sure to keep the edge square to the side of the chisel.

Regrinding the bevel will take time because a great deal of metal must be

removed. Maintain a light touch, and be patient. Once the new bevel has been formed your chisel should be as good as new—just a little shorter.

Tip: To reduce the chance of blueing any more chisels, try using white or pink 60-grit aluminum-oxide wheels which grind cooler. You'll pay about \$20 at Garrett Wade, (800) 221-2942; Highland Hardware, (800) 241-6748; or Woodcraft, (800) 225-1153.



another Revolution...

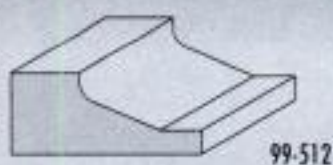


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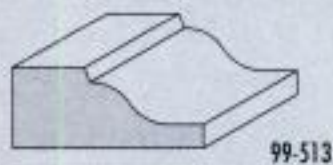
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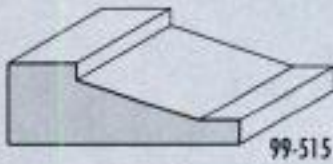
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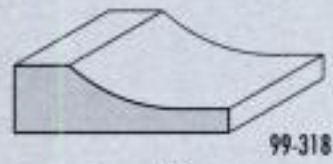
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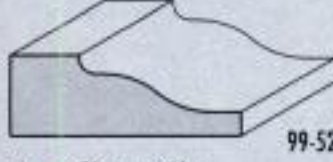
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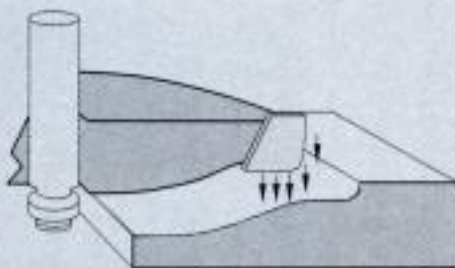
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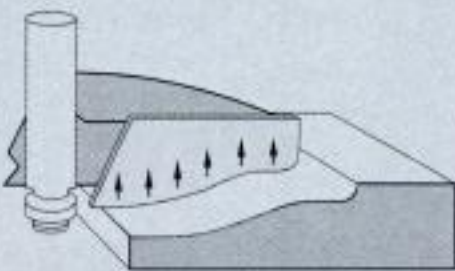
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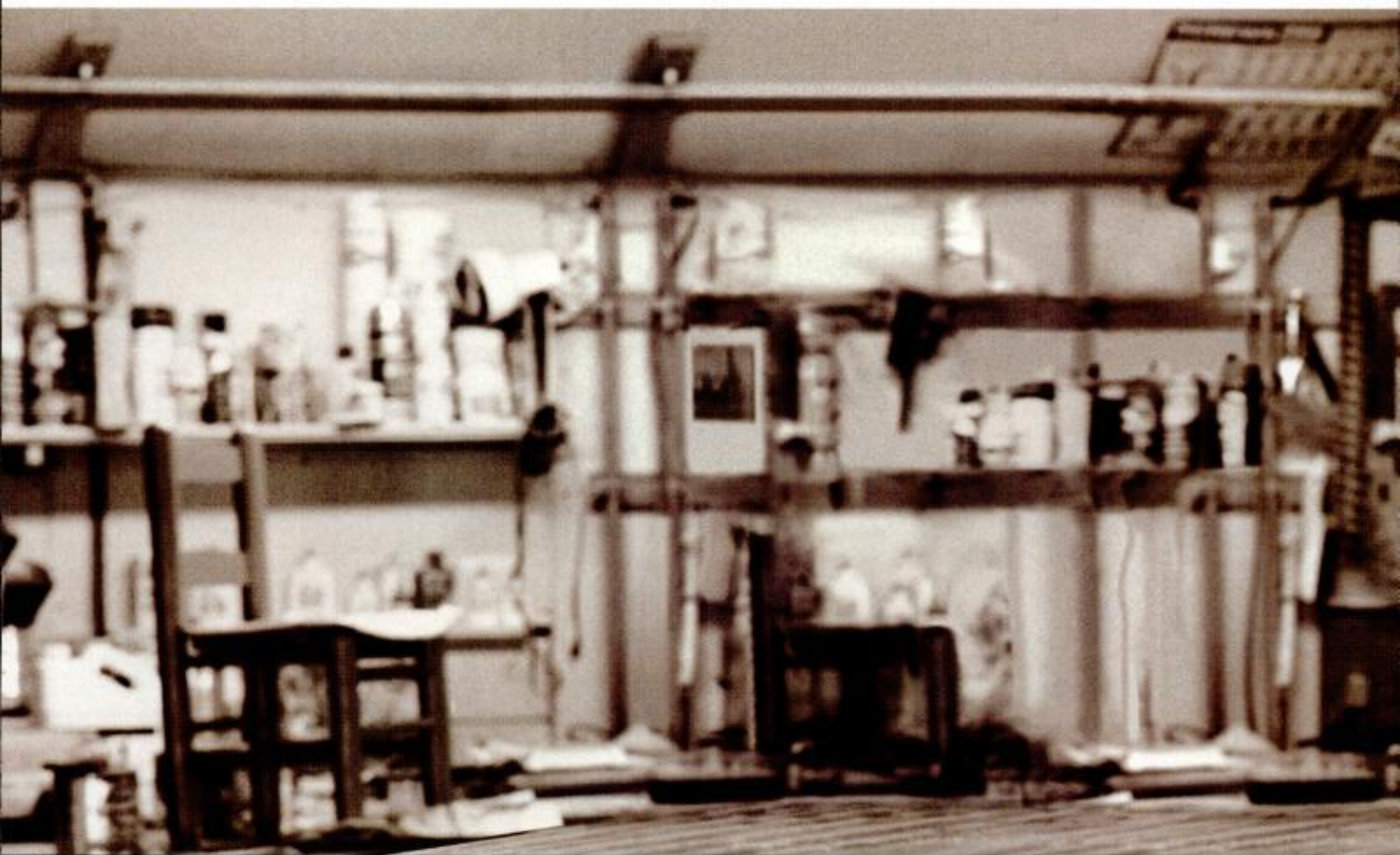
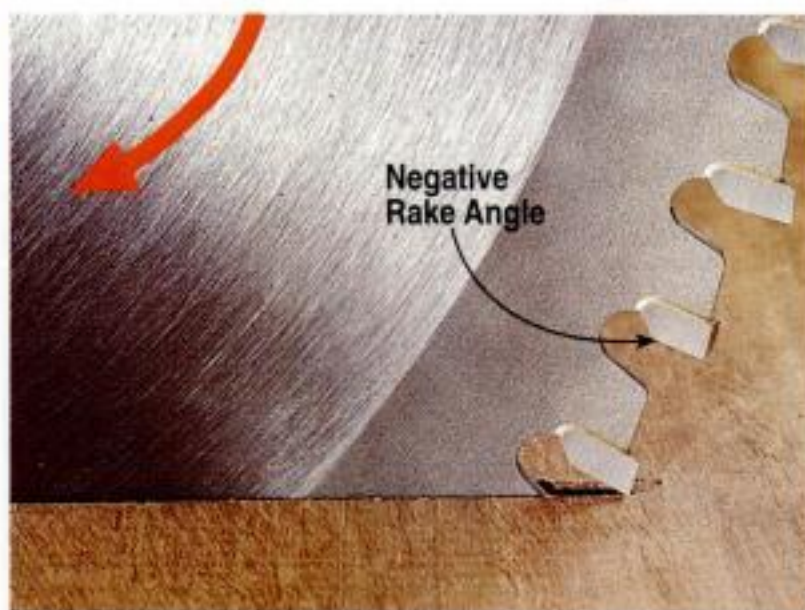
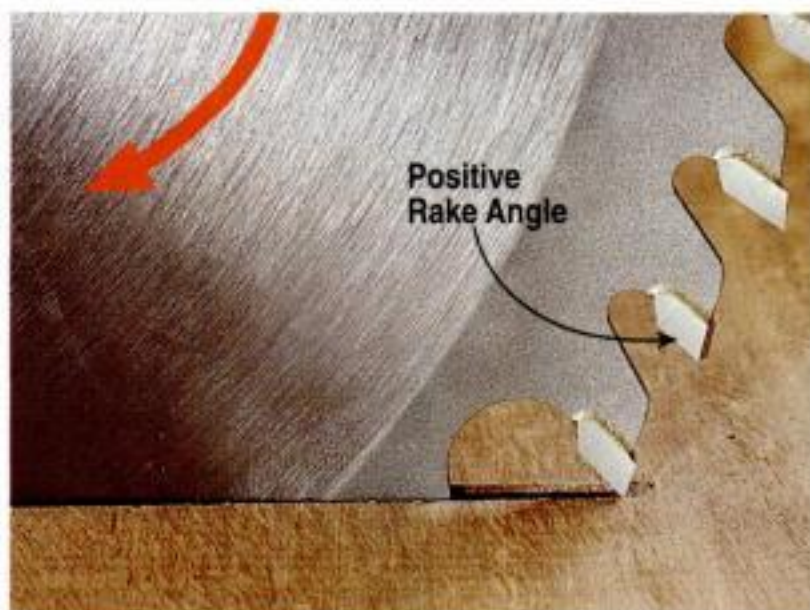
Q. I have trouble cross-cutting thick stock with my radial arm saw. Even with a slow feed rate the blade tends to jam in the wood. Do I need a larger saw?

Gene Rasmussen
Abington, Mass.

A. Don't blame the saw, blame the blade. My guess is that you're using a combination blade designed for a tablesaw. Its positive rake angle (see photo below), when used in a radial arm saw makes for an overly aggressive cut because the blade is moving through the material in the same direction as its rotation (climb cutting). The problem is more

pronounced when cutting thick stock because more teeth are cutting at one time.

A better and safer blade, designed specifically for radial arm saws, will have a zero to negative-6-degree rake angle (see photo below). The negative rake results in more of a scraping cut which will reduce the tendency of your saw to jam. If you cut a lot of thick stock, choose a blade with fewer teeth. This reduces the number of teeth engaged in the cut at one time.



Question & Answer

Filling Nail Holes

Q. I am making an oak bookcase as a built-in for our living room. What's the best way to fill the nail holes and finish the trim pieces once they're in place?

Stan Goetz
Boise, Idaho

A. Don't try to finish the trim in place. It's best to have all of your finish work done before you install the built-in.

As you install your trim, be careful about where you nail. For example, it's harder to see nail holes in the dark, coarse earlywood of oak than in the smoother latewood (photos below).

After the trim is installed, fill the nail holes with one of the numerous fillers designed to be applied to finished wood. Minwax makes Blend-Fil pencils

(available wherever Minwax products are sold), Behlens Fill Sticks (Constantine's 800-223-8087) and similar products are all available from mail order catalogs that carry finish supplies. These fillers are crayon-like in texture and come in a variety of shades to match most finishes.

These fillers are easy to apply. Simply rub the stick over the hole until it's full, then wipe off the excess with a clean rag. If you goof and the color is off, just take a wire nail, gently dig out the filler and try a different shade. You can also blend colors. For example, if the color from a stick is a little light, score the surface of the filler and rub in a darker color. The two colors will blend in the hole and produce a new shade.

Tip: A nail hole filled with a color that's darker than the surrounding wood can pass for a pin knot but a lighter color will always call attention to itself. **AW**



Paul St. Germain
Avid woodworker since 1968.

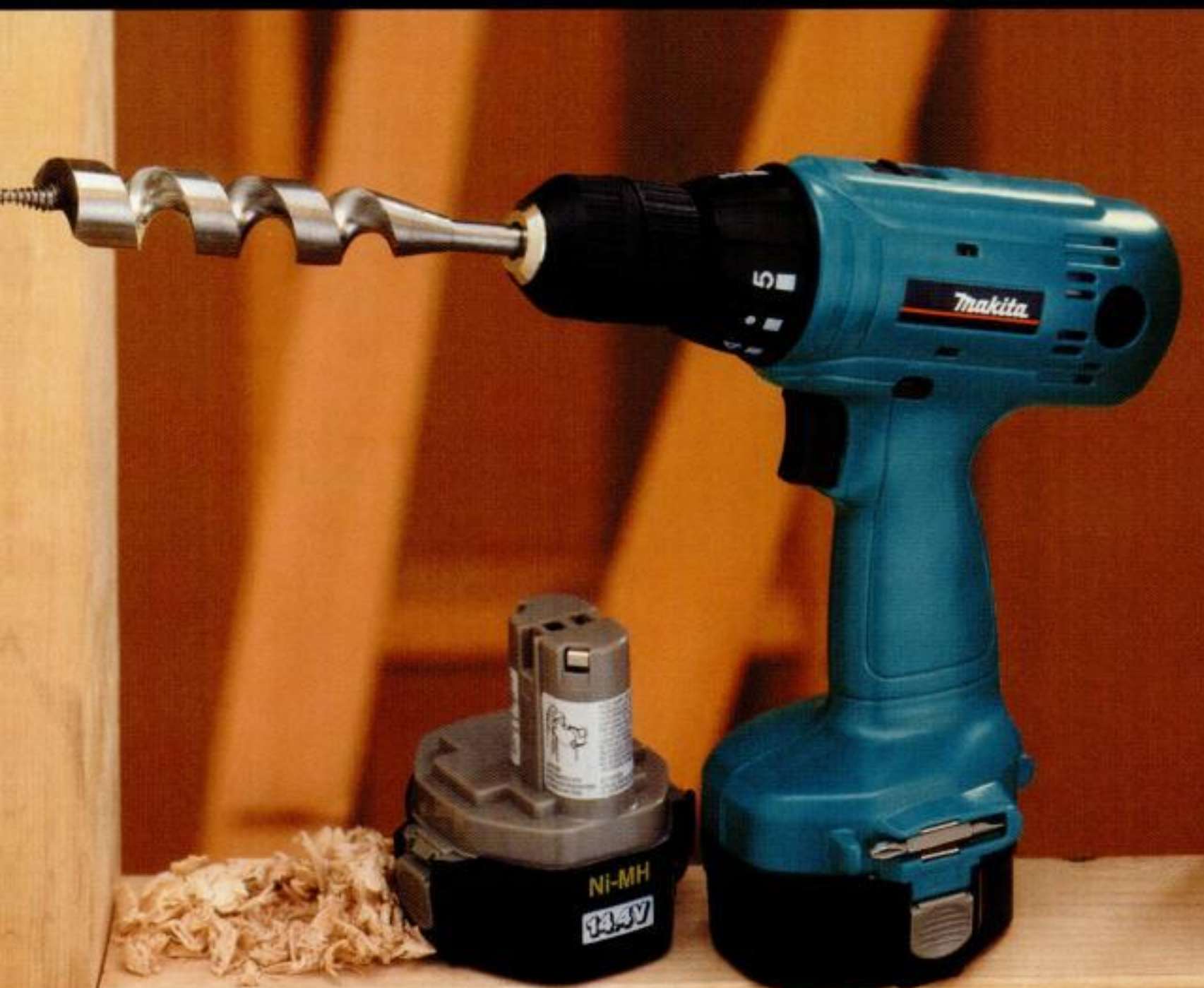
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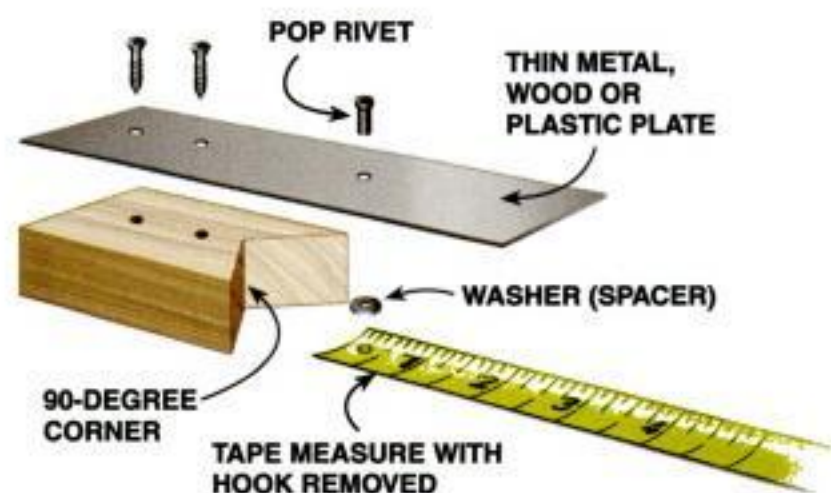
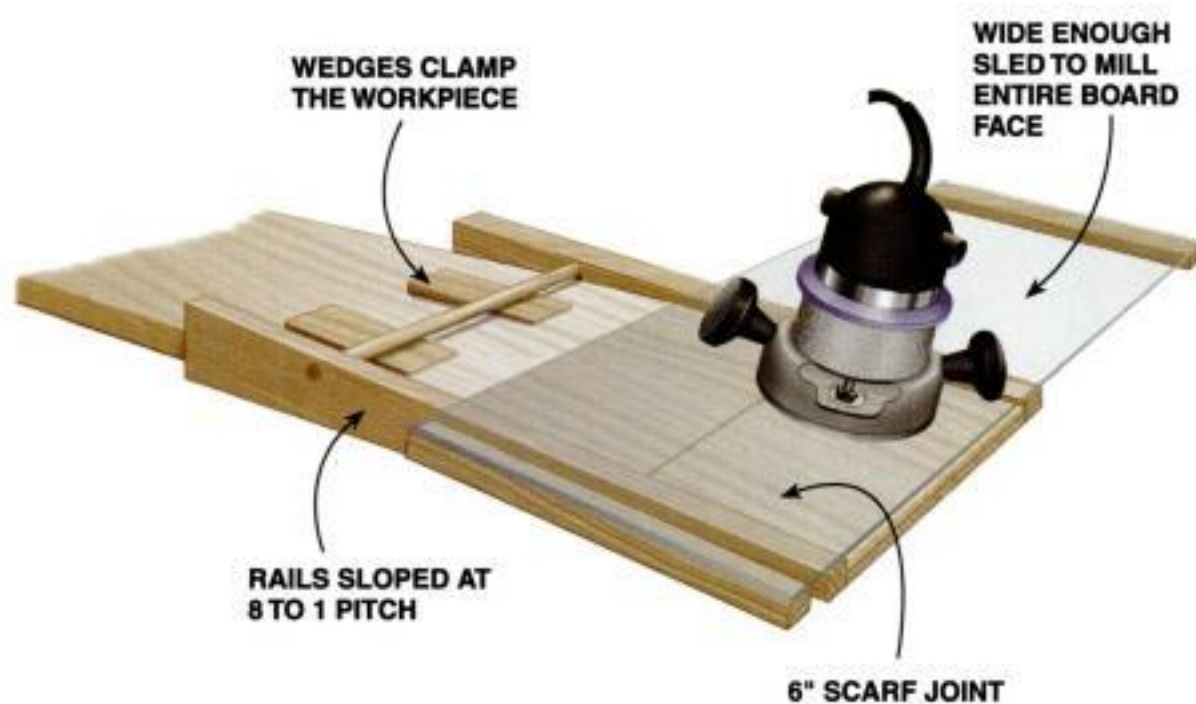
WorkShop Tips

Router Scarfing Jig ▼

Boatbuilders often need to join boards end to end to make longer planks. Instead of a butt joint they make a long taper on each board and overlap the ends. This is called a scarf joint. One or two scarf joints are easily planed by hand, but for any quantity it's well worth spending half an hour to make this simple jig.

The illustration shows $\frac{3}{4}$ -in. stock being joined with a slope of 8 to 1, which gives an overlap of 6 in. Position the plank so the end to be joined is flush with the end of the jig and wedge it securely. Make one pass with the router using a straight-flute plunge bit to remove the bulk of material. Then reset the router for a second, lighter cut, stopping just short of a feather edge at the plank end. You may wish to clean up the scarf with a few passes of a low-angle block plane.

ARQUES SCHOOL / SAUSALITO, CALIF



Taping Diagonals ▲

Measuring diagonals with a tape was a pain for me because the hook would always fall off the corner before I could get a reading. Finally I adapted a tape by riveting a small, notched block to the end, as shown. Now I can slip the tape over the corner of the cabinet to be squared with no fear of it slipping off. This is a good use for broken steel tapes missing their first couple of inches.

PETER SCOTT / REGINA, SK, CANADA



Laser Cutting Guide ▲

I use a laser pen to improve accuracy when making miter cuts on a compound miter saw. It's especially helpful when cutting ornate or rabbeted moldings. First I mark the edge of the molding where it is to be cut. Then I lay a laser pointer in the blade channel of the miter saw. I position the stock with the laser showing me the precise spot at which the blade will exit. Don't forget to remove the laser pointer before making the cut!

PHILIP RICH / PORT TOWNSEND, WASH.



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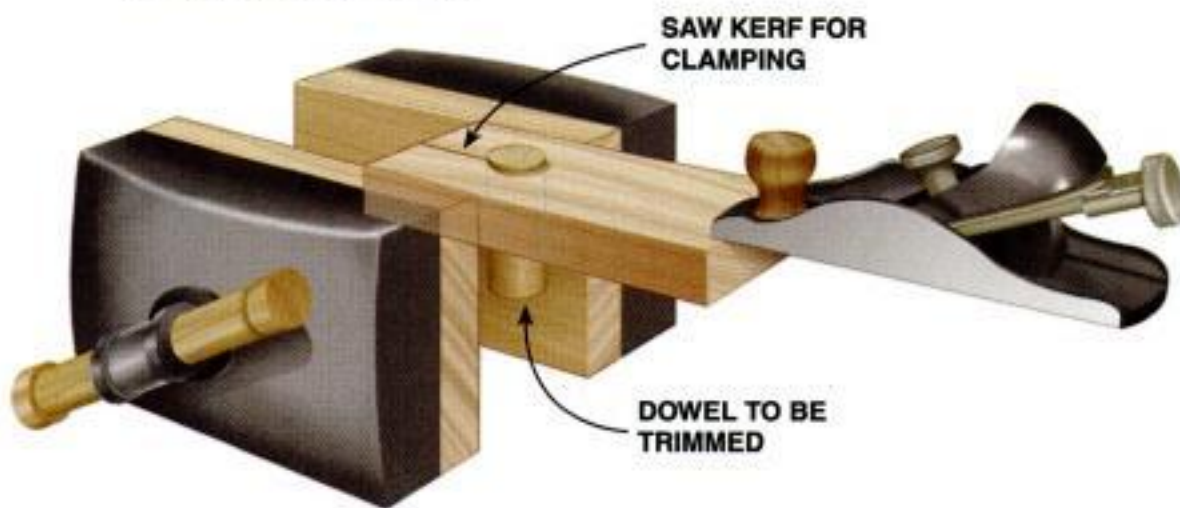


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Workshop Tips



Chip-Free Planing ▲ of Round Stock

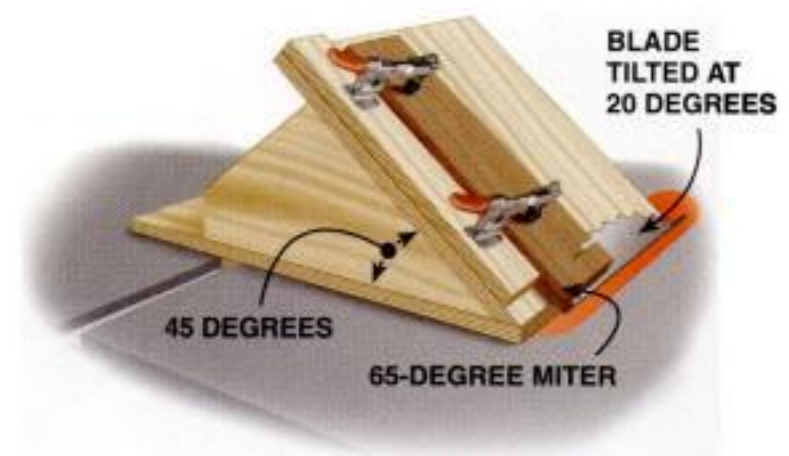
When making chairs I often need to plane the ends of dowels or other round parts. My method is to drill a hole the same diameter as the dowel (or slightly larger) in a piece of hardwood scrap. I cut a slot with the bandsaw, insert the stock, and put the whole assembly in a vice. Using a low-angle block plane, I get a very smooth cut with no chipping.

YEUNG CHAN / MILLBRAE, CALIF.

Sawing Steep Angles ▼

I made this jig from $\frac{3}{4}$ -in. plywood so I could cut angles steeper than 45 degrees on my tablesaw. The hardwood strip underneath slides in the miter gauge slot. I mounted toggle clamps on the plywood stop block to hold the workpiece securely. To saw a specific angle, 65 degrees for example, set the tablesaw angle to 20 degrees ($20+45=65$).

ALAN DUHN / CAMBRIDGE, IOWA



◀ Binder Clips

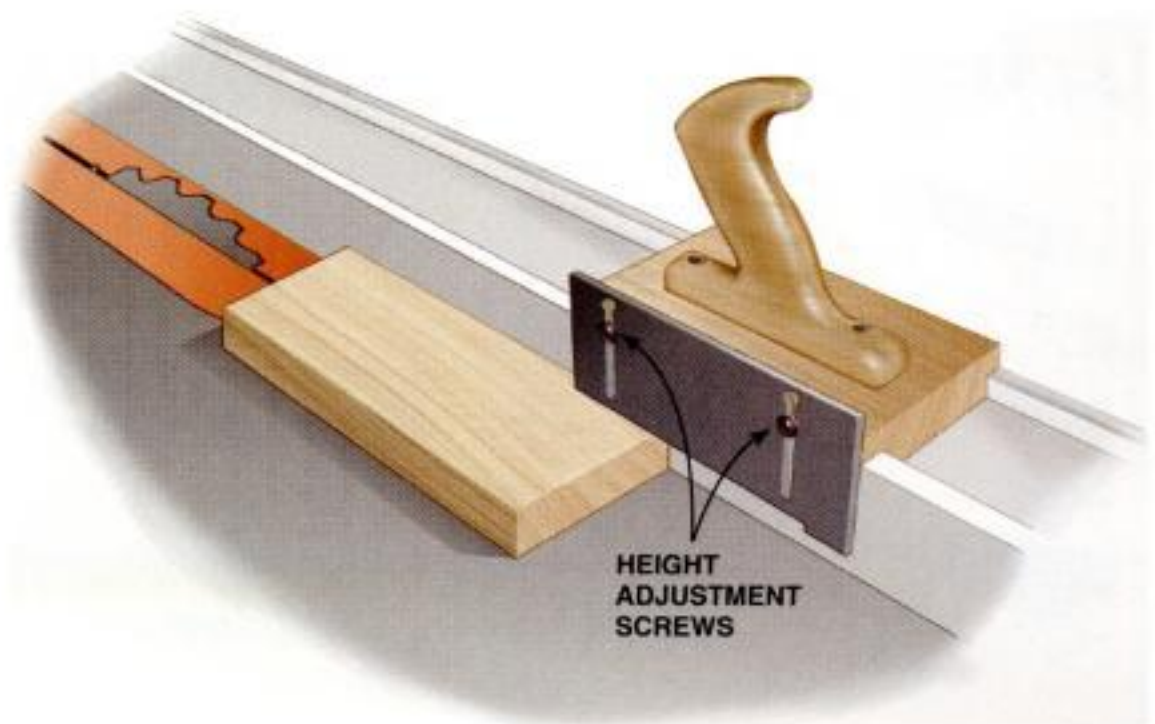
I do a lot of edge joining and always put a spring clamp on each end of each joint to keep the boards aligned while the glue sets. One day I ran out of spring clamps so I raided my office and discovered that binder clips work just as well—and at a quarter the cost of plastic-tipped spring clamps.

DAVID LEARD / MOBILE, ALA.

Deluxe Push Block ►

I made this push block for my Vega fence but it is easily adapted for other models. The handle is shaped for comfort and keeps your hand well away from the blade. Because the push block straddles the fence, it can't move into the blade area and cause an accident. To adjust the height of the push block, loosen the two round-head screws. When not in use, just lift the unit off the fence.

WAYNE MATTHIES / CATTARAUGUS, N.Y.



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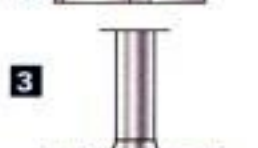
#1335 Wedge\$29.00



3 BULL NOSE

#1330 1/2" Dia. of Circle\$16.00

#1331 3/4" Dia. of Circle\$21.00



4 LOCK MITRE BIT

#1433

2" Dia., Stock thickness: 1/2"-3/4"\$37.50



5 RABBETING KIT

4 depth of cuts: 3/8", 7/16", 5/16", 1/4".

Set: 1/4" shank rabbeting bit, 4 bearings

(3/8", 1/2", 5/8", 3/4") & hex key.

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Rout into tight spaces and sharp corners.

These bits have Brass Pilots, measuring only

5/32" in dia., instead of usual 1/2" bearing.

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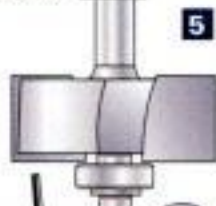
2 flute flat bottom cutters. Upcut spiral

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#1437 1/4" dia., 3/4" cutting length

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ITEM #1418 REG. \$141.20Sale \$43⁹⁵

Round Over/Beading Bit Set

1/4" shank, Carbide Tipped, 4 Round Over Bits with 1/2" OD bearing: (1/8", 1/4", 3/8", 1/2"), plus 3/8" OD bearing & allen wrench.



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Workshop Tips

Weighing Shellac

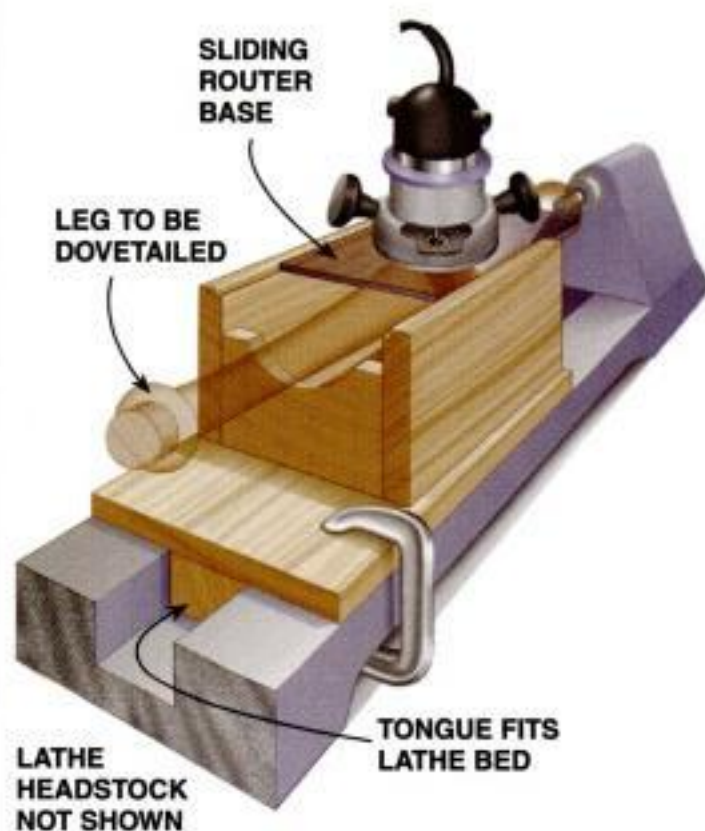
To mix various cuts of shellac flakes you need to be able to weigh small quantities accurately. I find a postal scale ideal for this purpose. Such scales are widely available at office supply stores. They're cheap and graduated in half-ounce increments up to one pound. Metric scales are also available.

JEFF JEWITT / NORTH ROYALTON, OHIO

Cutting Dovetail Slots ▼

Some tables, such as the classic Shaker style, have a turned center column with three dovetail slots to hold the legs. I make these slots with the spindle still in the lathe. That way I can use the lathe's indexing pin to accurately space the slots.

First I make an open box, with a tongue below, that engages the lathe bed. The top of the box is open and



the router slides in rabbets cut in the sides, as shown.

After turning and finishing the spindle, I lock the index pin at zero. Then I clamp the box to the lathe bed, position the router and adjust the depth of cut.

After making the first cut I mark the position of the router plate on the carriage with a pencil. Then I rotate the spindle 120 degrees (for a three-legged table), reset the index pin and make the next cut.

I advise making a trial cut in a piece of scrap first. To reduce the chances of breaking your dovetail bit, remove most of the waste with a straight bit before cutting the dovetail slot.

DAVID CENCULA / ROSCOE, ILL.

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Coopering Clamps ▲

When I need to make a coopered door or other glue up, I lay two strips of duct tape, sticky side up, across the bench. Next I lay the staves, tight together and concave side up, across the tape and apply glue with a brush. I then bring the ends of the tape together over the top of the staves and apply enough tension to close the joints.

THEO SIKKES / SMITHERS, B.C., CANADA



V-GROOVE IN SLED HOLDS STOCK AT 45 DEGREES

Trimming Corners ▲

I made this sliding jig to saw the corners off square stock in preparation for turning on a lathe. I find it a lot safer than setting a tablesaw blade at 45 degrees. I made my jig 18-in. long—it must be at least as long as the stock you want to turn. You can use this jig on a tablesaw or bandsaw.

WARREN STEPHEY / LEXINGTON, ILL.

If you have an original tip you'd like to share, send it to Workshop Tips, American Woodworker, 2915 Commers Drive, Suite 700, Eagan, MN 55121. We pay \$200 for tips we print. Original contributions become our property upon acceptance and payment. We're sorry, but tips can't be returned.

Router Table Inserts

While building a router table I needed an insert to hold the router. I found what I was looking for at the local hardware store—cutting boards made from 3/8-in.-thick polyethylene plastic. These sell for under \$5, are rigid and easily sawn, drilled, and routed.

RICK GRINSTEAD / WAXHAW, N.C.

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Combo. Set consists of 10 of each of the 3 sizes of clamps. 30 Clamps total- only \$4.65 each.

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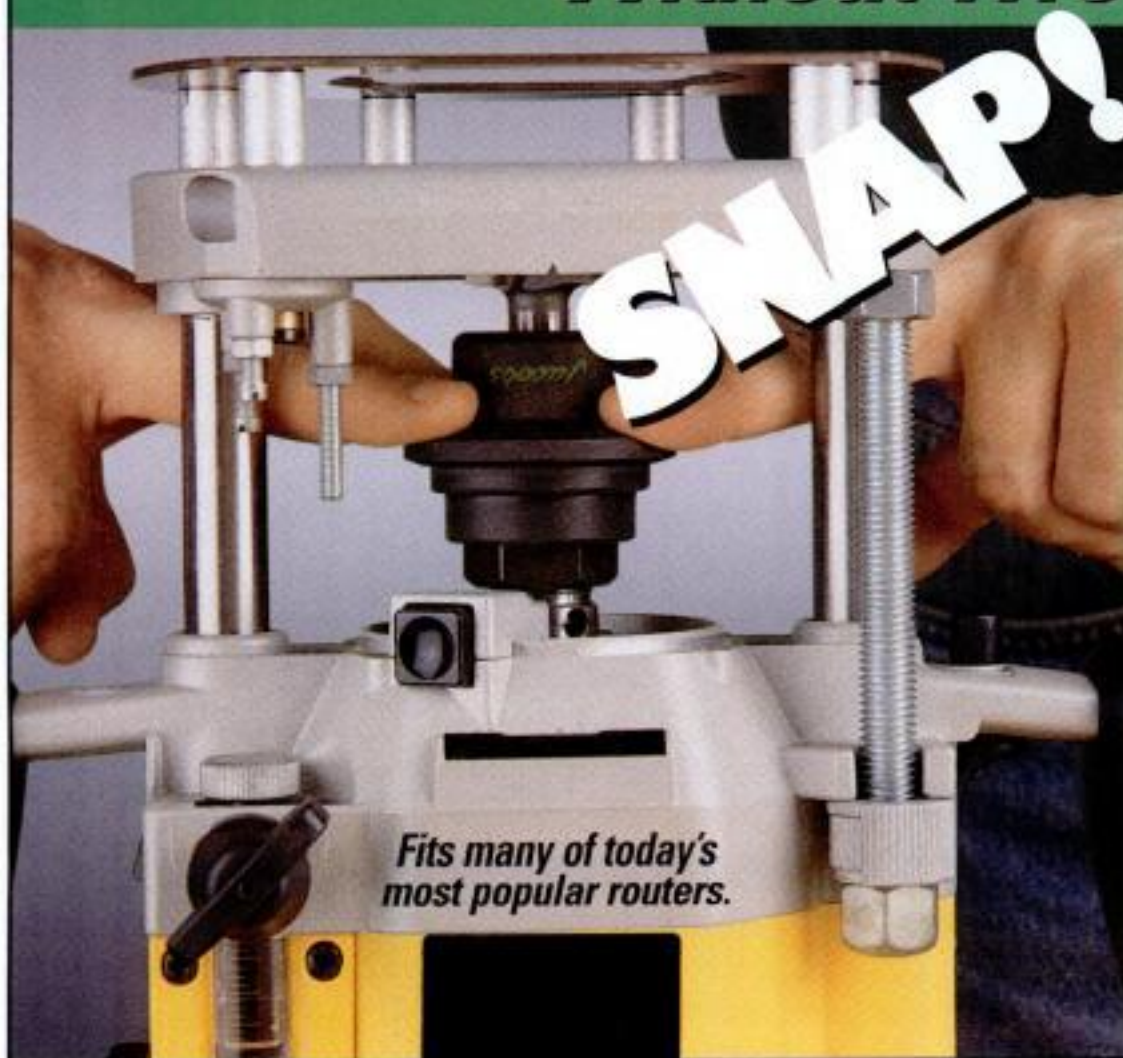


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23-710	Sharpening Center		217
31-460	4" Belt/Disc Sander		198
40-560	16" 2 speed Scroll Saw		239
40-540	16" var/spd Scroll Saw		249
11-990	12" Bench Drill Press		255
11-090	32" Radial Bench Drill Press		405
43-505	1/2" Bench Router/Shaper		398
22-540	12" Bench Top Planer		259
22-560	12-1/2" Planer w/ extra knives		329
36-865	Versa Feeder Stock Feeder		249
36-220	10" Compound Miter Saw		294
37-070	6" w/spd Bench Jointer		351
14-650	Hollow Chisel Mortiser		380
17-900	16-1/2" Floor Drill Press		490
17-924	Mortise Chisel Kit		65
36-285	8-1/4" Builders Saw w/ stand		475
34-555	Sliding Table		287
36-250	10" Slide Compound Saw		425
31-780	Oscillating Spindle Sander		253
46-700	12" Wood Lathe		575
40-650	Q3 18" Scroll Saw		389
36-905	30" Unifence		346
36-906	50" Unifence		444
36-444	10" Contractors Table Saw		589
33-830	NEW 10" Radial Arm Saw		851

Model	Description	List	Sale
50-850	1-1/2 HP, 1200 CFM		285
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Model	Description	List	Sale
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22-675	DC380 15" Planer		1175
28-275	14" Band Saw 3/4 HP		595
28-280	14" Band Saw 1 HP motor with enclosed stand		739
28-270	14" Band Saw 1 HP w/ 50-274 mobile base, 28-855 rip fence, & 26-266 cool blocks		849
31-280	Sanding Center w/ stand		789
37-190	6" Deluxe Jointer		603
37-195	NEW 6" Professional Jointer		625

Model	Description	List	Sale
5527-6	Sawzall with case		343
5537-226527	w/quick lok blade change		224
0407-2212V	Drill w/keys chuck&2 batt		175
0234-1	3/8" Drill 4.5 amp magnum		236
0234-6	1/2" Drill 4.5A mag 0-850 rpm		253
0235-6	1/2" Drill w/keyless chuck		255
0244-1	1/2" Drill 4.5A mag 0-600 rpm		255
0222-1	3/8" Drill 3.5 amp 0-1000 rpm		123
0228-6	3/8" Drill 3.5 amp 0-1000 rpm		207
0375-6	3/8" close quarter Drill		255
0379-1	1/2" close quarter Drill		288
5546-6	Screwdriver 200 & 400 rpm		150
5547-6	6546-6 w/bits, 1/4" chuck & cs		112
5399	1/2" D-hole Hammer Drill Kit		356
5397-6	3/8" w/ spd Hammer Drill Kit		275
5371-6	1/2" w/ spd Hammer Drill Kit		360
3107-6	1/2" w/spd right angle Drill Kit		244
6142	4-1/2" Grinder w/case & acc.		224
6490-6	10" Mitre Saw		496
6491	6490 w/ carbide blade & bag		594
6494-6	10" Compound Mitre Saw		585
6266-6	Top Handle Jig Saw		315
6496-6	10" Slide Compound Saw		1050

Item	Description	Teeth	List	Sale
LU72M010	Gen Pur. A.T.B. 10" 40	69	42	
LU82M010	Cut-off 10"	60	93	32
LU84M011	Comb 10"	50	78	45
LU85R010	Super Cut-off 10"	60	115	68
LM72M010	Ripping 10"	24	69	39
LU73M010	Cut off 10"	60	84	49
LU87R010	Thin Kerf 10"	24	72	48
LU88R010	Thin Kerf 10"	60	88	49
LU98R010	Ultimate 10"	80	128	75
LU91M010	Compnd Mitre 10"	60	88	54
F410	Quiet Blade 10"	40	95	54
SD308	8" Dado - Carbide	230	119	
SD508	8" carbide w/case & shims	344	172	
FB100	16 piece Forstner Bit Set	338	194	
94-100	5 pc. Router Bit Door System	320	169	
FT2000E	Plunge Router		185	

Model	Description	List	Sale
C8FB2	8-1/2" Slide Compound Saw		449
C10FS	10" Slide Compound Saw		1627
C15FB	15" Mitre Saw		1346
C10FCD	NEW 10" dual bevel Compound Mitre Saw		550
NT45AB	Coil Roofing Nailer		935
NT50AE	NEW Pinner 3/4" - 2"		519

Model	Description	List	Sale
50900DW	3-3/8" Saw Kit 9.6 volt		280
DA391D	3/8" angle Drill 9.6V		166
DA391DW	3/8" angle Drill Kit 9.6V		341

Model	Description	List	Sale
60950DWE9	5 volt Drill Kit w/2 batt.		125
60950DWE2	60950DWE w/flashlight		139
63200T-4	9.6 volt Battery		47
63200T-4	9.6 volt Battery		39

Model	Description	List	Sale
63430DAWE	1/2" Drill Kit		255
5620DWA	6-1/2" Circular Saw Kit		255
DK1016	1/2" Drill & 6-1/2" Saw combo kit		389

Model	Description	List	Sale
99008	3"x21" Belt Sander w/bag		347
99240B	3"x24" Belt Sander w/bag		360
N1900B	3-1/4" Planer with case		253
1912B	4-3/8" Planer		352

Model	Description	List	Sale
N9514B	4" Disc Grinder 4.6 amp		118
DA3000R3/8"	Angle Drill		355
2708W	8-1/4" Table Saw		637

Model	Description	List	Sale
6405	3/8" Drill Rev. 0-2100 rpm		115
6013BR	1/2" Drill Rev. 6 amp		270
9401	4" x 24" Belt Sander w/bag		458

Model	Description	List	Sale
5007NBK7-14"	Circ Saw w/ case		250
LS1011	10" Slide Compound Saw		995
LS1211	12" Slide Compound Saw		1620

Model	Description	List	Sale
3901	Plate Joiner Kit		375
3612C	3 HP Plunge Router		492
LS1040	10" Compound Miter Saw		460

Model	Description	List	Sale
LS1013	10" Dual Compound Slide Miter Saw		1088
BO5010	5" Random Orbit Sander		142

Model	Description	List	Sale
LS1220	12" Compound Miter Saw		379
9227C	7/8" Polisher		350
5J401	16" Bench Scroll Saw		300

Model	Description	List	Sale
2702	8-1/4" Table Saw		299
2703	10" Table Saw		309

Model	Description	List	Sale
SPN1+	Finishing Nailer 1" - 2" w/ cs		448
SN545	Stapler 7/16" crown, 1" - 2"		540

Model	Description	List	Sale
SLP20	Pinner w/cs 5/8" - 1-5/8"		422
SKS	Stapler 5/8" - 1-1/2"		390

Model	Description	List	Sale
SN70	Framing - Clip Hd 2 - 3-1/2"		725
SN65	Framing - Full Hd 2 - 3-1/2"		709
SN60	NEW Framing 2 - 3-1/2"		699

Model	Description	List	Sale
SPN40	Finish Nailer 1-1/4" - 2-1/2"		569

Model	Description	List	Sale
A100LS	Finish Stapler 1/2" - 1"		180
A150LS	Finish Stapler 1/2" - 1-1/2"		220
A125BN	Brad Nailer 5/8" - 1-1/4"		180
A200BN	Brad Nailer 5/8" - 2"		215

Model	Description	List	Sale
BOSTITCH	AIR NAILERS		
N80S-1	Stick Nailer		325
RN45	Coil Roof Nailer 3/4" - 1-3/4"		349

Model	Description	List	Sale
PN60N-2K	Finishing Nailer w/ case, oil, & treds		279
M18FS	Flooring Stapler 15 gauge		902
S325X-1K	Finish Stapler 1/2" - 1-3/8" with case & oil		269

Model	Description	List	Sale
JORGENSEN	ADJUSTABLE HANDSCREWS		
Item#	Length	Capacity	List

ETC001	ET1000F GRW GRI, ET3500F GRW saw, 2 batteries, 15 minute charger, and case Sale 299
RIESEMAYER FENCES	

Model	Description	List	Sale
50	3/4" Black Pipe	15.45	8.50
52	1/2" Black Pipe	12.65	6.95

Model	Description	List	Sale
PANASONIC	CORDESS		
EY6100FKW	12V 3/8" Drill Kit w/ 2 Ironman batteries, 15 min. charger, & case		379

Model	Description	List	Sale
EY6230FKW	NEW 15.6V Drill Kit with 2 Ironman batteries, 30 minute charger & case		425
EY3503FKW	5-3/8" 12V Wood Cutting Circular Saw Kit		500

Model	Description	List	Sale
EYC001	EY6100FKW drill, EY3503FKW saw, 2 batteries, 15 minute charger, and case		299

Model	Description	List	Sale
BIESEMEYER	FENCES		
B-50	50" Commer. Saw		443
T-SQUARE	52 52" Homeshop		360
T-SQUARE	40 40" Homeshop		335
T-SQUARE	28 28" Homeshop		325

Model	Description	List	Sale
AIRY	AIR NAILERS		
0241SK	Brad Nailer 3/8" - 1-9/16"		180
0626SK	1/4" Crown Stapler 3/8" - 1-1/4"		89

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DW124K	1/2" right angle Drill		590
DW321K	Top Handle Jigsaw Kit		300
DW364	7-1/4" Circ. Saw w/brake		294
DW610	1-1/2 HP 2 handle Router		266
DW411K1/4	sheet Palm Sander w/ case		58
DW682K	Biscuit Joiner with case		448
DW705	12" Compound Mitre Saw		734
DW621	2 HP Plunge Router		400
DW675K	3-1/8" Planer with case		292
DW431	3 x 21 w/spd Belt Sander		338
DW421	5" Palm Ran. Orb Sander		144
DW423	Palmgrip Random Orbit Sander - variable speed		170
DW421 & DW423	come with Free DW4317 case!		
DW272	Drywall Gun, 0-4000, 6.3 amp		160
DW276	Drywall Gun, 0-2500, 6.5 amp		160

Model	Description	List	Sale
DW972K-2	3/8" variable speed w/ 12V 2 XR batteries		362
DW991K-2	3/8" variable speed w/ 12V 2 XR batteries		415
DW991KS-2	DW991K drill, DW935 trim saw, 2 XR batteries & case		345

Model	Description	List	Sale
DW933K	NEW Jigsaw Kit		468
DW938K	Recipro Saw Kit		520
DW995K-2	1/2" Drill Kit w/ 2 batt.		259
DW997K	1/2" Drill/Hammer Drill Kit		454
DW936K	5-3/8" Saw Kit		458
DW995KS-2	DW995K Drill, DW936 Saw and case		385
DW995KS-2	DW995K 18V drill kit, DW938 18V reciprocating saw, & case		395

Model	Description	List	Sale
DW708	12" Slide Mitre Saw		649
DW788	20" Scroll Saw		549
DW733	12" Planer w/ extra blades		399
DW744	10" Portable Table Saw		499
DW756	6" Bench Grinder		164
DW758	8" Bench Grinder		184

Model	Description	List	Sale
DAVID WHITE	INSTRUMENTS		
LP6-20A	Sight Level package-20x...		329
LP6-20XLA	LP6-20A with 9055 tripod and 7620 rod		409
LT8-300	Level Transit - 26x		739
LT8-300P	above Level with optical plum		869
LT5-900	Level Transit - 20x		419
LT6-900	above Level with tripod and rod		615
AL76-900	Automatic Level - Transit - 18x		666
ALTP6-900	above Level with tripod & rod		799
AL8-225	Automatic Level - 22x		583
ALP8-22	above level with tripod & rod		584
AL8-26S	Automatic Level - 26x		554
ALP8-26	above level with tripod & rod		584

Model	Description	List	Sale
BOSECH	Model		
1587VS	Top Handle "CLIC" Jig Saw		292

Model	Description	List	Sale
1587AVS	1587VS Saw Kit with case and New Progressor blades		149

Model	Description	List	Sale
1584VS	Barrel "CLIC" Jig Saw		286
Bosch Metal Case	for above Jig Saws		24
Bosch 30 blade assortment	for Jig Saws		29.99

Model	Description	List	Sale
1584VS or 1587VS	with steel case and 30 Bosch blades		175

1295DH	5" Random Orb Palm Sndr	145	89
1274DV5	3"x21" w/spd Belt Sander	301	175
1278VSK1	1-1/2"x12" Belt Sander	218	219
1275DV5	3"x24" v/s Belt Sndr	379	219
1276DV5	4"x24" v/s Belt Sndr	400	229
1194VSRK	1/2" w/ spd Drill w/ case	303	59
1613EV5	2HP v/s Plunge Router	369	199
1634VSK	Recip Saw 10.5 amp	335	185
3315K	12V T-handle Drill Kit	345	159
3615K	14.4V Drill Kit	354	174
3107DV5	5" Random Orbit Sander	165	98
3107DVSK	3107DV5 with case	195	118
3725DV5	5" Random Orbit Sander	256	145
3727DV5	6" Random Orbit Sander	266	149

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Have you ever wondered how a bowl can have every inch, inside, outside, and bottom exquisitely turned, with no sign of having ever been mounted on a lathe? Bowls have to be mounted at the headstock end of the lathe to turn the inside, so how can the bottom not show screw holes or plugs?

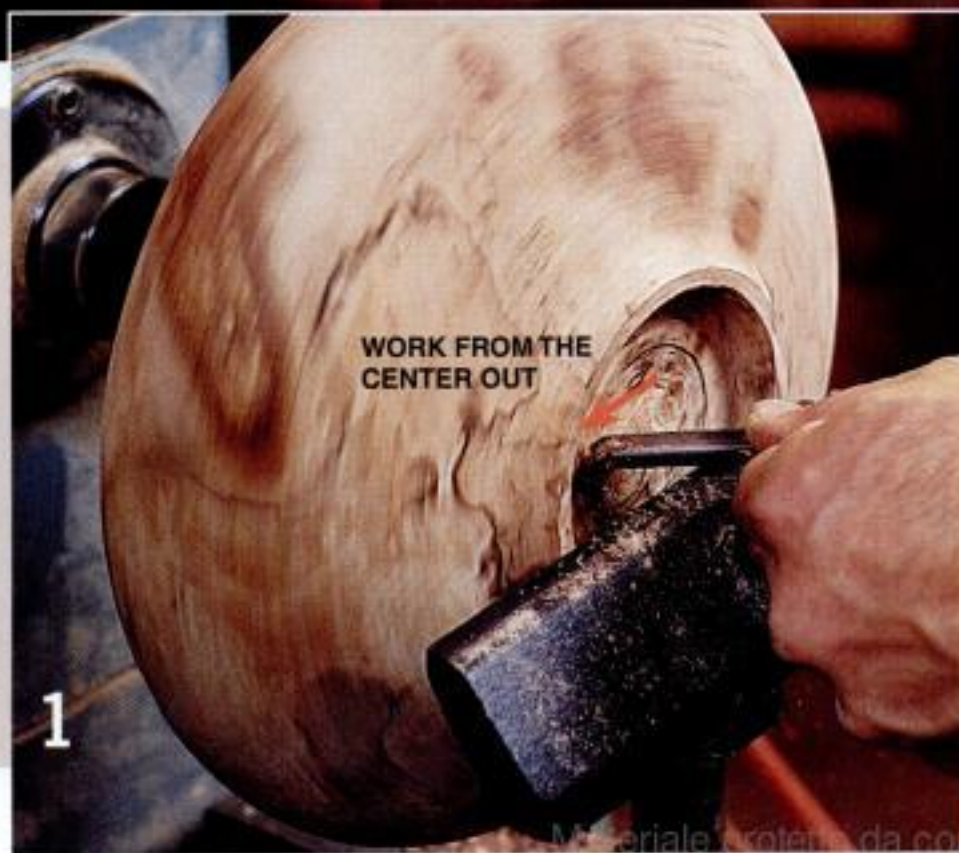
Solving this mystery will enhance every bowl you turn. Here's how you can do it. To turn a pristine bowl bottom, you have to be able to turn from both ends of the blank. Turners call this "reverse mounting." One way to do this is to buy an expensive chuck system with adjustable jaws. These systems are great, but you can get results just as good with methods woodturners used before fancy chucks were available.

I'm going to show you three different techniques for reverse mounting. The first makes use of a screw chuck and the second requires two faceplates. These two techniques have this in common: You turn the outside and bottom of the bowl first, glue a waste block to the edge of the bottom rim, reverse mount it onto the waste block, and then turn the inside. I use cyanoacrylate (CA) glue because it bonds quickly. Yellow or polyurethane glues will work as well, but you'll have to maintain pressure on the joint until the glue cures. If you are working with green wood, use CA glue. I recommend using one of these two

ART DIRECTION: DAVID FARR • PHOTOGRAPHY: MIKE HABERMANN

Turn the Outside and Base First.

HOLLOW the base with a $\frac{3}{8}$ -in. bowl gouge, working from the center out toward the rim. I establish the inside edge of the rim wall first, and ease the transition between the rim wall and the bottom with a cove or taper. I make the rim $\frac{3}{16}$ -in. to $\frac{1}{4}$ -in. wide, depending on the bowl's size. Finally, I make sure the edge surface of the rim is flat and perpendicular to the lathe's axis so the bowl will sit level.



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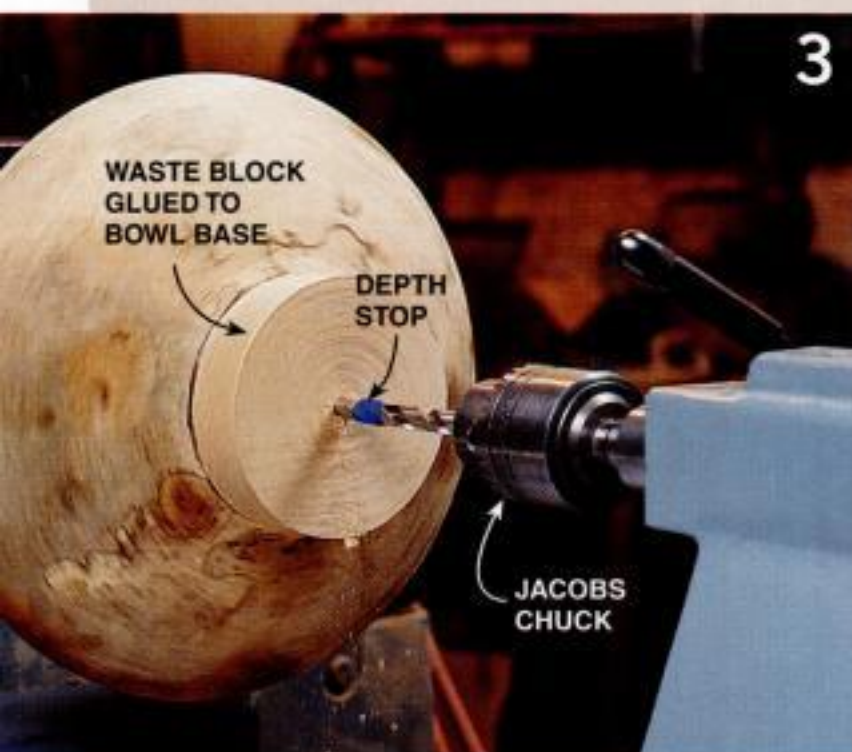
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Reverse Mounting Using a Screw Chuck. Mounting the waste block onto the bowl is easy—just mark, glue and press, but you have to be able to chuck a drill bit into the tailstock of your lathe.

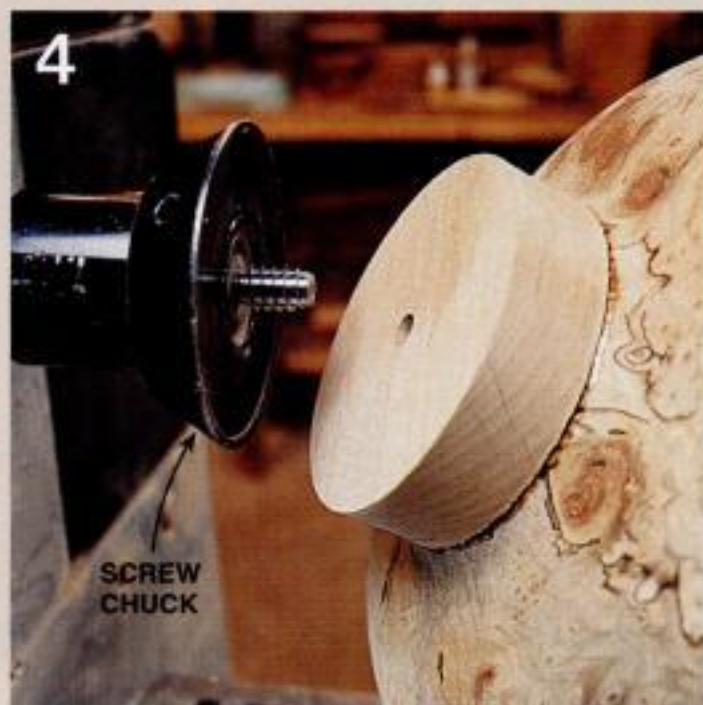
MARK the waste block for gluing by pressing it against the bowl base rim while the lathe is running. The friction leaves a polished circle on the block's face.

Lay a bead of cyanoacrylate (CA) glue on the mark and attach the waste block to the base rim. Then turn the waste block round and flat across its face.



BORE a perfectly centered hole in the waste block. Mount a Jacobs chuck (the one from your drill press might fit) in the tailstock and insert the proper-sized drill bit. With the lathe running at slow speed, advance the bit slowly into the block. Be careful not to drill into the bowl's bottom. Then remove the bowl from the screw chuck.

REMOUNT the bowl using the hole in the waste block. Since this hole was bored on the axis of the bowl, the piece will remount on center. Run the lathe at a slow speed and do any truing up that is necessary. Then turn the interior of the bowl, sand and finish it. Part the bowl off at the joint with the waste block. Stop just short of cutting all the way through, shut off the lathe and give the bowl a little tap to break it away. Remove any remaining waste with a light touch on the belt sander.



Woodturning

techniques whenever possible. The third technique, using a mandrel shaped to the bowl's interior, is used when you have to turn the inside of the bowl first, and the outside last.

It's Best to Shape the Bottom First

Attach what will be the open end of the bowl to the headstock any way you want. Screw holes will make no difference, because they get removed when you turn the bowl's interior. Shape the bowl's outer profile, leaving a turned section at the bottom for the base.

I make most bases concave, using a small bowl gouge to remove the waste from the interior (Photo 1). First I cut into the bottom face to create a rim. Then I hollow the center. For continuity, the recessed base should follow the bowl's main curve. I either blend the outside of the base rim into the bowl's outside shape with an ogee, or differentiate it with a ridge or groove.

Sand and finish the hollowed inside of the bowl's base now. This is the last shot you get at this surface until the bowl is off the lathe, and sanding under power will save tedious hand work later. If you plan to use a lathe-applied finish, do the interior of the base now as well, but leave the edge surface of the rim unfinished, as it will be a gluing surface.

With the outside and bottom of the bowl completed, it's time to reverse mount it so you can work the inside.

Reverse Mount Using a Screw Chuck

A screw chuck, used with a waste block makes it easy to flip the bowl blank over. I use a disk of wood a bit bigger than the bowl's base and thick enough (about 1 in.) to house the screw. Mark the face of the waste block for gluing (Photo 2) and glue it on. After gluing it on, drill a mounting hole. By drilling from the tailstock, the hole in the waste block will be on-axis (Photo 3). Remove the bowl from the screw chuck and remount it from the waste block so you can work the inside (Photo 4).

text continued on page 32

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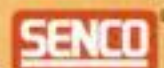


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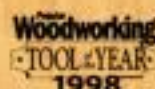
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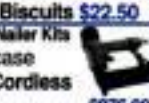
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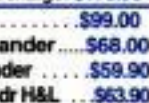
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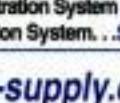
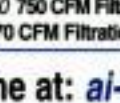
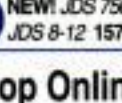
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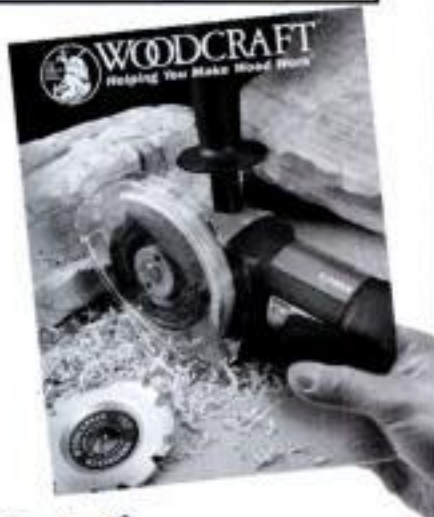
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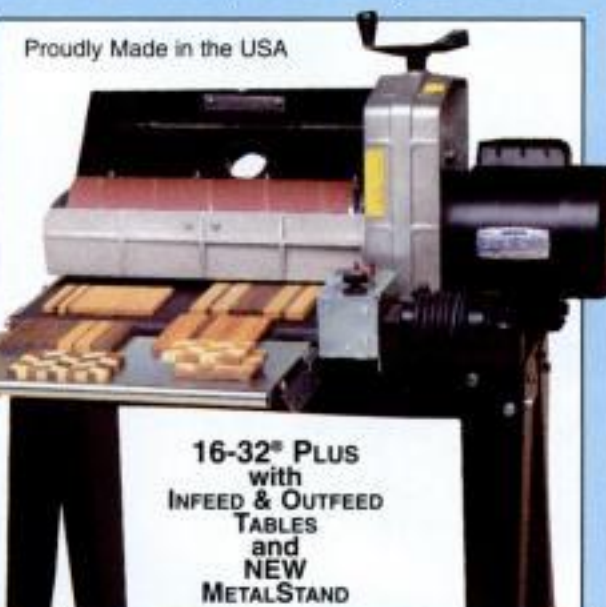
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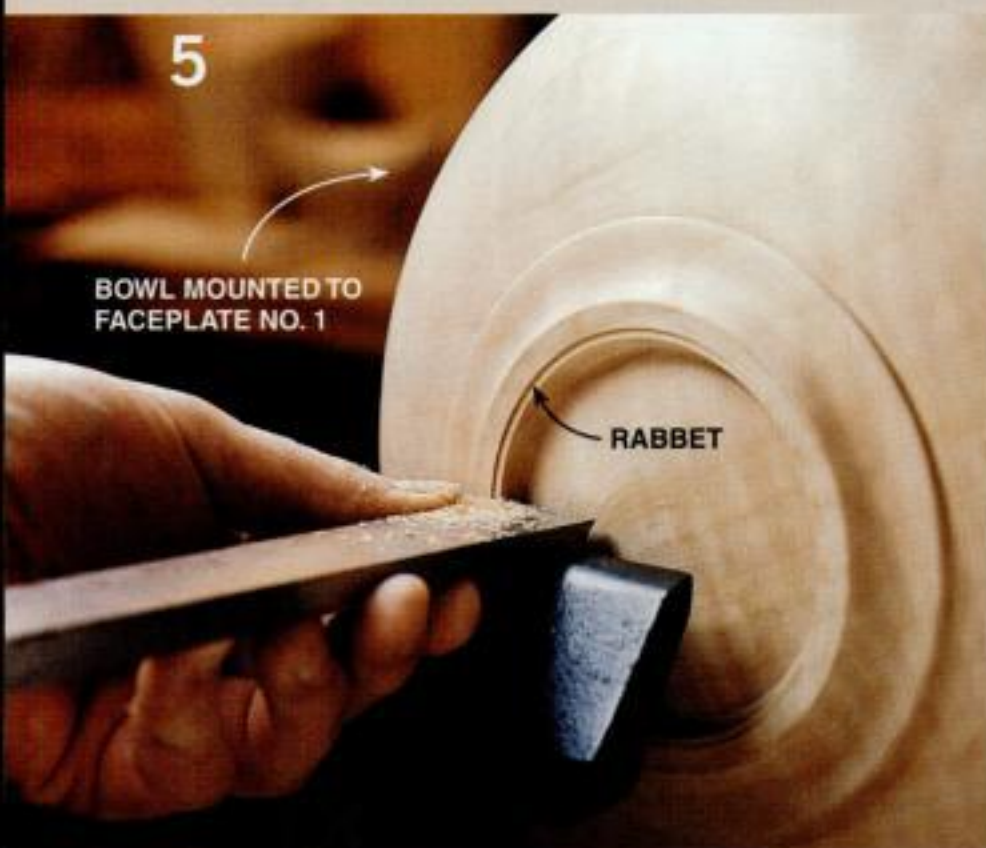
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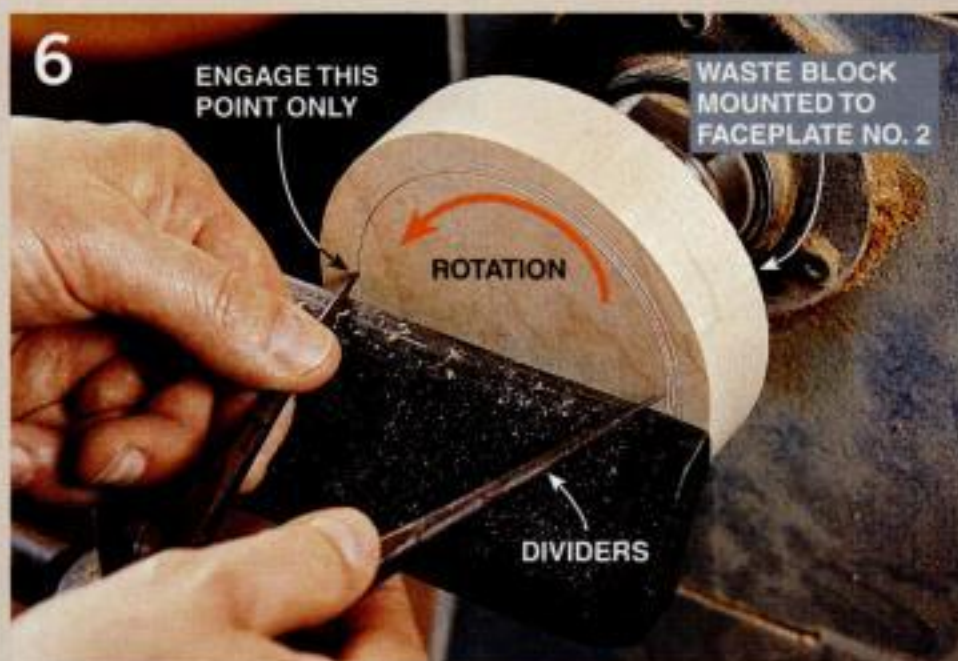
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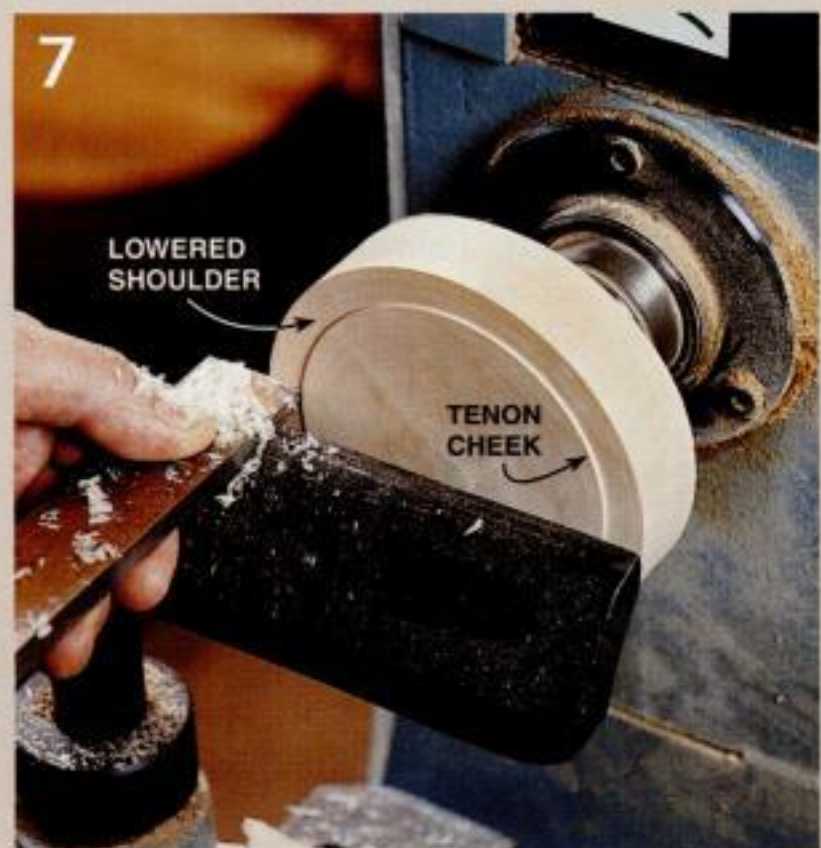
Reverse Mounting Using Two Faceplates. Two faceplates are cheaper than one screw chuck, and you don't have to drill from the tailstock. You do have to cut a rabbet into the bowl's base rim and a tenon that will fit it snugly on the waste block.



CUT a rabbet, about $\frac{1}{16}$ in. by $\frac{1}{16}$ in. into the inside edge of the bowl's base rim with a flat scraping tool. Make sure to cut in perpendicular to the edge. You've created a short, round mortise. Remove the bowl from the lathe leaving it attached to faceplate No. 1.



SCRIBE the diameter of the base's round mortise onto a waste block mounted on faceplate No. 2. First true the waste block's face. Then, using a pair of dividers set to the inside edges of the base rim mortise, center the tenon diameter on the waste block. Lay them on the tool rest, and with the lathe running at slow speed, lightly mark the waste block, engaging only the divider point nearest you—it's the one on the downward side of the rotation. Check to see if the mark aligns with the other point and reposition the dividers until it does. When you've centered the dividers, scribe the diameter, using only the near point.



LOWER the shoulder outside the scribed line on the waste block to create a round tenon. The fit between the cheeks of the tenon and mortise must be exact for the bowl to remount on center, so work carefully when you get near the scribe line and check the fit often. The tenon must be short enough so that the base rim seats on the lowered shoulder of the waste block.



APPLY a bead of CA glue to the tenon shoulder on the waste block, being careful not to get it on the tenon cheek. Then press the waste block onto the bowl base, making sure it seats properly, and hold it until the glue sets. Remount the assembly on the lathe from faceplate No. 2, and check the remounting by running the lathe at slow speed before removing faceplate No. 1. Finish turning the inside of the bowl, then part it from the waste block at the base rim, removing all traces of the mortise and tenon.

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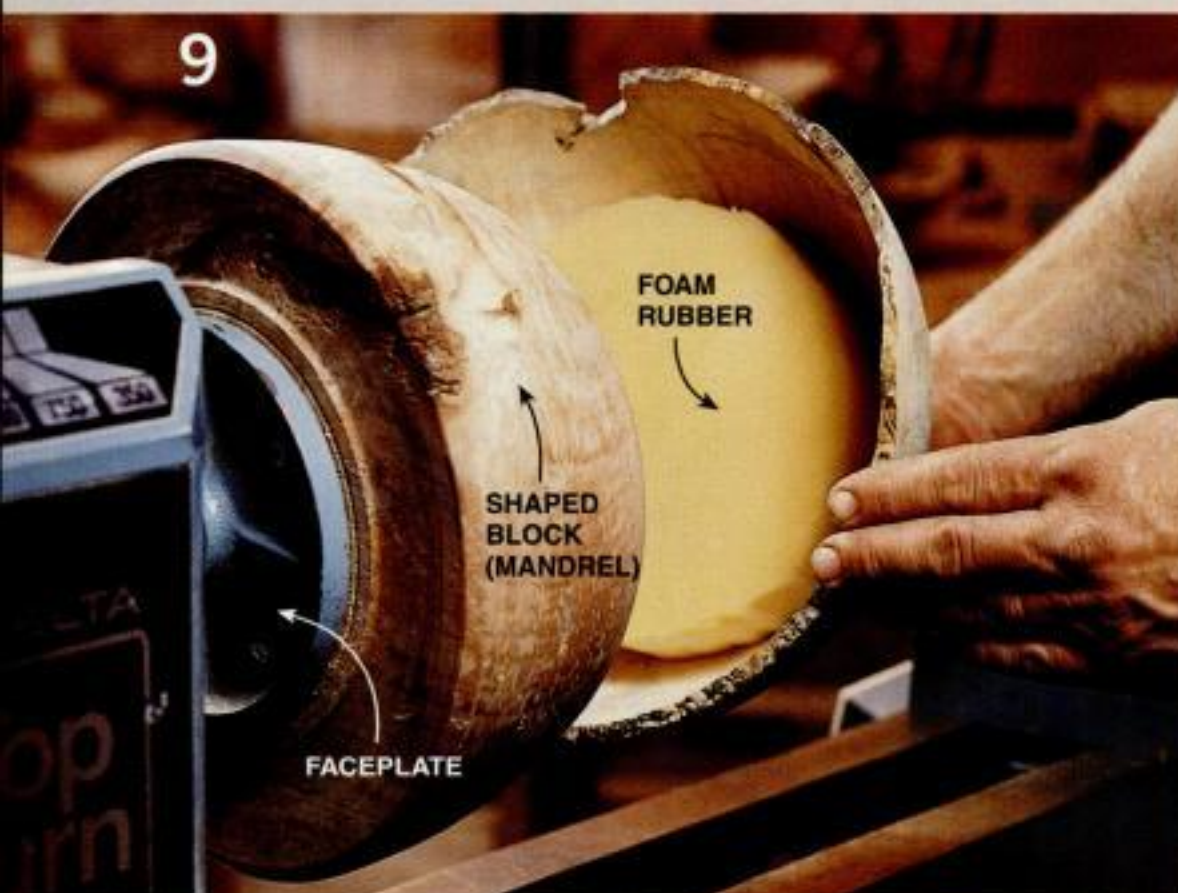
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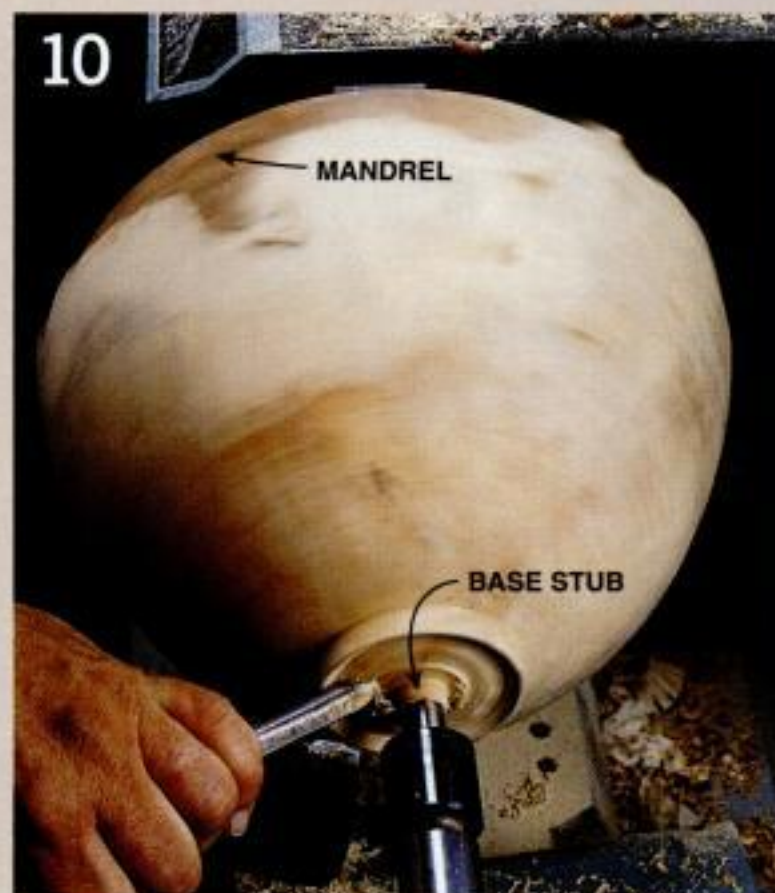
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Woodturning

Reverse Mounting With a Shaped Mandrel. You have to turn a mandrel—a mounting block that will fit the inside shape of the bowl and be able to work the bowl's outside by making light cuts with sharp tools at slow speeds. Use this method if you want to rework an already finished bowl.



TURN a faceplate-mounted block so it will closely match the finished inside of a natural-edged bowl. A piece of 1- to 2-in. foam rubber is put between the two to provide friction and prevent marring the bowl's interior. Rotate the piece by hand first to check for clearance on the natural edge. Then run the lathe at slow speed. You'll probably have to adjust the tailstock placement to get the piece running true to the axis.



REMOVE the waste with very light cuts and the lathe running at slow speed. Even though the tailstock is being used, the bowl is only held in position by friction. Leave an adequate stub at the base to support the pressure of the tailstock. You'll have to remove this stub by hand after the bowl has been removed from the lathe.

[continued from page 26](#)

Reverse Mount Using Two Faceplates

If you don't have a screw chuck, you can remount a bowl on center using two faceplates and a waste block. To do this you must allow extra base rim height when you first turn the outside and bottom of the bowl. This extra height will be removed when the finished bowl is cut from its mounting block. With the bowl mounted on faceplate No. 1, cut a small rabbet into the inside bottom edge of this rim (Photo 5).

Mount a waste block on faceplate No. 2, true its face, scribe it (Photo 6), and create a round tenon that matches the round mortise you made in the base (Photo 7). Glue the waste block to the bowl (Photo 8), then remount from faceplate No. 2, leaving faceplate No. 1 attached. This allows you a chance to reshape the base just in case things don't line up on the first try. When you're satisfied with the mounting, remove faceplate No. 1 and finish turning the inside.



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Mount a piece of wood of suitable diameter and thickness onto a faceplate or screw chuck. Turn the front surface of this piece to match the contour of the bowl's interior (Photo 9). If you're going to remount an already finished bowl, you'll first have to glue a stub to the center of its bottom for the tailstock to bear on. Position the bowl around the mandrel, with foam rubber or a scrap of short-napped carpet in between, and hold it tight with the tailstock. Once the piece is positioned, finish the outside down to the glued-on stub (Photo 10). **AW**



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Build a Whittled Peg Rack

George Vondriska
Fri., 9:00-11:00 am; Sat., 9:00-11:00 am
Sun., 11:30-1:30 pm
This butternut wall-hung coat rack
appeared in AW issue, #73. Make one at
the show and use it to hang your favorite
fedora. Capacity: 12. Cost including all
materials: \$75.

Make a Hinge Mortising Jig

Carol Reed
Fri., 9:00-11:00 am; Sun., 11:30-1:30
Make and keep a great jig for routing
hinge mortises in your boxes and cabinets.
You will also get a set of hinges and learn
to install them using the jig. Capacity: 20.
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Construct a Pair of Cam Clamps

Fred Matlack
Fri., 2:00-4:00 pm; Sat., 9:00-11:00 am
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Handmade from wood and aluminum,
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to use on your next project. Capacity: 20.
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Make a Mahogany Jewelry Box

Frank Klausz
Fri. & Sun., 2:00-4:00 pm
Learn to layout and cut dovetails by
hand. Use tools sharpened by Frank,
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Customize a plastic marking gauge to suit
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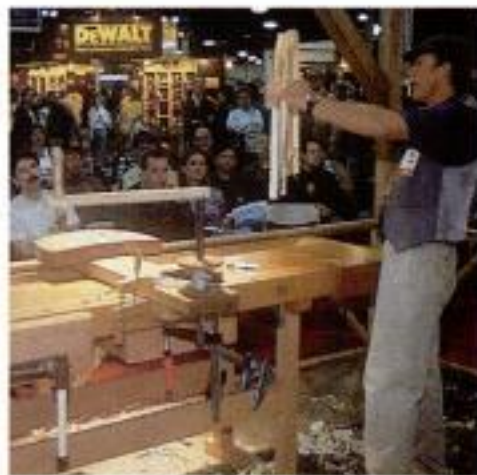
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Sun., 11:30-1:30 pm
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Woodworking Fundamentals

Frank Klausz
Fri., 11:30 am-1:00 pm; Sat., 1:30-3:00 pm
Learn how to select and understand tools, machines and materials. Choose projects and joinery you can handle. Allow for wood movement. Use the proper glue.

Tablesaw Basics, Fred Matlack

Fri., 11:30-1:00 pm; Sat. 3:30-5:00 pm
Learn how to use it safely and efficiently for ripping, crosscutting, dadoing, and other essential woodworking operations.

Making and Fitting Cabinet Doors

Paul Anthony
Fri. & Sat., 1:30-3:00 pm
There's nothing more important to the look of a cabinet than its doors. This design tour of cabinet door styles will include a demonstration of construction and installation techniques.

Getting Started with your Router

Carol Reed
Fri., 1:30-3 pm; Sat. 11:30-1:00 pm
For anyone new to routing. Learn how to rout safely and successfully. Discover which routers, bits, and aftermarket jigs and fixtures will work best for you.

Finishing Secrets

Michael Dresdner
Fri., 3:30-5:00 pm; Sat., 3:30-5:00 pm
Learn how to select the best finish for the job. Understand wood stains and use them correctly. From surface preparation to final polish, you'll know what it takes to get a professional finish.

Tablesaw Tips and Tricks

Andy Rae
Fri., 3:30-5:00 pm; Sat., 11:30 am-1:00 pm
Tired of wobbly cuts and wasted wood? Want to know the safe way to saw? Learn 4 savvy steps, from simple tune-up procedures and safe sawing methods, to jigs that improve your skills and accessories the pros use.

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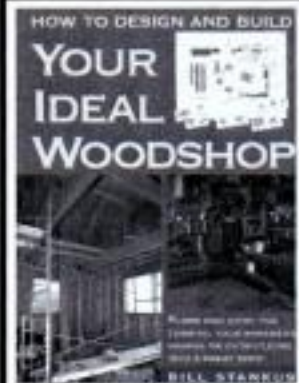
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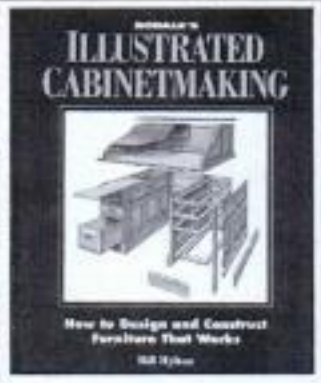
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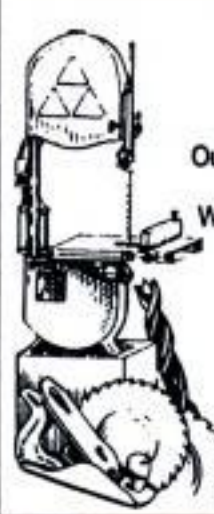
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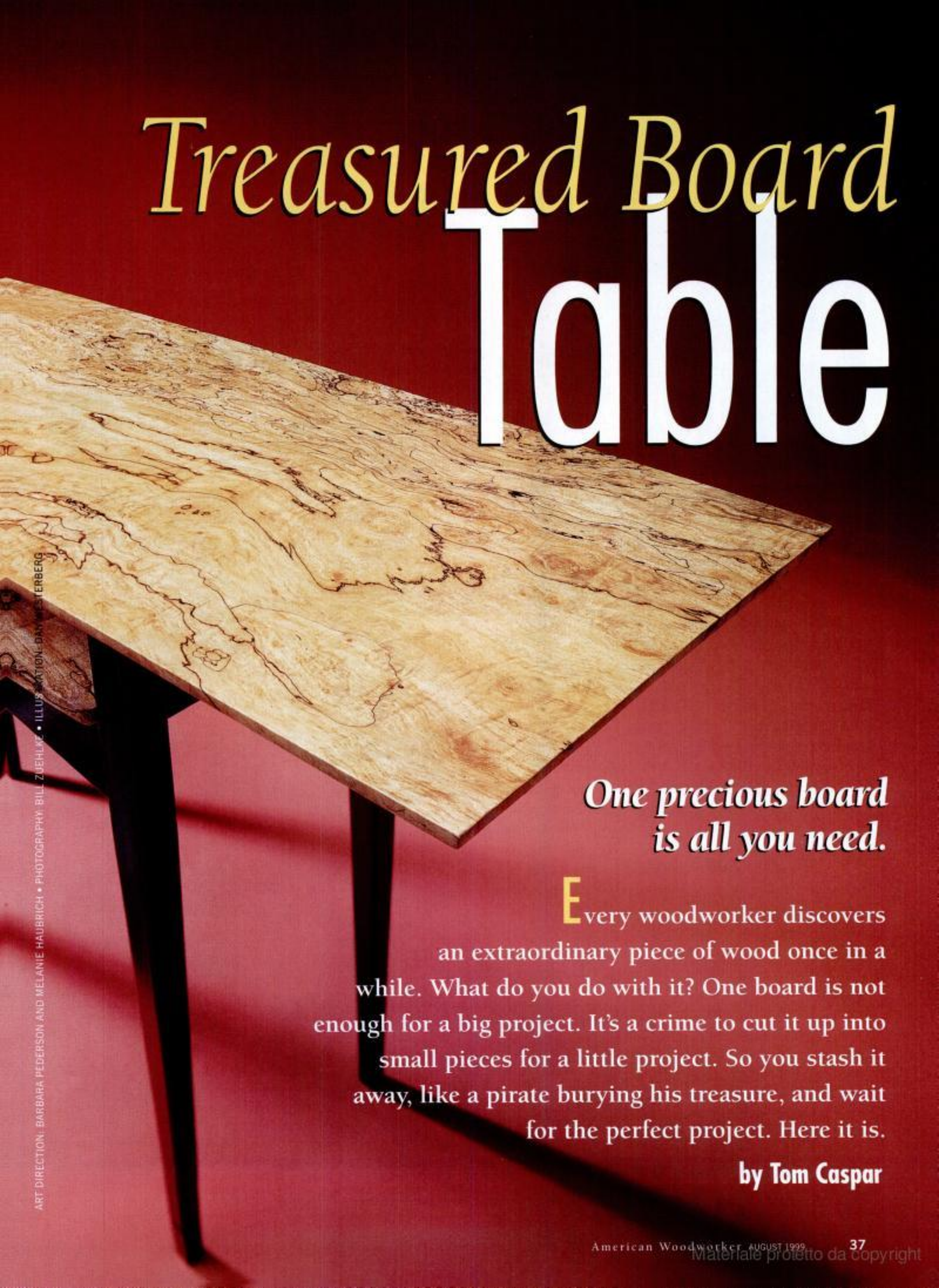
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Treasured Board Table

*One precious board
is all you need.*

Every woodworker discovers an extraordinary piece of wood once in a while. What do you do with it? One board is not enough for a big project. It's a crime to cut it up into small pieces for a little project. So you stash it away, like a pirate burying his treasure, and wait for the perfect project. Here it is.

by Tom Caspar

Treasured Board Table

TURN YOUR PRECIOUS GEM into an uncomplicated table for the hallway or behind the sofa. The thin black base recedes from view, leaving your beautiful wood to glow.

Our treasured board started out as a bigleaf maple growing on the western coast of Oregon. After it was felled by loggers, the tree laid on the forest floor and started to rot, or "spalt." Then it was hauled to a nearby river to be floated to the sawmill. It didn't make it to the mill. The log sank to the bottom of the river. Years later it was recovered from the river by a sawyer, cut into planks, and dried. Sunken treasure, indeed.

The base of the table is made from yellow poplar, a humble species of wood with green heartwood. While it may not be pretty, yellow poplar has appealing qualities. It's relatively inexpensive, even in thick planks. It's easy to machine and sand, and its small pores fill quickly with finish, making a smooth surface to complement the top. Soft maple has the same characteristics and would be another good choice.

All the joints in this table are made with a plate joiner. The base is light in weight and won't be subject to much stress, so biscuits are a safe bet. The table rails are fairly thick. There's plenty of room for two #20 biscuits for each

joint. All the rails and legs are made from the same piece of 6/4 lumber. (Make sure you have enough for a few extra legs.) The table's joints are staggered to keep the thin legs strong.

Preparing the Stock

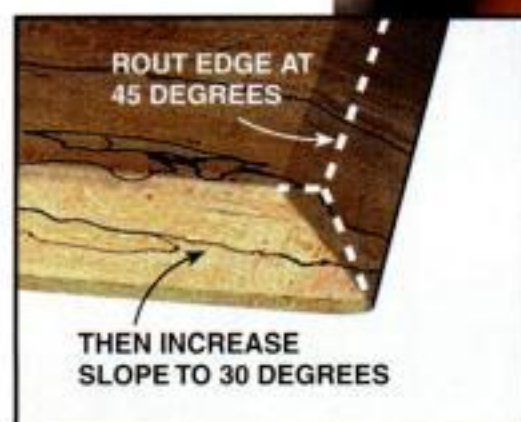
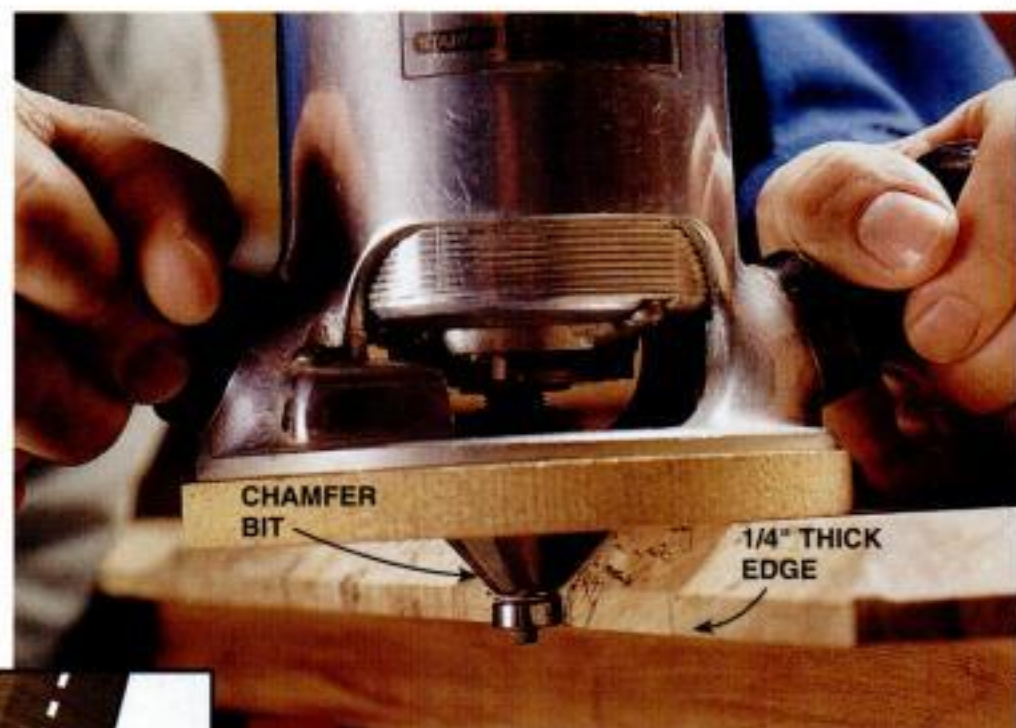
Mill the wood for the base first, but don't take it down to final thickness and width right away. Leave it 1/8-in. oversize all round. Here's why: The legs are narrow pieces, and when they're released from a wide board they may bend or twist. Let them settle into a relaxed state over the course of a few days, then joint them again and mill to size. As for the

rails, they should be allowed to relax too, because you're removing almost 1/2-in. of thickness.

Work on the top while you wait for the other wood to settle down.

The Top and Shelf

Your top may be made from one board or glued up from a couple of boards. In any case, take the time to compose it with



1 CHAMFER THE EDGE of the top with a router. Go around the top four or five times, lowering the bit for each pass. The chamfer will make the top seem thinner. Standard router bits cut a 45-degree chamfer. Increase the slope of the chamfer to 30 degrees to improve the floating effect, using a plane or belt sander.



**FIG. A
TOP AND SHELF DETAILS**

CUT CURVED EDGES on the top and shelf. A bent stick and three reference points are all you need to draw the curve.

care (see "Composing a Tabletop" p. 76). If your board has been following you around for a while, that's great, because it has reached a state of equilibrium and won't distort as you mill it. This table has no under structure to help hold a top flat, so you're relying on the stability of your special board.

Draw the slight curve of the top with a bent stick (see AW #73, p. 47, for a simple way to do this). Bandsaw the curve and chamfer the underside of the edge with a router (Photo 1). Stop before you make the final cut and fair the curves of the edge. This is easier to do now than when the edge was at its full thickness. Finish cutting the chamfer with a hand plane or belt sander.

Plane the shelf and cut it to width, but hold off on cutting it to length. You'll fit it to the base after the base is glued up. Then you'll draw the curves and smooth them off.

The Base

Mill all pieces to final thickness and width. Taper the legs on two sides before cutting the joints. With legs this small it's safer to build your own tapering jig with toggle clamps than to use a commercial jig that forces you to hold the leg in place by hand (Photo 2). Draw the taper on one leg in order to set up the jig. Try it out on a spare leg. After cutting the first

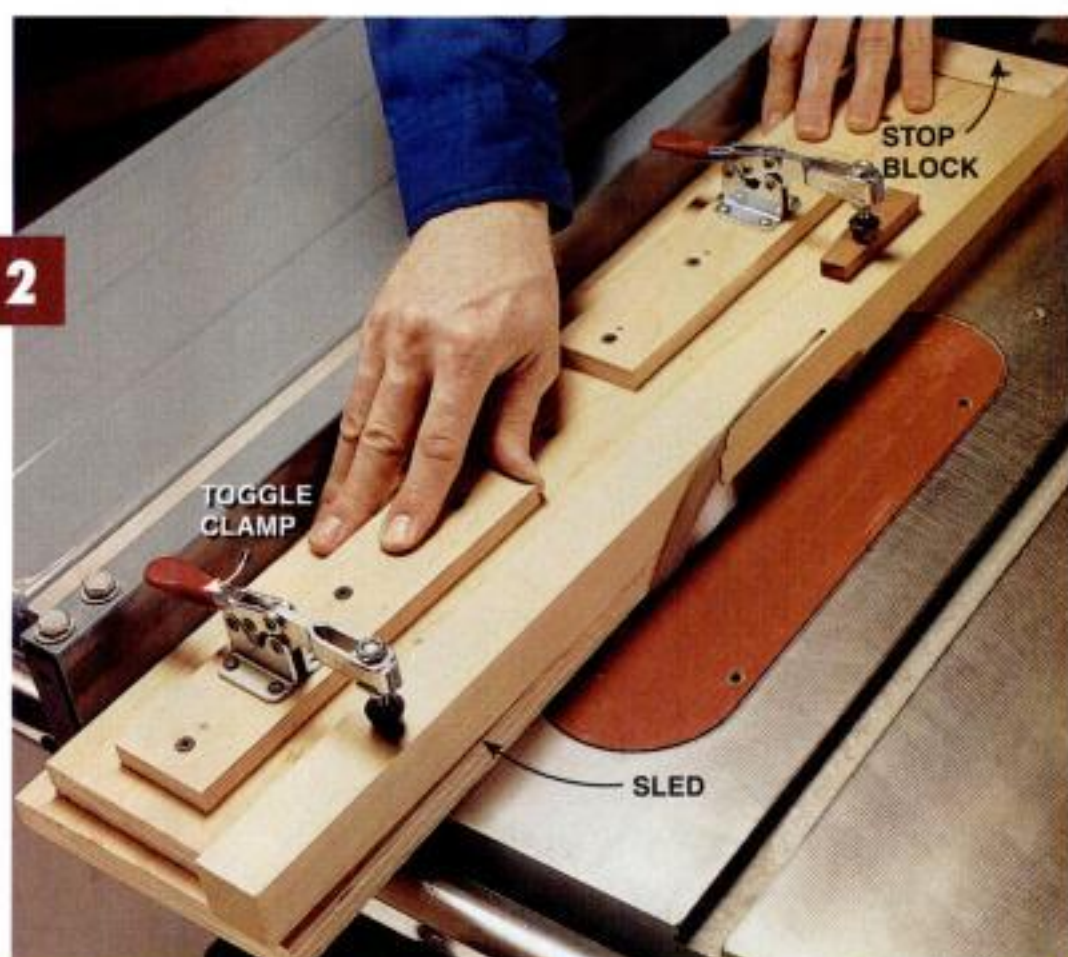
taper, flip the leg so the taper faces up. You'll need a shim under one toggle clamp when you cut the second taper.

Draw a centerline down the outside face of each rail to locate the slots for the biscuits. The four main rails are flush with the *inside* of each leg, rather than the outside. This means that the inside face of the rail will be your reference surface. Make sure the inside face is down when you cut the slots.

Clamp the rail down to a truly flat surface. Set your plate joiner on the work surface to cut the first slot. Then place a 3/8-in.-thick spacer under the machine and cut the second slot.

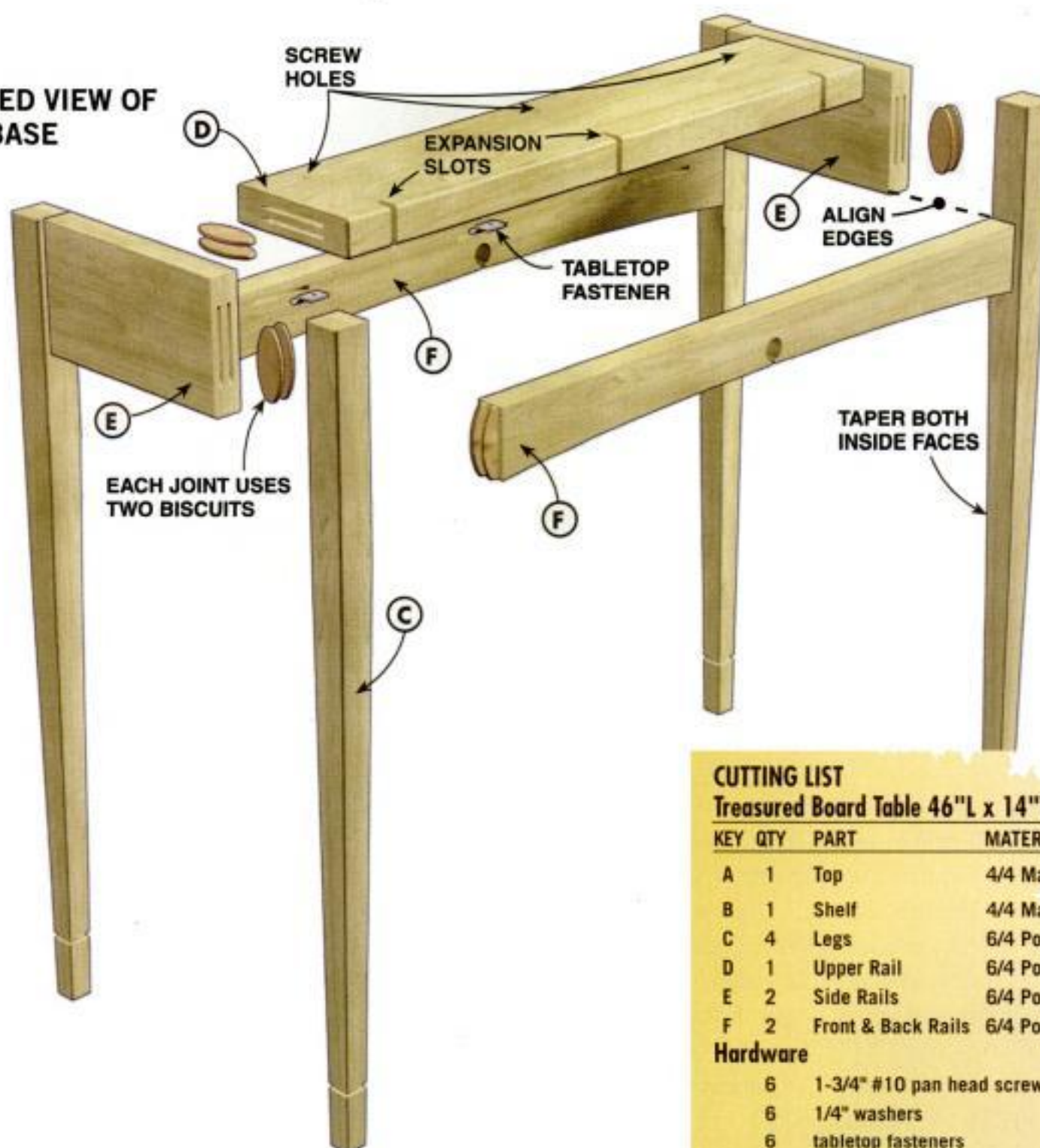
The front and back rails are as narrow as possible while still wide enough to hold a #20 biscuit. The slots go all the way from side to side and cut into the top edge of the rail a bit. That's fine, because these over-cuts will be covered by the shelf.

2 CUT THE TAPERED LEGS on the tablesaw. Hold the narrow leg in place with toggle clamps mounted on a sled. This will keep your hands well away from the saw blade. A stopper board at the foot of the leg prevents it from sliding.



BLADE GUARD REMOVED FOR PHOTO. PLEASE USE YOURS.

**FIG. B
EXPLODED VIEW OF
TABLE BASE**



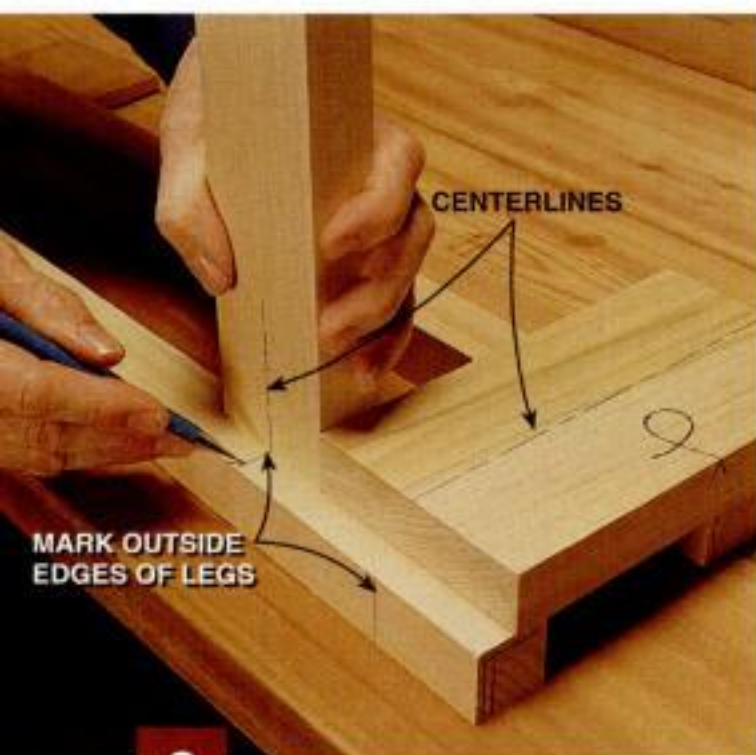
CUTTING LIST

Treasured Board Table 46"L x 14"W x 27"H

KEY	QTY	PART	MATERIAL	TH	W	L
A	1	Top	4/4 Maple	3/4"	14"	46"
B	1	Shelf	4/4 Maple	1/2"	11-1/4"	23-1/2"
C	4	Legs	6/4 Poplar	1-1/4"	1-1/4"	23-1/2"
D	1	Upper Rail	6/4 Poplar	1-3/16"	5"	23-1/2"
E	2	Side Rails	6/4 Poplar	1-1/16"	4-1/4"	7-1/2"
F	2	Front & Back Rails	6/4 Poplar	1-1/16"	2-5/8"	23-1/2"

Hardware

- 6 1-3/4" #10 pan head screws
- 6 1/4" washers
- 6 tabletop fasteners
- 6 1/2" #10 pan head screws



MARK OUTSIDE
EDGES OF LEGS

3

LAY OUT THE BISCUIT slots with center marks. First mark the center of each rail. Then transfer the marks to the legs. Use the side rail as a spacer to determine where the front rail goes.

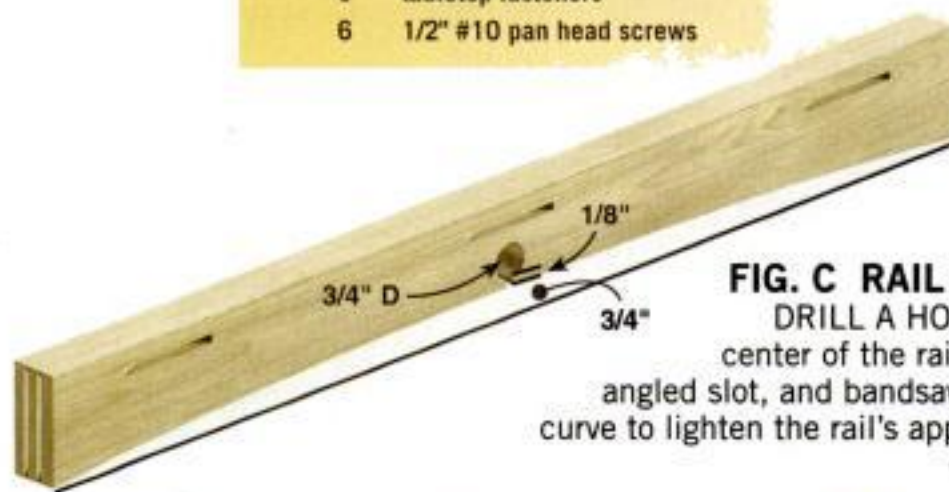
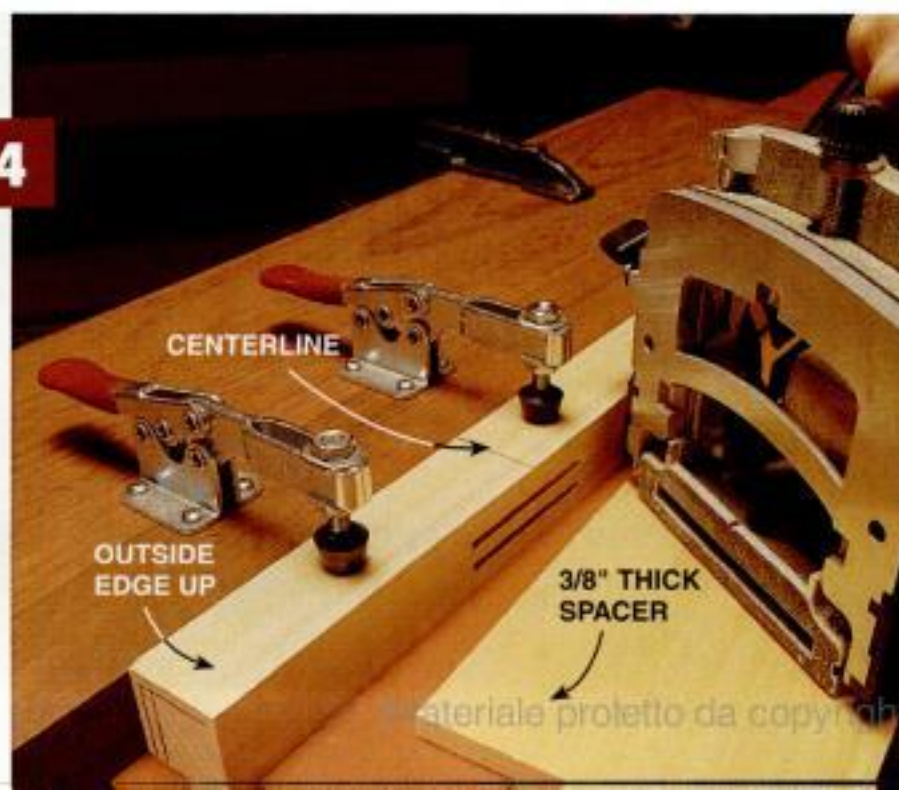


FIG. C RAIL DETAIL

DRILL A HOLE in the center of the rail, cut the angled slot, and bandsaw a slight curve to lighten the rail's appearance.

CUT DOUBLE slots with a plate joiner for a strong joint. Hold the leg in place with toggle clamps mounted on a stiff board. Cut the first slot with the plate joiner flat on the work surface. Then raise the plate joiner with a 3/8-in. spacer to cut the second slot.

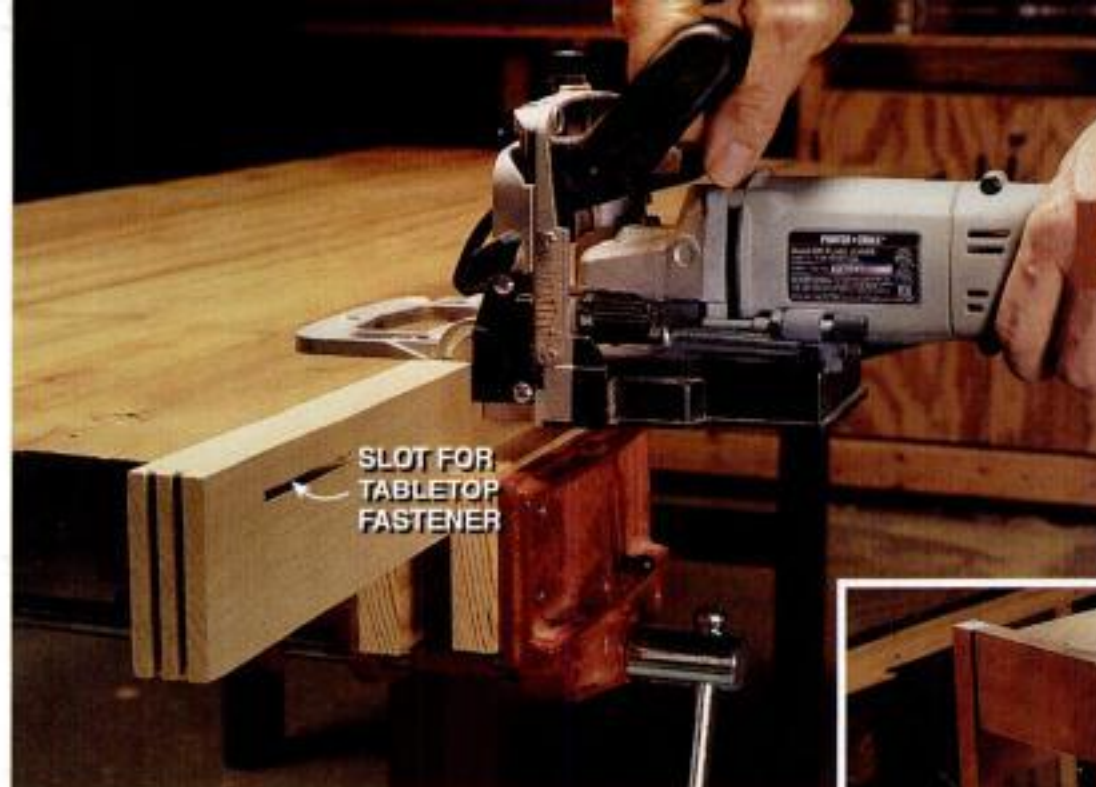
4





**FIG. D
TAPER OF LEG**

START THE TAPER 1/2-in. below the rail. This will leave plenty of room for cleaning up the saw marks.



5 CUT SLOTS for tabletop fasteners with the plate joiner. Reference with the fence set on top of the rail.

SPRAY THE BASE with matte-black paint. Wear a respirator and exhaust the paint fumes outside with a fan. Easy-to-sand red primer is used first to fill the pores and make a smooth surface. The thin, black lines of the base seem to disappear while the beautiful top springs to life!



Mark the legs for slotting directly from the rails. Stand a side rail on a leg, flush with the top end, and transfer its centerline mark to the outside face of the leg. The front and back rails fit directly below the side rails, so it's easy to mark their positions (Photo 3).

Make a simple jig for slotting the legs. Hold the legs in place with the same toggle clamps you used for the taper jig (Photo 4).

Drill and shape the front and back rails. Round the lower edge with fine sandpaper. Mark the inside faces of all the rails so you don't get mixed up in the glue-up. Sand the outside faces. Slot the front and back rails with your plate joiner for the tabletop fasteners (Photo 5).

Radius the edges of the side rails and legs on a router table using a 3/16-in. round-over bit. Then smooth the surfaces. This will reduce the radius of the edges a bit. That's just what you want to happen on the legs, because the setback of the rails is also 3/16-in., and you don't want the radius to come too close to the face of the rail.

Drill holes for screws to hold the top on one side of the upper rail. Slot the other side of the rail on the tablesaw. The slots allow the top to expand and contract without cracking. This rail is slightly thicker than the other rails so the screws penetrate only 1/2-in. into the top.

Glue-up and Finishing

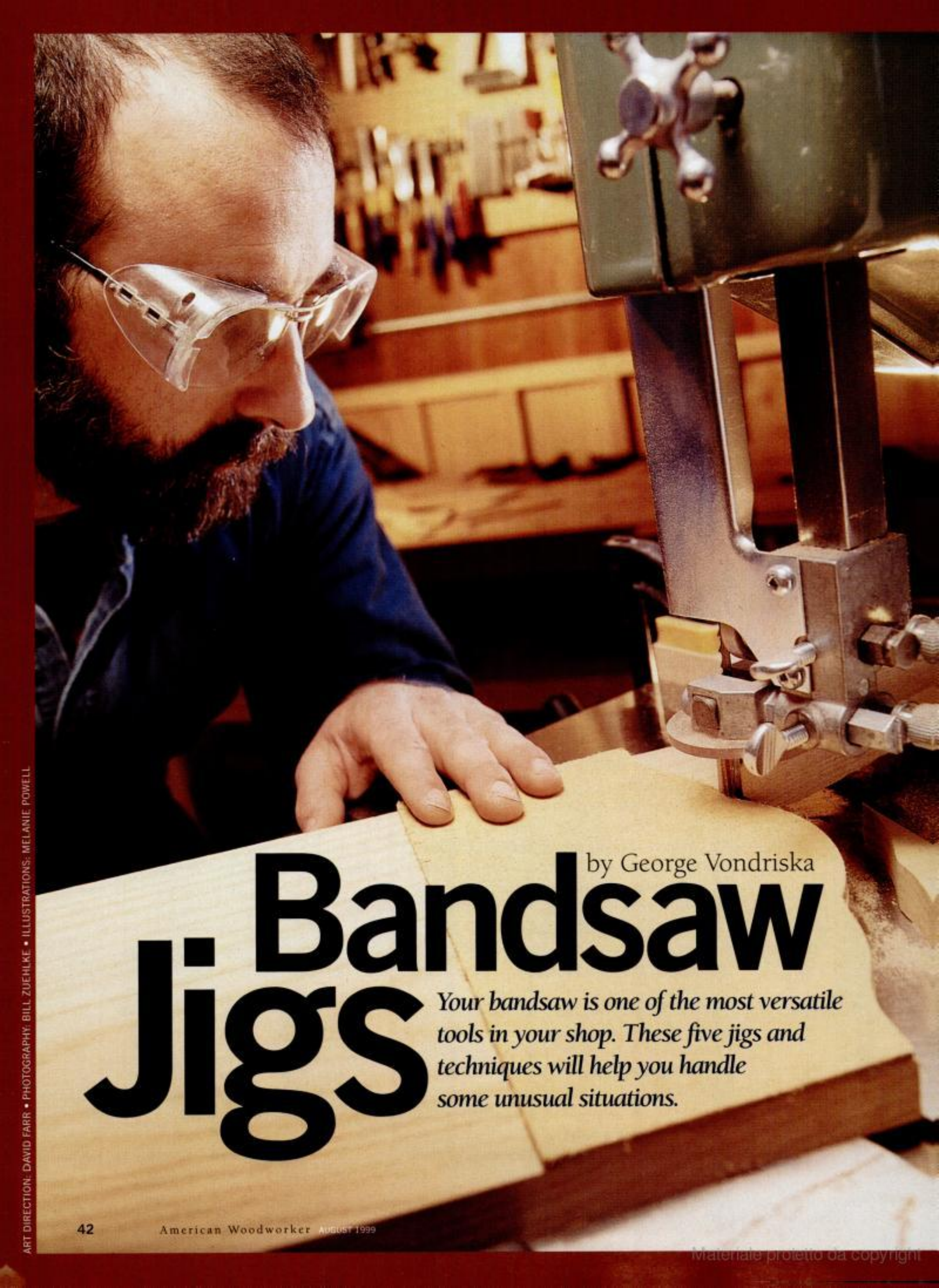
Glue the ends of the table first. Biscuits don't align pieces side to side. You must do that yourself. Make sure the side rails are flush with the top ends of the legs before you apply clamping pressure. Have a mallet handy to knock the parts into place. You'll need pencil marks to align the top edges of the front and back rails. Square across from the bottom edge of the side rails to make these marks. Now you're ready to glue the rest of the table.

Prime the base by spraying on a sanding sealer, Krylon, for example. You will need one can. Sand with 220-grit paper. Color the base with a matte-black spray paint, such as Krylon 1613 Semi-Flat Black, (Photo 6). You may need two cans of paint. Screw down the top, attach the shelf, and bring your buried treasure out into the light of day. **AW**

SOURCES

We bought our spalted maple from Northwest Timber, P.O. Box 1010, Jefferson, OR 97352; (541) 327-1000; or visit their Web site www.nwtimber.com/.
Tabletop fasteners and toggle clamps: Woodcraft Supply, (800) 535-4482.
Low-silhouette toggle clamps; 13W24; \$11.50 ea.
Tabletop fasteners; (bag of 10) 27N10; \$1.50, plus S&H.

Thanks to furniture designer Dan Cramer for his invaluable assistance in refining the details of this table. You can visit his Web site www.cramerstudio.com



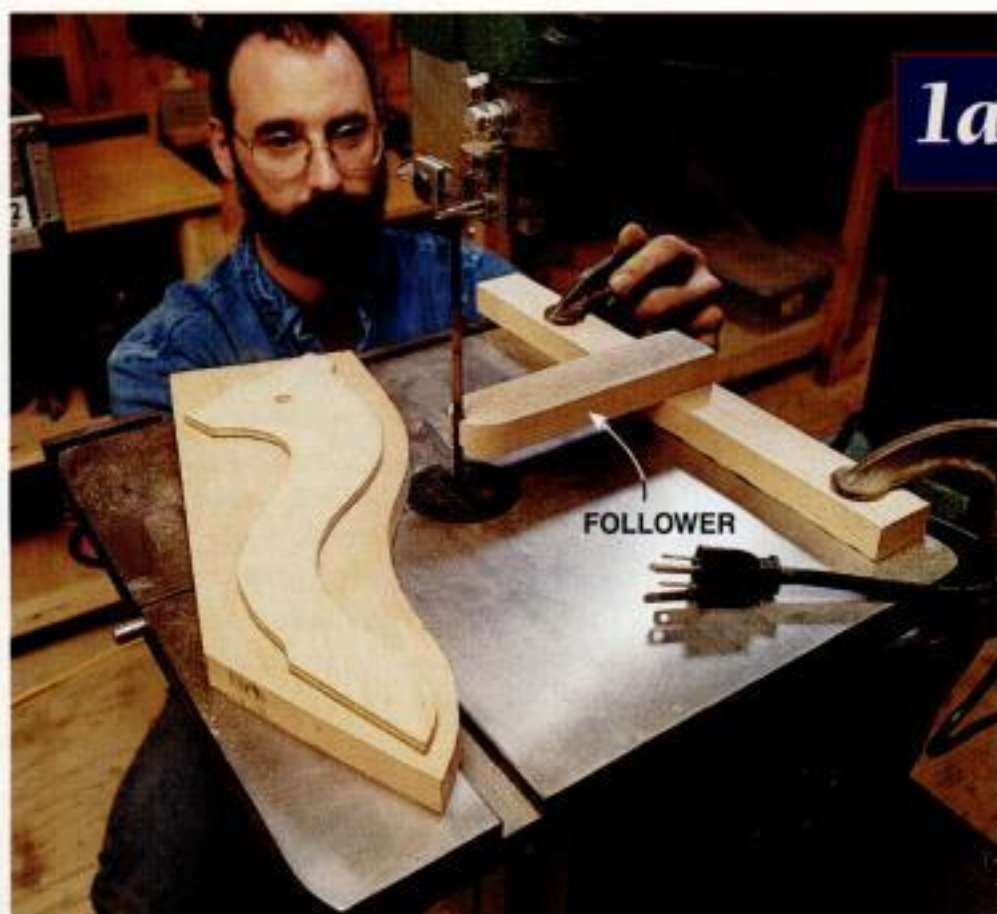
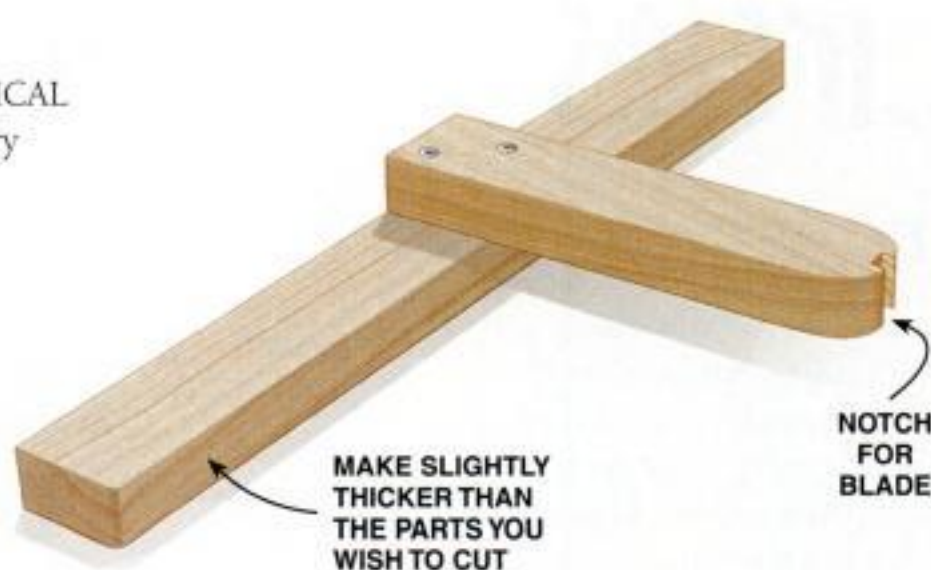
Jig Bandsaw

by George Vondriska

Your bandsaw is one of the most versatile tools in your shop. These five jigs and techniques will help you handle some unusual situations.

Cutting Multiples

IF YOU NEED TO MAKE A LOT OF IDENTICAL parts using a template, a pattern cutter is very handy. It won't completely eliminate steering the material, but it's a lot easier than simply following a line. The pattern cutter will help you consistently cut within $\frac{1}{16}$ in. to $\frac{1}{8}$ in. of the template; you can then trim off the waste with a flush-trim or pattern-cutting router bit. Every part you make will look exactly like the template.



CLAMP YOUR JIG to the bandsaw. The notch in the follower surrounds the blade. The amount the tip of the follower projects past the blade is the amount of waste you'll leave outside the template. At first you may want to keep this around $\frac{1}{8}$ in. Now that I'm comfortable using a pattern cutter, I set mine to leave $\frac{1}{16}$ in. I use hot-melt glue or double-stick tape to hold my template to the work. Just be sure it's a good bond so it won't slip.

ALLOW THE TEMPLATE to run along the tip of the follower. You still need to steer, but the follower will guide you. Keep the feed rate slow.



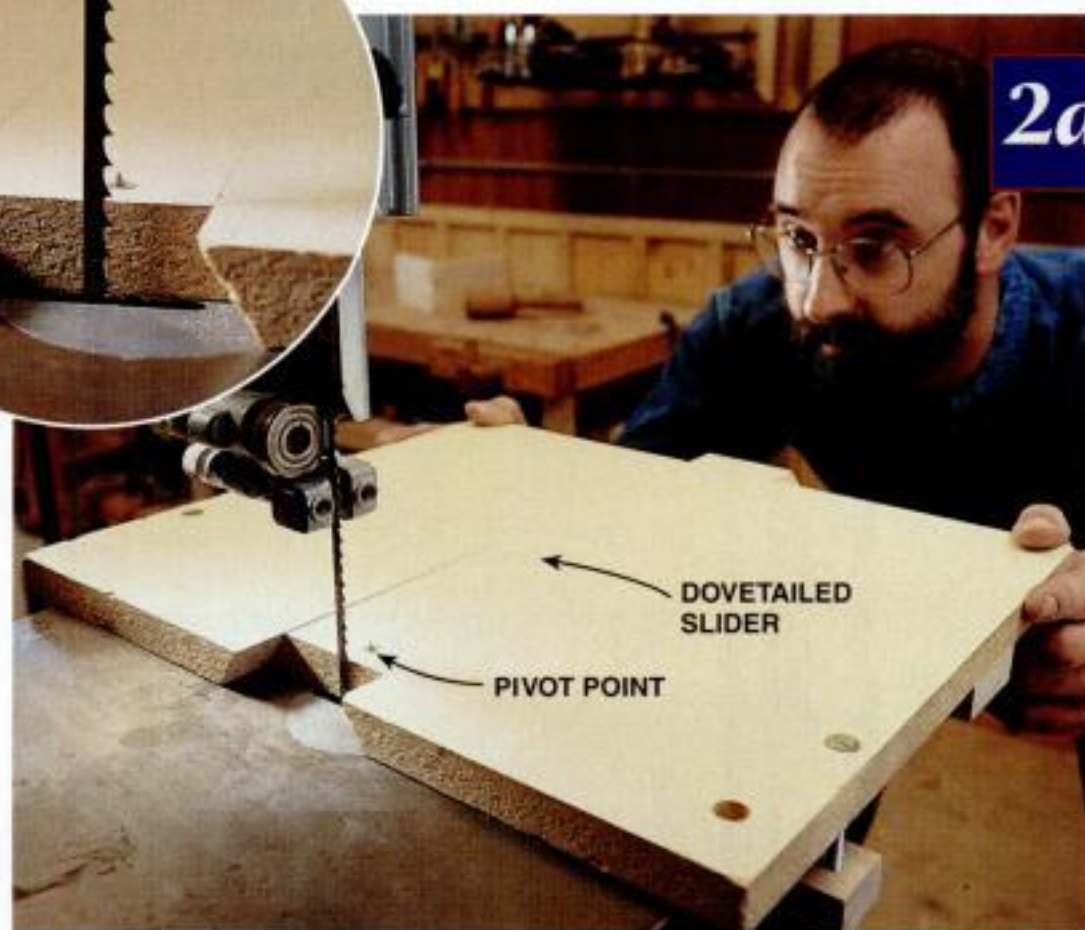
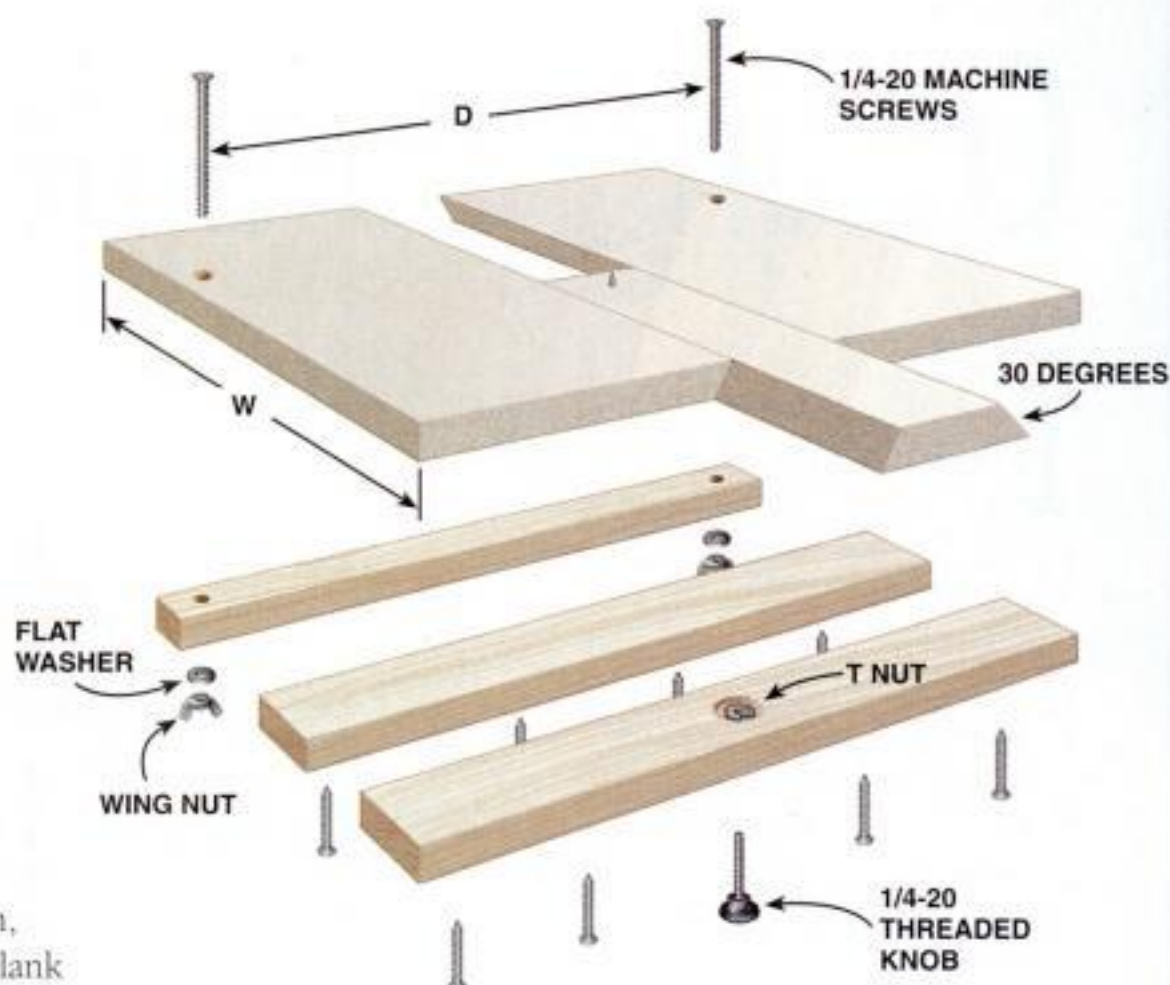
Perfect Circles

WHETHER YOU NEED CIRCLES that are 4 in. or 4 ft. in diameter, a jig like this makes it a snap. Fit the jig to your saw, modifying the cleats as necessary. Make your blanks about 1-in. bigger than the circle you want to cut. With a 1/4-in., 4-tpi blade on the saw, make a notch in the blank. The notch creates a pocket for the blade to start in,

and should be centered on the width of the blank

(Photo 2b). **Sources:** Threaded inserts

for jigs: McFeeleys; (800) 443-7937.
Knobs for jigs: Woodworker's Supply;
(800) 645-9292.

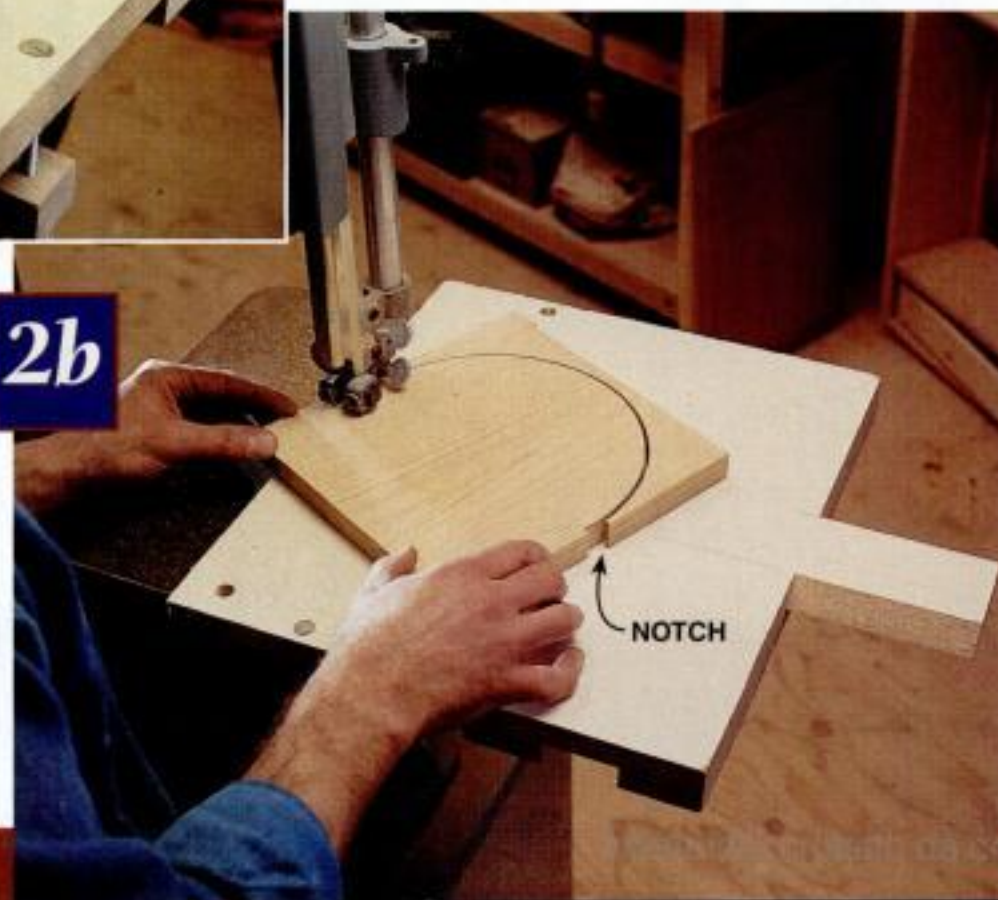


2a

MOUNT THIS ADJUSTABLE circle jig to your saw table. It has an adjustable dovetailed slider, and a screw for a pivot point. The pivot point must be lined up with the front of the saw blade. With the jig clamped to the saw table, measure from the blade to the jig's pivot point, set it to the desired radius, and lock the dovetailed slider in place. Put the blade in the pre-cut 1/4-in. by 1/4-in. notch, center the blank on the jig, and press the blank down onto the pivot point.

SPIN THE BLANK to cut a perfect circle. It's a good idea to cut a piece of scrap first to make sure the set up is right. Don't feed too fast, or the blade will wander. If the blade wanders even with a slow feed rate, check the position of the pivot point. It probably needs front to back adjustment.

2b



Compound Cuts


3a

TRACE YOUR PATTERN on two adjacent faces. Cut all the lines on one face, keeping the offcut pieces. Then use masking tape to reassemble the block.


3b

TAPE THE OFFCUTS back together, and cut the adjacent face.


3c

LIKE MAGIC your part appears from the center of the blank when you remove the tape.

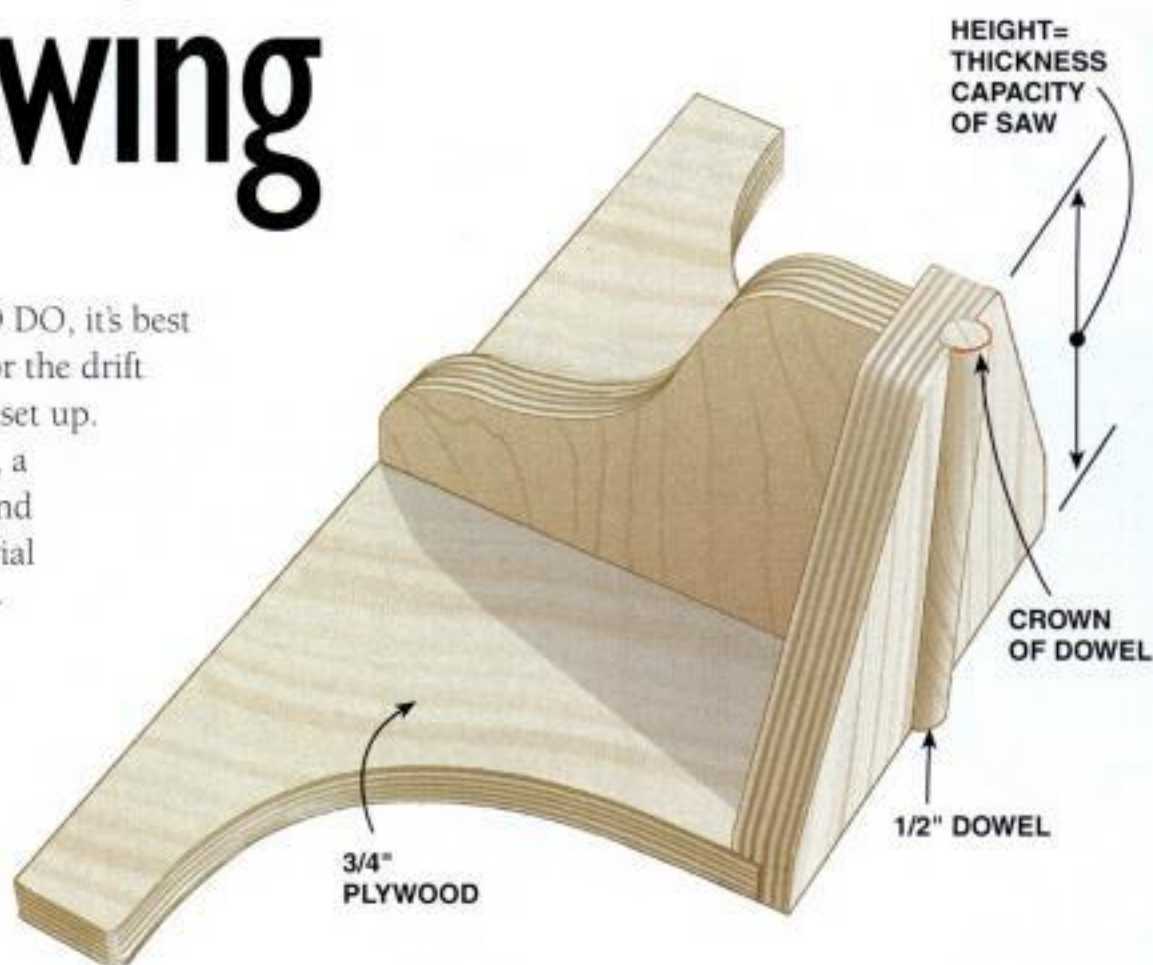
WOODCARVERS USE THIS technique to rough out carving blanks and furniture builders use it to cut cabriole legs. Blade selection will depend on the tightness of the curves you're cutting. I did the legs in these photos with a 1/4-in., 4-tpi blade.

Easy Resawing

IF YOU HAVE LOTS OF RESAWING TO DO, it's best to use a resaw fence that compensates for the drift of the blade. See AW #61, p. 50 for this set up.

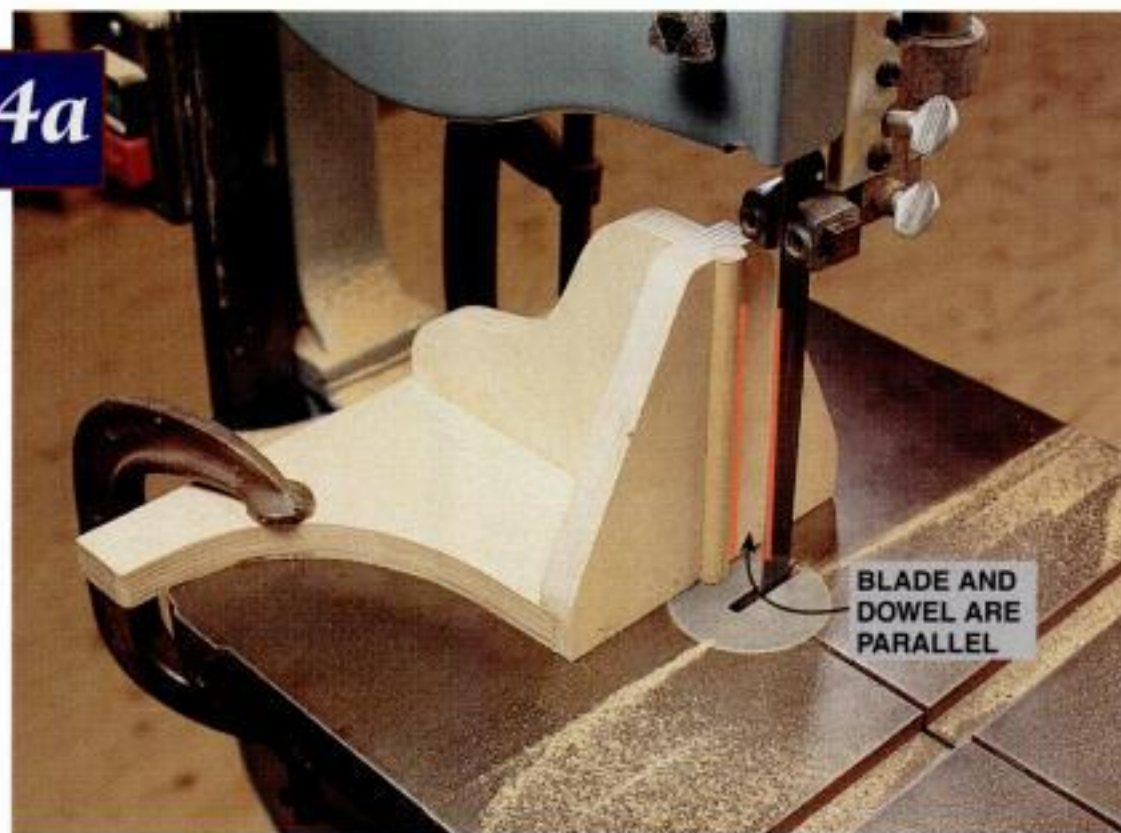
If you only need to resaw a board or two, a single-point fence is the way to go. The round face of a dowel is the only surface the material bears against, so you don't need to compensate for blade drift.

First, get a good resaw blade for your saw. I use the biggest blade the saw will take. In this case, that's a $\frac{3}{4}$ in., 3 to 4 tpi.



SET THE FENCE on your bandsaw table and be sure the dowel and blade are parallel vertically. The crown of the dowel must be slightly in front of the teeth of the blade. Set the distance from the dowel to the blade to the amount you want to resaw. Securely clamp the fence. Use a marking gauge to mark a line on the edge of the board you're going to cut.

4a

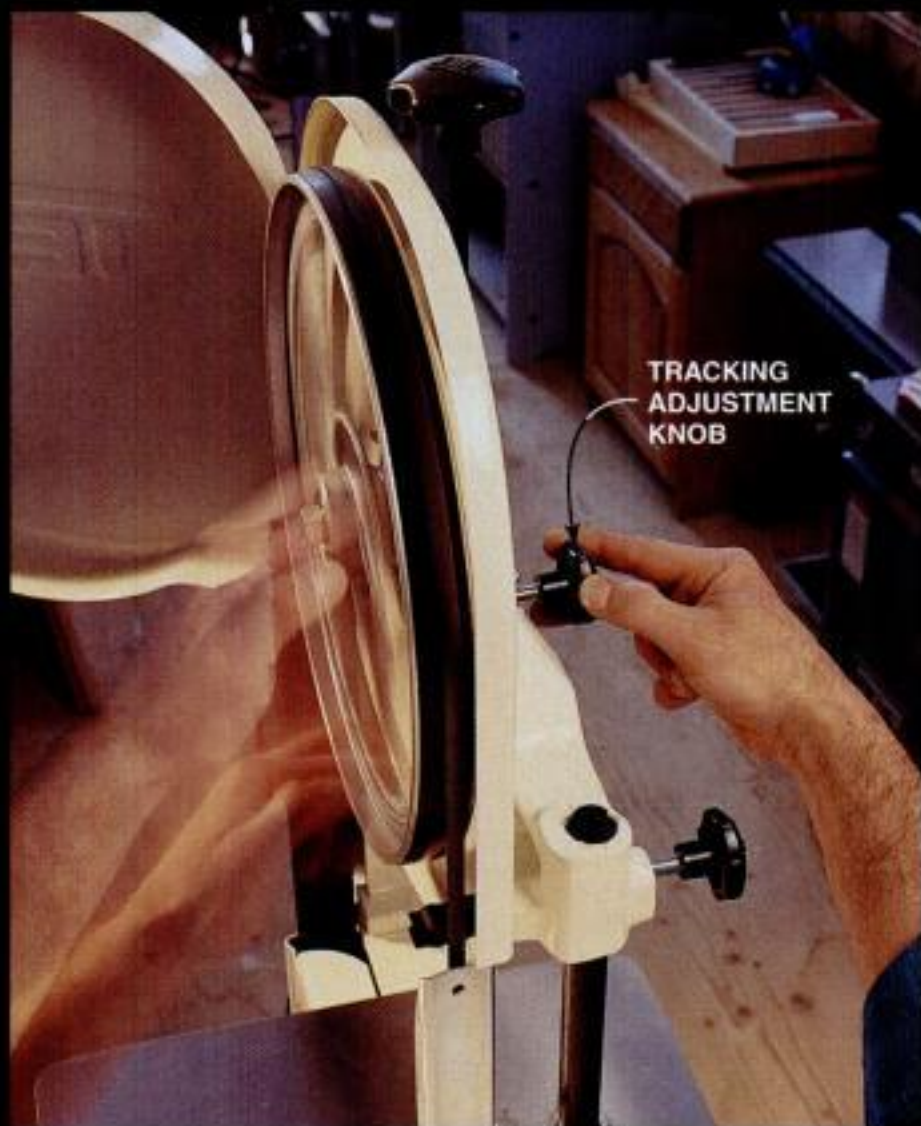


STEER THE BOARD through the resaw fence, cutting on your marked line. The board should only contact the dowel. The fence acts as a guide, but you'll need to steer the piece to keep it on the line. Keep your eye on the face of the board too. It should stay tight against the dowel. To keep my hands away from the blade, I pull the last 6 in. through the cut instead of pushing.

4b



good set up = good performance



TRACKING
ADJUSTMENT
KNOB

ADJUST THE TRACKING. With your saw unplugged, back off the guide blocks and thrust bearings as far as possible. Put the blade on, and set the tension according to the settings on the saw. Then, use the tracking adjustment knob to correctly set the upper wheel. What you're adjusting is the front to back position of the blade. Turning the upper wheel by hand, adjust for proper tracking. On most saws, blades up to 1/2-in. wide should track so the teeth are in the center of the tire. For larger blades, center the blade on the tire. Never run the saw with a blade that's overhanging the tire's edge.



UPPER
THRUST
BEARING

LOCATE THE UPPER AND LOWER THRUST BEARINGS so they're about .003 in. (the thickness of a piece of typing paper) behind the blade. The valleys between the teeth on any blade are called the gullets. Bring the guide blocks forward until the fronts of the blocks are even with the bottoms of the bandsaw blade gullets. Then move the blocks in until they're .003 in. from the sides of the blade. Again, typing paper will work as a feeler gauge. Turn the blade a few rotations by hand to make sure nothing is rubbing. Now you're ready to power up!



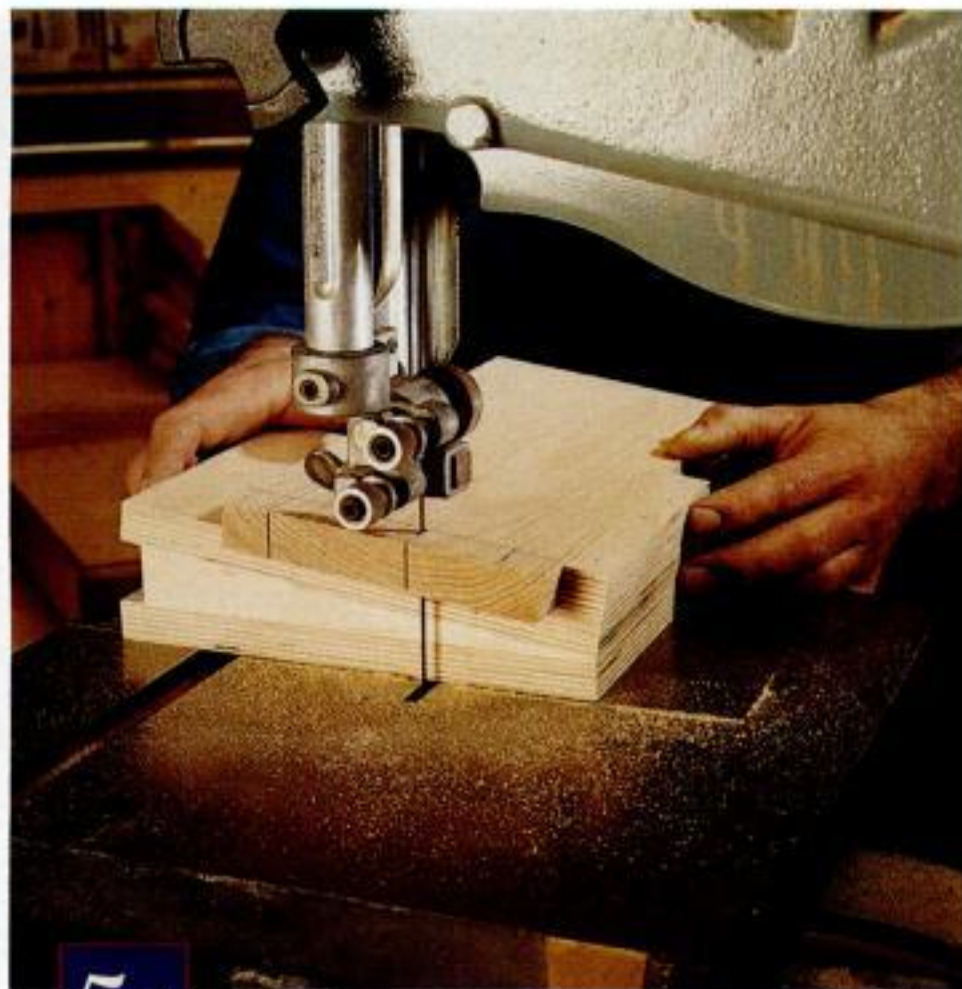
MAKE SURE THE TENSION IS RIGHT. I check it by doing a test resaw in a 5-in.- or 6-in.-tall hardwood scrap. Just go in a few inches, taking it easy on the feed rate. Turn out of the cut. Place a straight-edge across the saw cut, and check if it's flat. If not, apply a little more tension and test again. Once you find the right setting for a given blade on your saw, you can always go straight to that setting. Be sure you're doing this test with a sharp blade, or the "barrel cut" that results might only be the result of a bad blade.

Band-Sawn Dovetails

HERE'S A GREAT WAY TO PRODUCE THROUGH DOVETAILS. It's similar to the way you hand cut them, but a little easier, and like hand-cut dovetails, practice helps.

This technique is well suited to cutting large numbers of dovetails for small boxes or drawers. The material you're dovetailing has to be short enough to fit in the throat of the saw. Use layout techniques similar to hand-cut dovetails. (see AW #54, p. 52). If you don't mind tilting your table left and right to make the angle cuts, you don't even need to make the jig. I prefer to keep my table square once it's set, so the jig gives me the left and right tilt I need.

Lay out the depth and width of the pins and sockets and mark the waste wood. You only need lines on the face of the material. For cutting dovetails, I like a $\frac{3}{16}$ -in., 10-tpi blade. The high tooth count gives a good surface finish, and the narrow blade easily turns to cut the base of the sockets.


5a

WITH THE JIG ANGLING UP to the right, cut the lines on the right side of the sockets.


5b

TURN THE JIG in the other direction to cut the left side of the sockets.

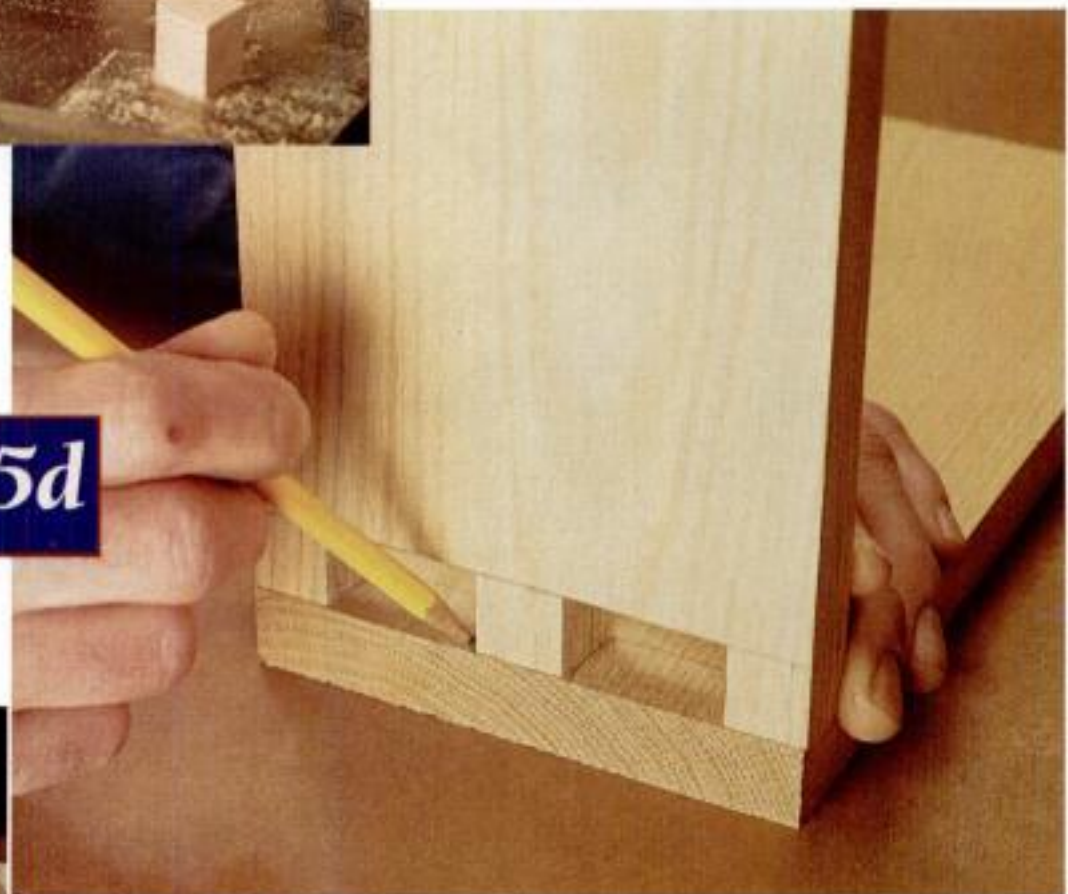


5c

TAKE OUT THE WASTE. Remove the jig. Cut into the waste wood and follow along the baseline of the socket. When you get near the end, you'll need to lift the board to match the angle of the cut to the angle of the pin. Turn the board and cut in the other direction, nibbling out all the waste down to the baseline.

WITH PINS AND SOCKETS COMPLETE, trace them onto the tail board. Be sure your pencil is sharp because these lines are very important.

5d



5e

CAREFULLY CUT ON THE LINES, producing the tails. I try to take away half the pencil line to get a good fit.



SIDEBOARD

by Tim Johnson and Bruce Kieffer

This sideboard is a reproduction of one that originally appeared in Gustav Stickley's 1912 Craftsman Furniture Catalog as piece No. 814½. The cost was \$50. It was factory produced, at a time when woodworking as a hobby was virtually unknown. Today, though it will cost a lot more than \$50, this piece is perfect for our power tool-driven workshops.

This project is a major undertaking, but by dividing it into three stages, you'll find it easier to manage. You need to know how to make rabbets, dadoes, mortises and tenons, and machine-dovetailed drawers. The wood for this sideboard cost us \$700, and the hardware, which is unique to this piece, cost \$1000. However, it's possible to make your own hardware (see p. 67) for about \$100.

Quartersawn white oak, with its striking ray flake figure, is the wood of choice for this piece. The drawer fronts are solid, the doors and side panels book-matched veneers. If veneering is new to you, our step-by-step photos will take you through the process.

Lay Out the Parts

Lay out the rough lumber so you can see it all and decide how to use each piece. On the completed sideboard, the drawer fronts (EE, FF, GG, JJ), plate rails (T and MM), back stile (U), and lower front rail (S) will be most visible, so use the boards with the best quartersawn figure. Make the drawer fronts from single boards.



A masterpiece in Arts and Crafts Style



Boards for the top should be matched for color first, then figure. Width isn't an issue. Choose pieces for the side rails (P and Q) last. After you've chosen the wood for these important pieces, rough cut them (including the lower back rail), about 1-in. oversized in both dimensions, and set them aside until you're ready for them.

The legs (M and N) are made from 8/4 rough quartersawn lumber, with the best-figured side as the front of each leg. It's a good idea to make an extra leg for testing tear out and milling to dimension, because you'll need to cut 1⅞-in. square legs from 2-in. rough stock. It helps to cut the legs to rough dimensions on the bandsaw, before planing, to minimize the amount of bow or

cup in each leg. On a wide plank, use a cardboard pattern to help you lay out the legs.

Cut all plywood parts and web frame pieces to exact dimensions. The only web frame pieces that show are the front edges of the drawer divider webs (C). Be sure these show quartersawn grain. The same is true for the divider and shelf faces (L and AA).

Find quartersawn veneer with suitable width and figure (Sources, p. 57). Faces for the 12½-in.-wide doors are made of two pieces book-matched so the flake pattern resembles a mountain peak. Each piece must be 16-in. long and at least 6½-in. wide, with ray flake extending diagonally all the way across. The side panels are bigger, 23-in. L by 18-in. W, so use four book-matched pieces for each face.

Build Web Frames

Your first constructions are four web frames. Two of them (C and D) serve as drawer dividers. Tongue-and-groove joinery is easy and allows plywood dust panels (E) to be included in the design. The lower frame (F, G, and H) is made the same way, with an added center rail. This frame will be glued between the lower front and back rails. The upper frame, (A and B), employs mortise-and-tenon joinery for extra rigidity. Position its inside rails 16⅞-in. apart, spaced 9⅜-in. from the outer rails.

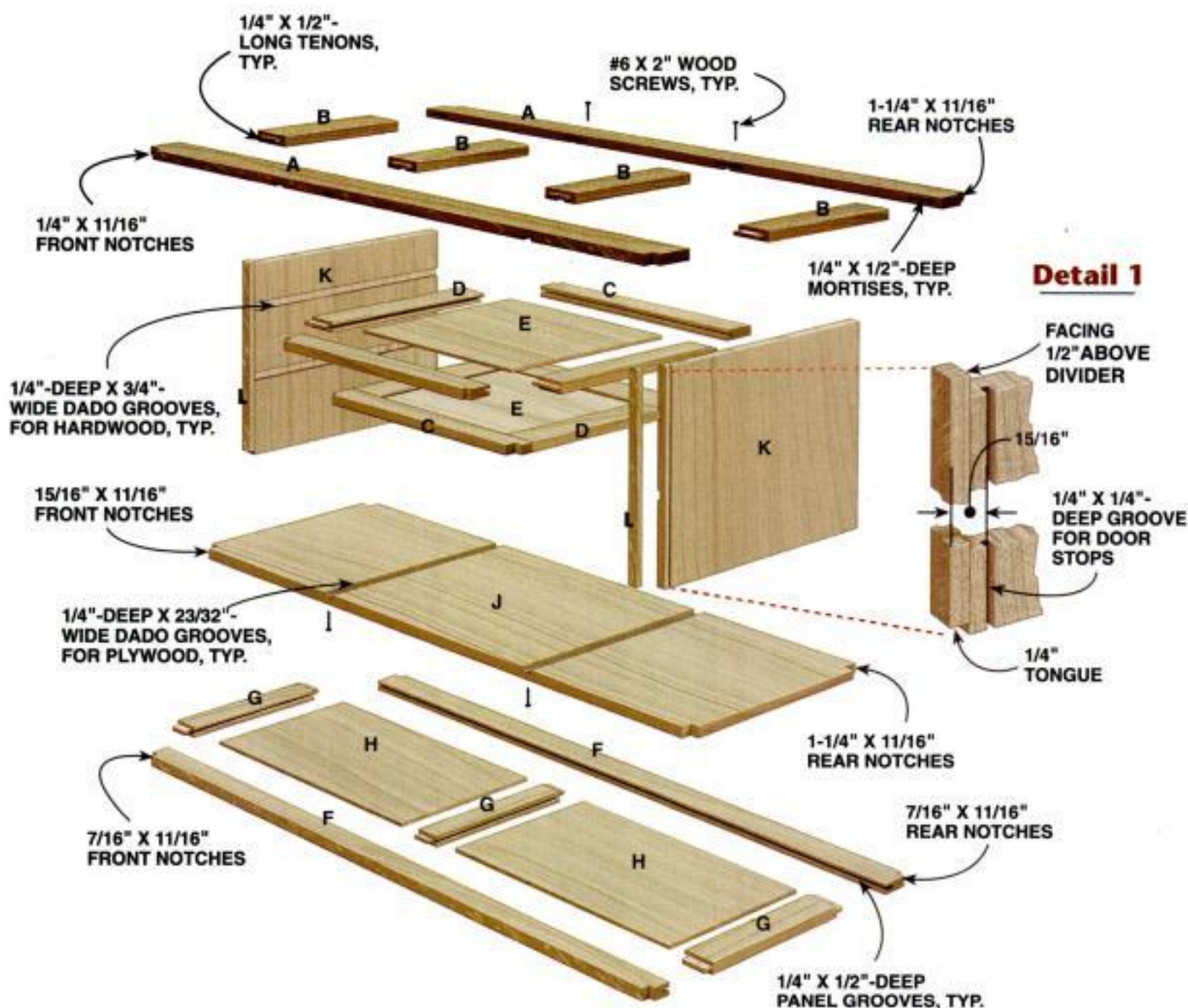
The top and bottom web frames and the horizontal shelf (J) must be made

FIG. A Interior Assembly

ASSEMBLE THE INTERIOR

This stage consists of three operations: making and assembling web frames; preparing plywood pieces, and; assembling the interior structure. You'll end up with two assemblies, the drawer and shelf section and the lower web frame.

stage



1 ASSEMBLE THE INTERIOR

by fitting the drawer section into the dados in the horizontal shelf and upper web frame. Dados are great for easy, accurate assembly. Carefully position the three pieces so their back edges align. Secure the joints with glue and screws.

square and to the same width, 47³/₈-in., though they have different depths. Notch the corners of each piece to fit around the legs.

Make the Dividers

Cut dados in the vertical dividers (K). When you measure for these dados, allow for the 1/4-in. tongue at the bottom of each divider. Glue facing strips (L) on the vertical dividers. At 3/4 in., they'll be slightly wider than the plywood. Position them so the overhang is on the drawer (dadoed) side, and allow for the 1/4-in. tongue at the bottom edge. After gluing, cut a dado on the outside of each vertical divider for door stops, (Fig. A, Detail 1).

Assemble the Interior

Notch the front corners of the drawer web frames so they fit between the facing strips on the vertical dividers. Assemble these frames and dividers to form the drawer section. Glue this assembly, taking care to make it square.

Cut dados in the top web frame and horizontal shelf to house the drawer section. Dados for plywood parts are only 23/32-in. wide. Fit the drawer section between the top web frame and the plywood shelf and glue and screw them together.

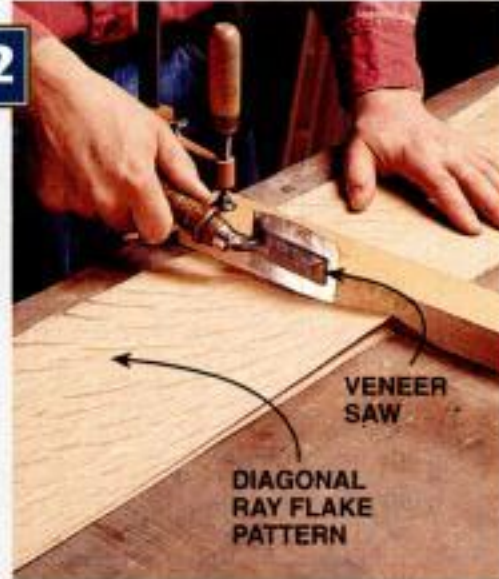
Cutting Rails and Legs

Cut all the through tenon rails (P, Q, and S) to size, and make

Veneering the doors and panels takes time, but it's not hard and the end result is worth it. Choose the two best pairs of book-matched veneer for the door fronts.

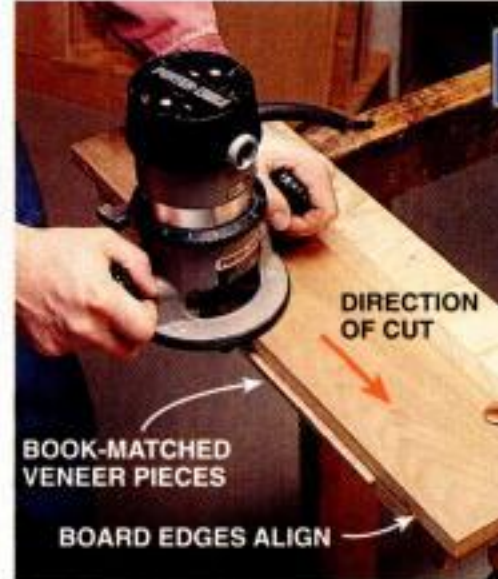
CUT THE BOOK-MATCHED PIECES

of veneer with a veneer saw. With its flat bottom and offset handle, the veneer saw is designed to be used while held against a fence. Here the fence is a board clamped across the pieces of veneer. It holds them in place and guides the saw. The saw's curved blade keeps a minimum of teeth engaged and allows starting the cut anywhere on the piece. Choose pieces of veneer with ray flake running diagonally across their entire widths, and cut them at least 1-in. oversize.



JOINT THE EDGES

of the veneer. Fold the two book-matched pieces together and clamp them between two straight-edged boards so the veneer protrudes. Make sure the edges of the boards are aligned. Trim the edges of the veneer with a router and a flush-cutting bit, making a climb cut. (Advance the router from right to left. This will reduce the chance of tear out.)



HOLD THE BOOK-MATCHED PIECES

together with a piece of veneer tape. Run this tape the length of the joint on the front surface after pieces of masking tape have been stretched across it on the back side. After the veneer tape dries, remove the masking tape. The doors require two pieces of veneer per side, the side panels need four.



APPLY GLUE

to the edged door substrate. Unibond 800 (see Sources, p. 57) is a modified urea formaldehyde adhesive designed for cold press veneering. It has a slow set, gives a good bond, won't creep, sands well, and is easy to apply. Use a foam roller to spread the glue uniformly. To hide any bleed through, tint the glue with dye powder—the same color you'll be using to dye the sideboard.



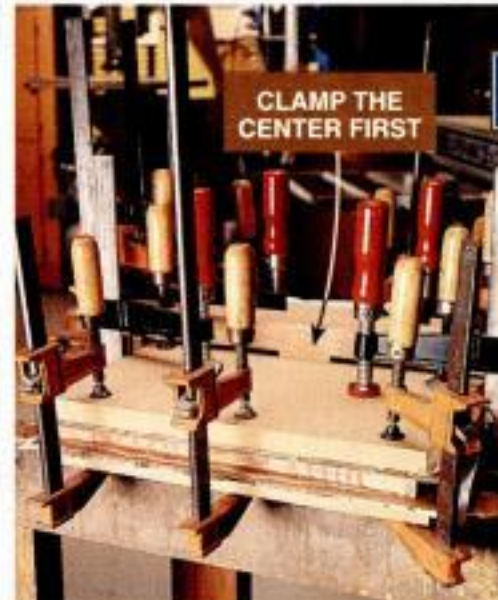
GLUE THE BOOK-MATCHED JOINT

from the back side. Bend the taped pieces to open the joint and apply a thin bead of glue. Close the joint and immediately lay it, with the veneer-taped side up, onto the glued surface of the substrate. Position it squarely, and press it flat.



CLAMP THE VENEERED PANEL

between sheets of MDF, separated by newspaper. Even clamping pressure, working from the center to the edges, is the key to a successful glue-up. To apply pressure to the center of the panel, place boards over blocks taped to the centers of both pieces of MDF and clamp the ends of these boards together. Move the pressure out by using deep-throated clamps first and then smaller ones around the perimeter. Glue should squeeze out around all edges. By setting the assembly on saw horses, you can get clamps all around it.



TRIM THE EDGES

of the veneer with a router and flush-trim bit, using a climb cut. The oak edging gives the appearance of a solid wood door and provides solid mounting for the hinge screws. The side panels need neither edging nor trimming. Make them slightly oversized so they can be cut to final size on the tablesaw.



ASSEMBLING THE SIDEBOARD CARCASS

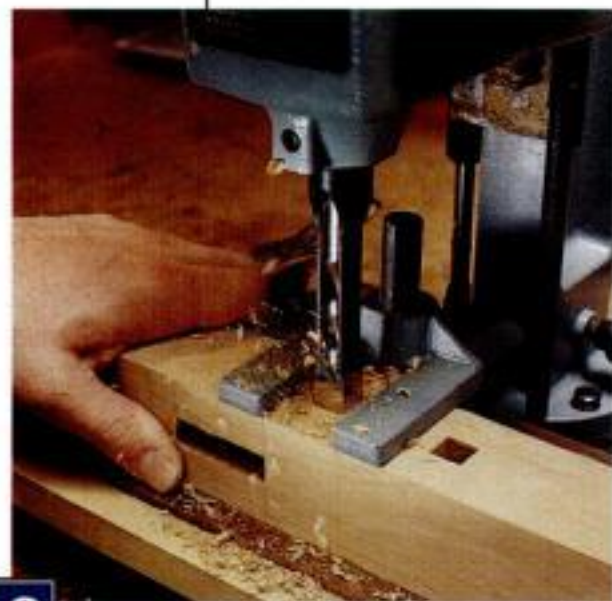
There are five operations in this stage: making rails; making legs; assembling the sides; fitting the plate rail, and; assembling the carcass. When Stage 2 is completed, much of the hard work is done!

stage

2

Detail 1

FIG. B
Carcass Assembly



9 CHOP THROUGH MORTISES

by cutting to half-depth, turning the piece over (keeping the same face registered against the fence), and finishing the cut from the other side. A mortising machine is great for this, but a mortising attachment on a drill press will get the job done too. The mortise being cut here is for a front rail. The location of both the rail and mortise are marked on the leg. After mortising, locate and drill $\frac{3}{8}$ -in. dia. by $\frac{3}{8}$ -in.-deep tenon pin starter holes in the legs.

some scrap pieces for testing the tenon cuts. Cut the legs (M and N) to size, mark them for position (right front; left rear), and mark each side (front, back, inside, outside).

Assemble Side Rails and Panels

On a piece of leg scrap, lay out and chop one mortise 2½-in. long and another 1¾-in. long. Use scrap rail pieces to adjust the fit of the tenons to the mortises (a sliding fit without side-to-side play), then cut the through tenons on the rails. Chamfer the ends.

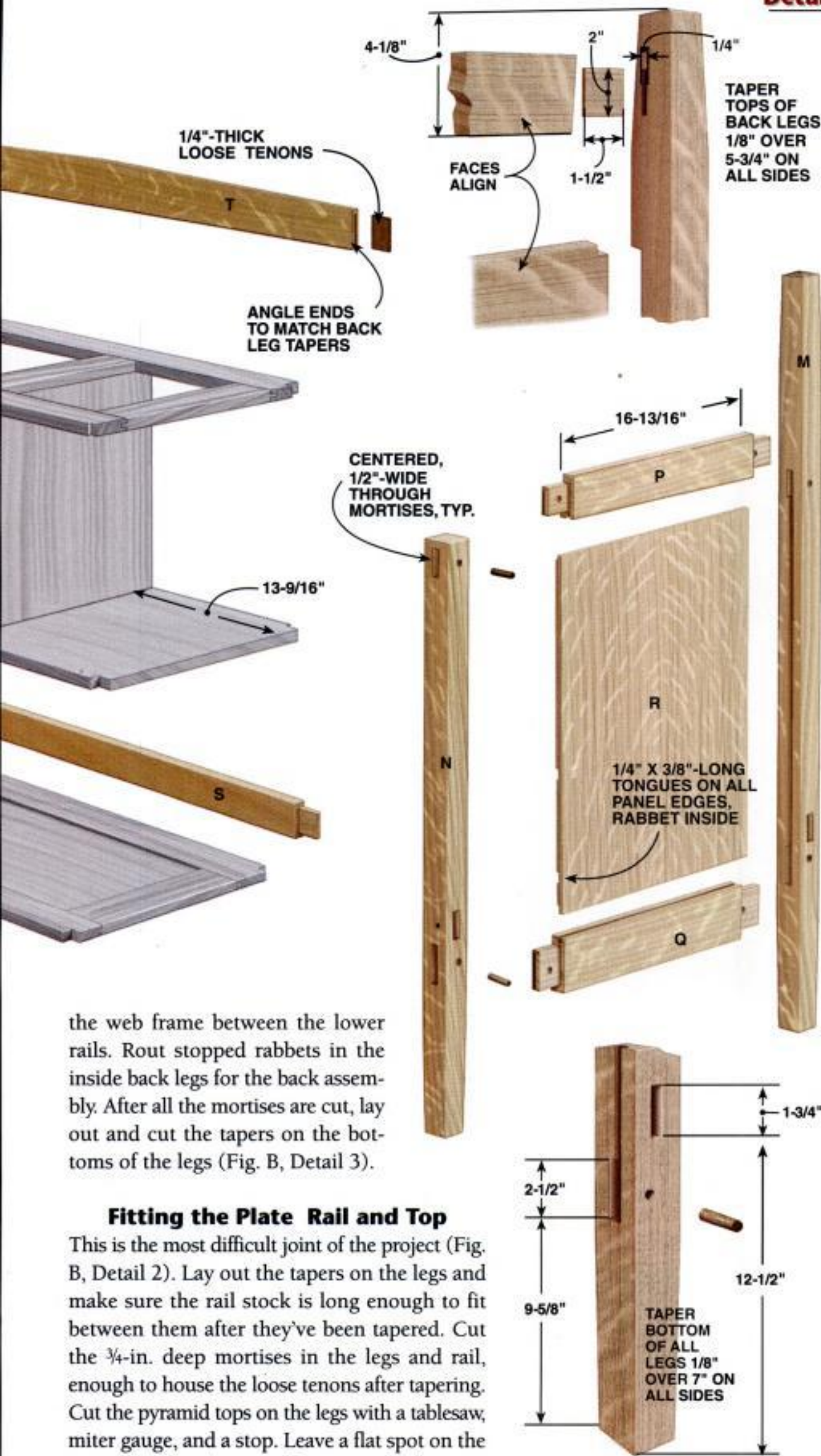
Cut rabbets in the upper side rails for the top web frame (Fig. B). Cut dados in the edges of the side rails and tongues on the panels (R) so the insides of the rails and panel are flush. Cut dados across the inside of the panels for the tongues on the plywood shelf

and the lower web frame. Glue the rails and panels together. Align the inside rabbet on the panel with, or slightly inside of the tenon shoulders (Fig. B, Detail 1).

Mortise and Dado the Legs

Use the assembled sides to locate the positions of the mortises and mark them on the sides of the legs. Mark the mortises for the front and back rails by measuring from the bottom of the legs (Fig. B, Detail 3). Chop the mortises (Photo 9) and rout dados for the side panels in the legs (Photo 10).

Dry-assemble the sides and legs, then add the front and back rails. Check the fit of the lower web frame between these rails and make any necessary adjustments. Remove the rails and legs. Glue



the web frame between the lower rails. Rout stopped rabbets in the inside back legs for the back assembly. After all the mortises are cut, lay out and cut the tapers on the bottoms of the legs (Fig. B, Detail 3).

Fitting the Plate Rail and Top

This is the most difficult joint of the project (Fig. B, Detail 2). Lay out the tapers on the legs and make sure the rail stock is long enough to fit between them after they've been tapered. Cut the 3/4-in. deep mortises in the legs and rail, enough to house the loose tenons after tapering. Cut the pyramid tops on the legs with a tablesaw, miter gauge, and a stop. Leave a flat spot on the top to bear on the stop. Now taper the legs.

Reassemble the carcass (without the lower

Detail 2

The upper plate rail is joined to the tapered legs with a loose tenon. The rail's face aligns with the face of the upper back stile. The upper back stile is notched around the stopped dado in the leg back, allowing for expansion.



10 ROUT THE DADOES

for the side panel tongues on the insides of the legs, between the mortises. A fence clamped to the router positions the bit accurately. Locate the dados by dry-fitting the legs on the rail and panel assembly and marking their positions.



11 LAY A BEAD OF GLUE

in the leg dados, in the mortises and on the tenons and glue the legs to the rail and panel assembly. You can't take this step until all of the leg mortises, dados, rabbets, pyramids, and tapers have been completed, as well as finish sanded, so check twice to make sure you're ready.

COMPLETING THE SIDEBOARD

Put together a beautiful piece of furniture by adding doors and drawers, the back, the top, applying the finish and mounting the hardware.

stage

3



12 ASSEMBLE THE CARCASS with glue, clamps, and a little help from some friends—a helper is one, the saw horses are another, and the box, exactly sized to the opening between the lower rail assembly and the drawer and shelf assembly, is the third. Glue and clamp one assembled side at a time, as shown, adding bar clamps at the bottom rails and upper plate rail after both sides are in place.

Detail 1 The doors are hinged on strips that are glued to the legs. Door stops are mounted on each side and to the upper web frame. The 2-in. hinges are mortised into the hinge mounting strip and door edges.

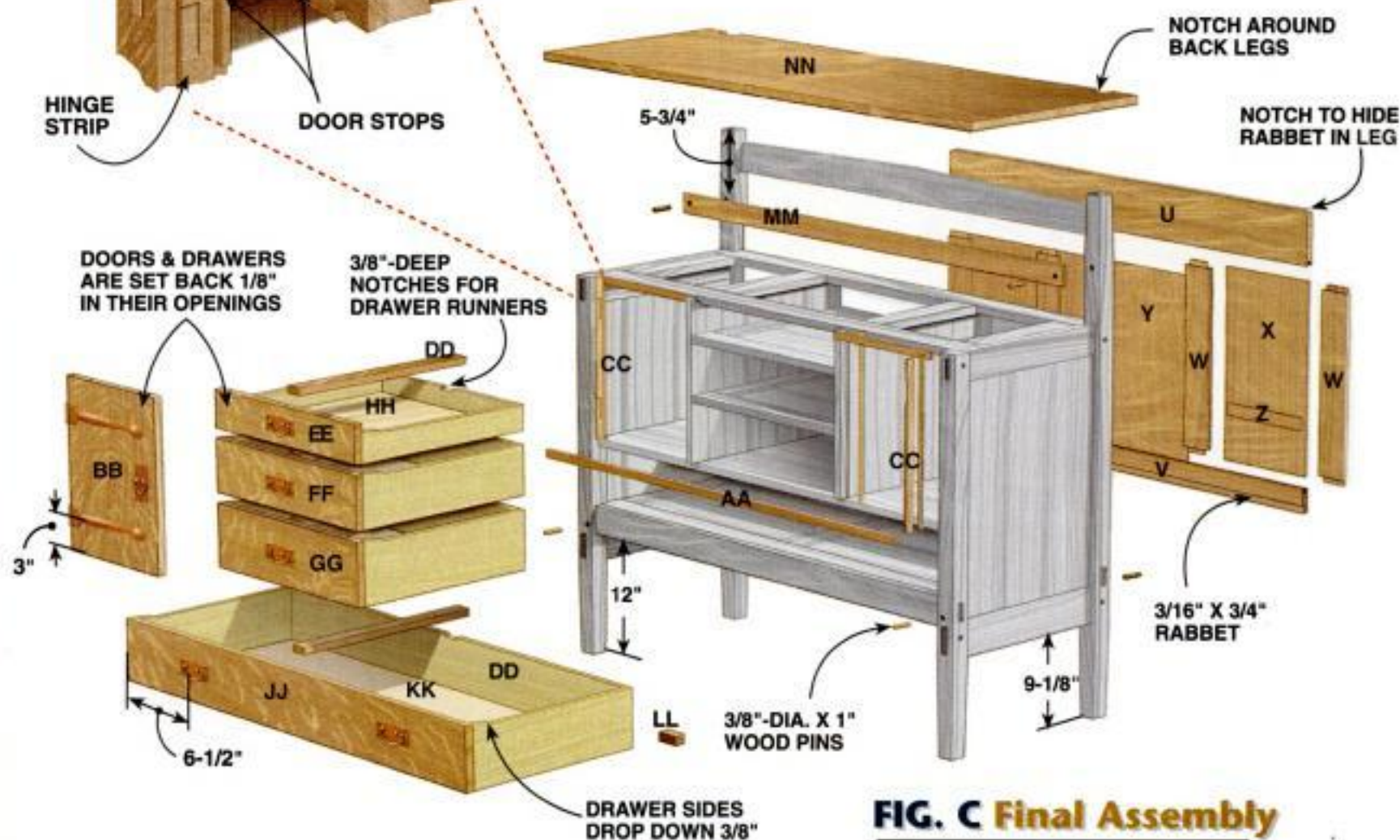


FIG. C Final Assembly

rail assembly) and transfer the taper of the leg tops to the plate rail. Use a sliding bevel to transfer this angle to the miter gauge and cut the ends of the plate rail. After a good fit between rail and legs is made, cut the peak on the upper rail's top edge and glue the loose tenons into the rail.

Assemble the Carcass

Setting up the two interior assemblies and having a second pair of hands makes a difficult glue-up easier (Photo 12). After the clamps are removed, drill holes for the pins and install them.

Doors and Drawers

The doors and drawers on this cabinet are set back, both for aesthetic and practical reasons. The set-back adds visual interest and camouflages a less-than-perfect fit.

Work from the open back when positioning the drawer stop blocks (LL), then mount the drawer run-

ners (DD). The drawers' stepped sides and center-mounted guides are production techniques that allow extra margins of error when fitting, but do little to make the drawers work better.

Install the Back Assembly

The back (V-Z) is assembled the same way as the drawer web frames—tongue-and-groove, with panels between. You've already chosen a piece with nice figure for the top stile—it's the only piece that shows. Cut a rabbet in the bottom stile to fit over the lower back rail and fit the back into the leg rabbets. Drill counterset mounting holes and screw the back in place.

Attach the Top

Notch the back edge of the top to fit the legs and screw it down through holes in the top web frame that are large enough to allow for seasonal movement.

A Beautiful Finish

We chose a finish that is easy to apply, adds rich color, brings out the figure, and has a soft luster.

Mix two shades of Transfast Wood Dye water-based dye: 5 parts Dark Chocolate Brown to 1 part Medium Red Brown, both mixed at 1 tsp. to 4 oz. water ratio. Before you use a water-based dye it is imperative that you wet all surfaces with a sponge. Let the surfaces dry and sand the raised grain smooth. Wet the surfaces again, especially end grain, before you apply the dye. You can spritz the dye on with a plastic spray bottle and wipe with a cotton cloth. After the dye has dried, seal it with a coat of 1-lb. cut dewaxed dark shellac followed by a coat of 2-lb. cut dewaxed pale shellac. This enhances the color and builds enough of a finish so you can sand it lightly before applying the top coats, Master-Gel finish. (See Sources, below, for these supplies.)

The Hardware

The crowning touch on this sideboard is the authentic hand-hammered copper pulls and strap hinges, made by Tony Smith (see Sources, below). This hardware is well worth the several months' wait and the \$1000 cost, but you can also make your own hardware (see p. 67) or buy similar mass-produced hardware.

After the hardware is installed, stand back, and enjoy your masterpiece! **AW**



13 CUT DOVETAILS with a router and template jig and you'll have drawers that look just like the originals, especially if you make half-blind fronts and backs. After dovetailing, and evening-up the bottom edges, cut 1/4-in.-deep dados on all four pieces for the bottom. If you locate the dados behind the lowest tail, it won't show from the side. Glue the drawer parts together with the bottom inside.

Sources

Quartersawn White Oak Veneer

B & B Rare Woods
(303) 986-2585; www.wood-veneers.com

Certainly Wood

(716) 655-0206; www.certainlywood.com

Radial-Sawn Quartersawn White Oak Lumber

Hearne Hardwoods, Inc.
(888) 814-0007

Unibond 800

Vacuum Pressing Systems
(207) 725-0935; www.vacupress.com

Hand-Hammered Copper Hardware

Tony Smith
P.O. Box 9758
Laguna Beach, CA 92652-7739

Finishing Supplies

Homestead Finishing Products
(216) 631-5309

MATERIALS LIST

Lumber & Plywood

25 board feet of 4/4 quarter sawn white oak
25 board feet of 5/4 quarter sawn white oak
15 board feet of 8/4 quarter sawn white oak
20 board feet of 4/4 plain sawn white oak
25 board feet of 4/4 birch
1 sheet 3/4" x 4' x 8' white oak veneered plywood
1 sheet 1/4" x 4' x 8' white oak veneered plywood
1 sheet 3/4" x 4' x 8' MDF

Quartersawn White Oak Veneer

8 book-matched pieces
7" wide x 17" long for doors
16 book-matched pieces
5" W x 24" L for panels.

FIG. A

Ref.	Qty.	Dimensions	Parts
A	2	3/4" x 3" x 47-5/8" oak	top web stiles
B	4	3/4" x 3" x 13-5/16" oak	top web rails
C	4	3/4" x 2-1/2" x 19-1/2" oak	drawer web stiles
D	4	3/4" x 2-1/2" x 15-1/2" oak	drawer web rails
E	2	1/4" x 15-1/2" x 15-1/2" oak ply	drawer dust panels
F	2	3/4" x 2-1/2" x 47-5/8" oak	bottom web stiles
G	3	3/4" x 2-1/2" x 13-11/16" oak	bottom web rails
H	2	1/4" x 13-11/16" x 21-1/16" oak ply	bottom web dust panels
J	1	3/4" x 19" x 47-5/8" oak ply	horizontal shelf
K	2	3/4" x 19" x 15-9/16" oak ply	vertical dividers
L	2	1/2" x 3/4" x 15-13/16" oak	facings for vertical dividers

FIG. B

Ref.	Qty.	Dimensions	Parts
M	2	1-7/8" x 1-7/8" x 49" q.s. oak	back legs
N	2	1-7/8" x 1-7/8" x 37-1/8" q.s. oak	front legs
P	2	1" x 2-3/4" x 21-1/16" q.s. oak	upper side rails
Q	2	1" x 3-1/2" x 21-1/16" q.s. oak	lower side rails
R	2	3/4" x 17-9/16" x 22-1/2" oak ply	side panels*
	4	18-9/16" x 23-1/2" q.s. veneer sheets	side panel faces
S	2	1" x 2-3/4" x 50-1/2" q.s. oak	front & back rails
T	1	1/2" x 3-1/4" x 46-1/2" q. s. oak	upper plate rail

FIG. C

Ref.	Qty.	Dimensions	Parts
U	1	5/8" x 5-3/8" x 47-1/4" q. s. oak	back top stile
V	1	5/8" x 2-1/2" x 47-1/4" oak	(back bottom stile)
W	4	5/8" x 3" x 19-1/8" oak	back rails
X	2	1/4" x 19-1/8" x 10-1/4" oak ply	outside back panels
Y	1	1/4" x 19-1/8" x 17-3/4" oak ply	center back panel
Z	2	3/16" x 1-1/4" x 9-1/4" oak	filler strips behind shelf
AA	1	1/2" x 3/4" x 46-1/4" oak	horizontal shelf facing
BB	2	3/4" x 12" x 15-3/16" particleboard	door cores
	8	5/16" x 13/16" x 16" oak	door edging**
	4	13-1/2" x 16-3/4" q. s. veneer sheets	door faces
CC	2	1/4" x 3/4" x 15-13/16" oak	hinge mounting strips
	4	1/4" x 1/2" x 15-13/16" oak	door stops
	2	1/4" x 1/2" x 12-1/8" oak	upper door stop fill strips
DD	4	11/16" x 1-1/2" x 18-5/16" oak	drawer runners
EE	1	3/4" x 3-9/16" x 19" q.s. oak	top drawer front***
	2	5/8" x 2-3/4" x 18" birch	top drawer side
	1	5/8" x 2-3/4" x 19" birch	top drawer back
FF	1	3/4" x 4-15/16" x 19" q.s. oak	center drawer front***
	2	5/8" x 4-15/16" x 18" birch	center drawer sides
	1	5/8" x 4-15/16" x 19" birch	center drawer back
GG	1	3/4" x 5-13/16" x 19" q.s. oak	lower drawer front***
	2	5/8" x 5-13/16" x 18" birch	lower drawer sides
	1	5/8" x 5-13/16" x 19" birch	lower drawer back
HH	3	1/4" x 17-3/4" x 18-1/4" birch ply	drawer bottoms
JJ	1	3/4" x 5-13/16" x 46-1/4" q.s. oak	bottom drawer front***
	2	5/8" x 5-13/16" x 18" birch	bottom drawer sides
	1	5/8" x 5-13/16" x 46-1/4" birch	bottom drawer back
KK	1	1/4" x 17-3/4" x 45-1/2" birch ply	bottom drawer bottom
LL	10	3/4" x 1" x 2" oak	drawer stops
MM	1	3/8" x 1-15/16" x 50" q.s. oak	lower plate rail
NN	1	7/8" x 21" x 56" q.s. oak	top

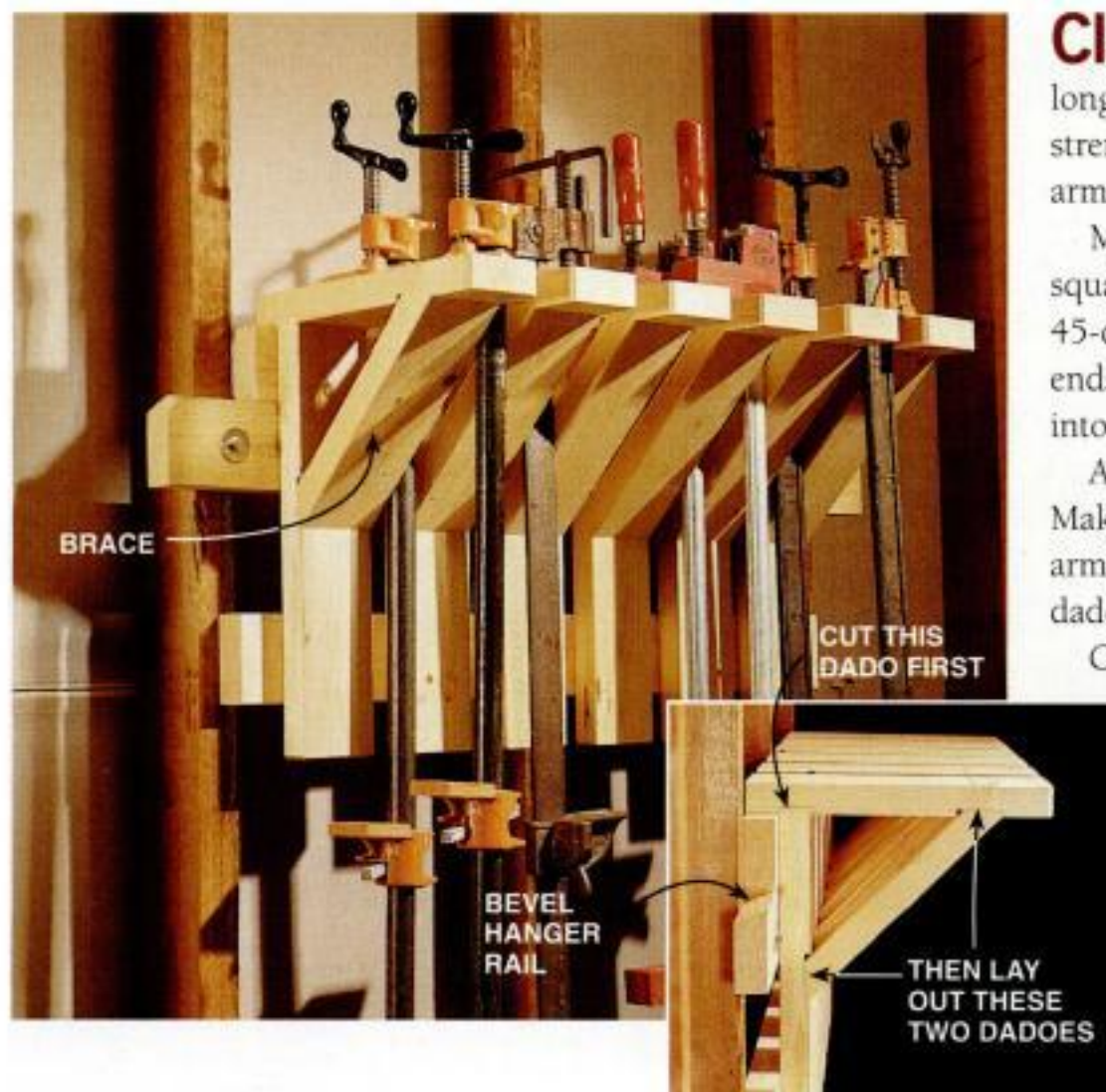
*Finished size—make oversize and trim after veneering.

**Extra thickness allows trimming of doors to fit.

***Drawer opening size.

Tips For Tool

Organize your shop with these



Clamp Warehouse Hang your long, heavy clamps on this rack designed for strength. The braces are notched into the bracket arms in a simple version of a timber-frame joint.

Mill 2x4 dimensional lumber straight and square to make these brackets. The braces form a 45-degree triangle with the two arms. Miter the ends of the braces first. Then cut shallow dados into the horizontal arms.

Assemble one pair of arms on a workbench. Make sure they're square. Lay a brace on top of the arms and mark the positions and depth of the dados. Assemble with glue and screws.

Cut a 30-degree bevel on the top rail and hanger rail. Space the brackets $1\frac{3}{4}$ -in. apart. Drill holes in the hanger rail for large lag screws and space them to hit studs. Mount and level the hanger rail first, then place the clamp rack on it. If you fasten a vertical arm to the wall, the rack will be locked in place so it won't lift off the hanger rail.

ART DIRECTION: DAVID FARR • PHOTOGRAPHY: BILL ZUEHLKE
ILLUSTRATION: RON CHAMBERLAIN/MELANIE POWELL

Chisel Corral

Where's the $\frac{1}{2}$ -in. chisel?

When all the handles of your chisels look alike, you've got to see the blades, too. Grabbing the right size is easy with this open rack. The long slot allows you to store chisels with blades wider than the holes. The bottom shelf prevents you from brushing up against sharp edges.

Make the rack by ripping three lengths of wood from one wide board. Cut the center piece $\frac{3}{8}$ -in. wide, then clamp them back together (without glue). Drill $\frac{3}{8}$ -in. dia. holes spaced 2-in. apart down the middle of the center piece. Unclamp the three pieces. Crosscut the center piece to make three short bridges, one from each end and one from the middle. Glue the wide board back together with the bridges separating the outer boards.

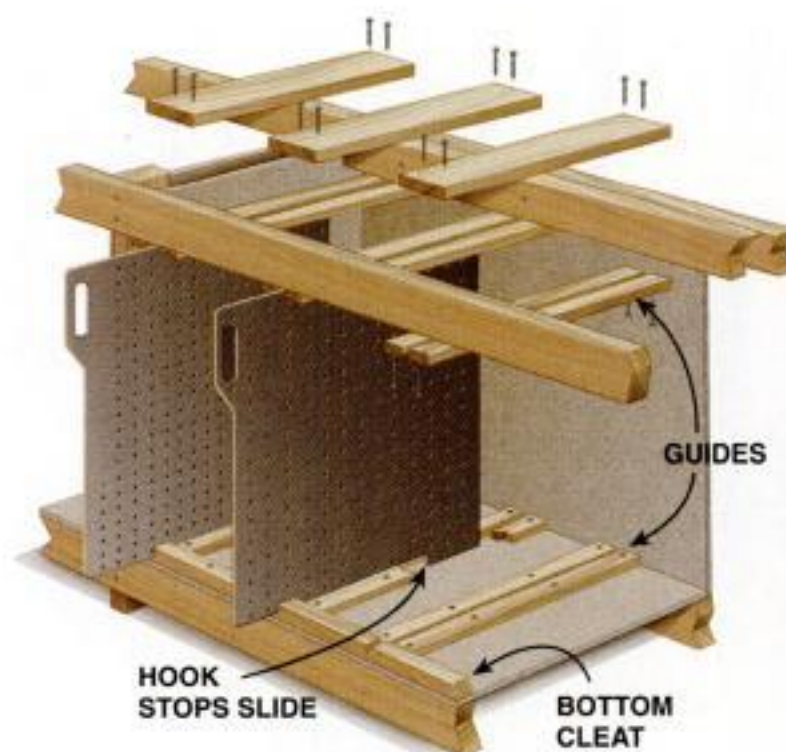
Cut $\frac{3}{8}$ -in.-deep dados into the $\frac{3}{4}$ -in. uprights and shelf. Reinforce with screws from the back.



Storage

weekend projects.

by Tom Caspar



Tool Slides Hang tools on Peg-Board slides without taking up valuable wall space. Dozens of hook styles are available—you'll probably find one to fit every tool.

Top and bottom guides keep the slides on track. Make the dados wide enough for the slides to travel easily in the cleats. A hook at the back end of the slide stops against the bottom cleat, so you can't accidentally pull the slide out all the way.

Source: The best hooks to use on the slides are ones that screw in place. They're available from Sporty's Tool Shop, (800) 543-8633, #1573T, 29-Piece Peg-Board Hook Kit, \$19.95.

The Tool Cabinet Store your small tools in this simple, easy-to-build plywood cabinet. The shallow drawers are ideal for layout tools or carving gouges. Deep drawers hold marking gauges and block planes. Place your cabinet on a shelf or hang it from a wall by fastening through the back.

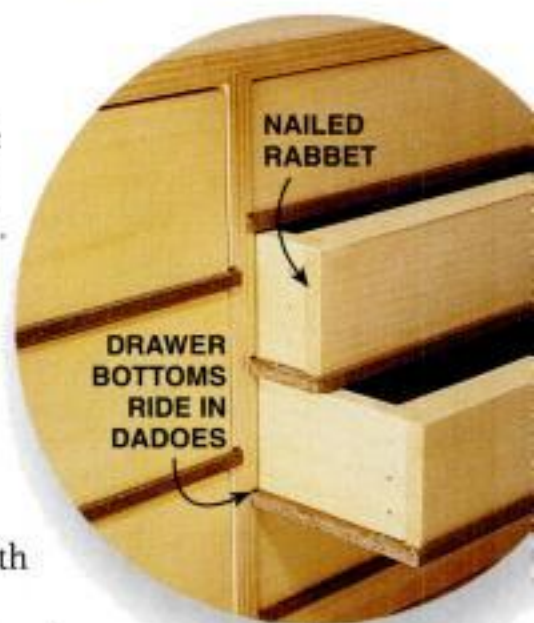
Use 1/2-in.-thick ApplePly or Baltic birch for the case and back, 1/4-in.-tempered hardboard for the drawer bottoms, and pine for the drawer sides.



The drawer bottoms do double duty. They function as slides and pulls as well. Cut 3/16-in.-deep dados in the case's sides for the drawer bottoms to slide in. Stagger the dados in the middle divider so it stays strong. The lowest drawers do not have dados. Cut rabbets for the cabinet's back and fasten it with screws or nails.

Simple rabbet joints hold the drawer sides together. (The back of the drawer is made the same way as the front.) Nail and glue the sides together, then even up the bottom edges. Glue the sides down to the hardboard bottom. The stiffness of the drawer sides keeps the hardboard from bending under the weight of your tools.

Source: To find an ApplePly distributor near you, call States Industries at (800) 626-1981, or visit www.statesind.com/distaply.htm





Magnetic Holder

Stick awkward tools on a magnetic tool bar. You can find small tools right away when they're out in the open. When you get a sliver, you'll know right where the tweezers are!

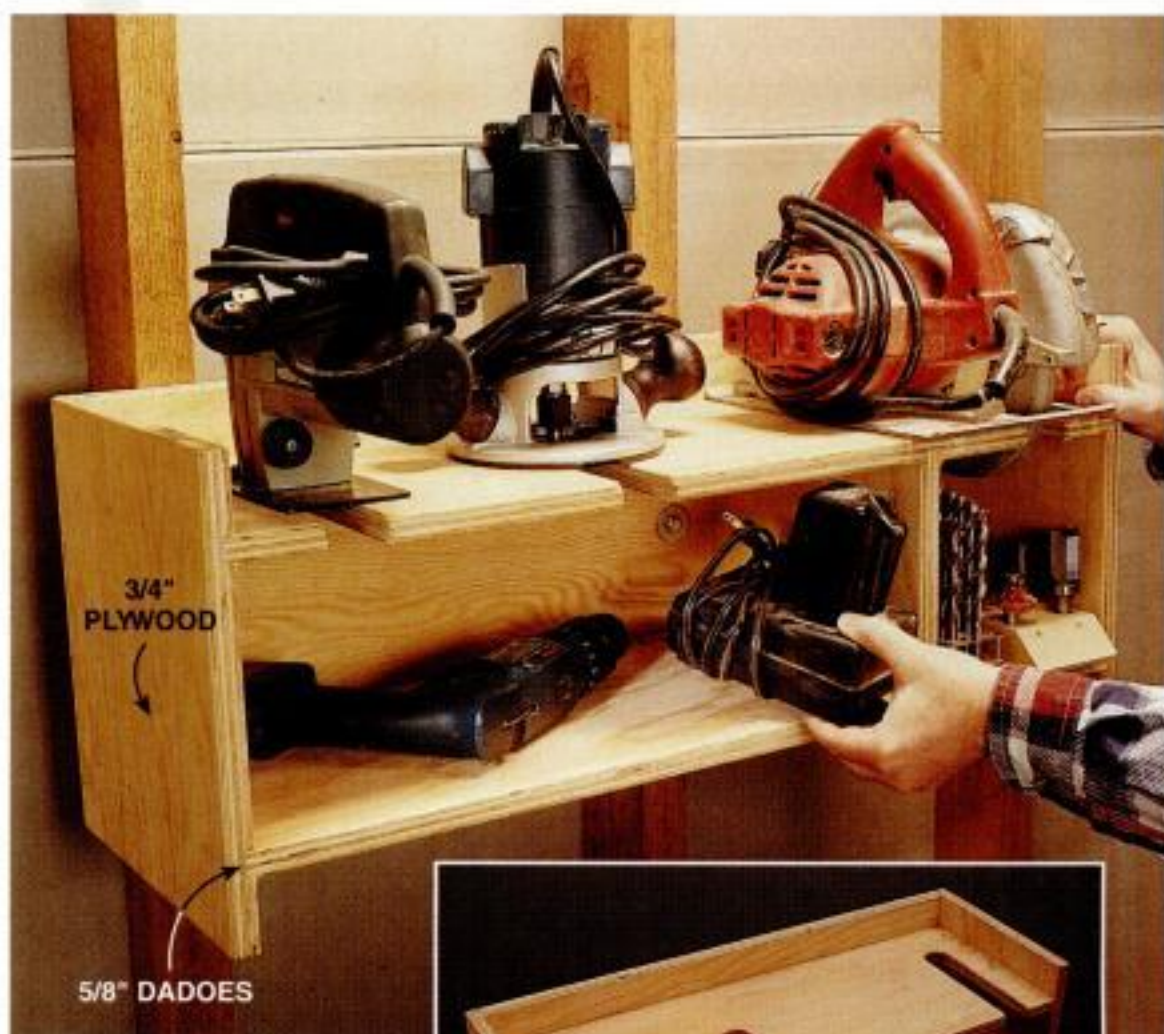
Source: Wooden magnetic tool bars are available from Lee Valley Tools, (800) 871-8158: 12-in. Bar; #93K75.12, \$7.50 plus S&H. 24-in. Bar; #93K75.24, \$14.50 plus S&H.

Power Tool Roost Power tools are ready to use if you leave their bits and blades in place. Store them in an upright position on a slotted plywood shelf.

Make the box from $\frac{3}{4}$ -in. plywood. The sides are $\frac{3}{4}$ -in. deeper than the shelves.

Assemble a stack dado set to make $\frac{5}{8}$ -in.-wide cuts. Move the rip fence 2-in. from the blade. Saw four shallow dados across the side pieces. Then rabbet the ends of the shelves to fit in the dados. Slide the fence $\frac{3}{8}$ -in. away from the dado blade. Stand the shelves up on end and cut.

Put the box together and cut the back to fit. Take the box apart and round over all the edges and slots with a router. Assemble with glue and 4d nails.



Saw Blade Box Separate carbide saw blades in slots so their brittle teeth can't bang against each other. The angled top of this box makes it easier to handle the sharp blades.

Make the plywood box by cutting three tall sides and one shorter side. Build your box 7-in. wide and it'll hold both $7\frac{1}{4}$ -in. and 10-in. blades. Pencil a 45-degree line on two side pieces. Lay out the length and spacing of the slots. Rip the slots on the tablesaw, stopping the cut on the pencil line. Then cut the tops of the two sides at 45 degrees. Assemble the box with screws.



Tool Hang-Up

Tools won't bump into each other in this rack. It's safe, too: you (or your kids) won't get cut on a tool's exposed edge.

Make dado cuts partway across the width of a $\frac{3}{4}$ -in. board. Each dado should be $\frac{1}{8}$ in. wider than the tool that fits in it. Screw the board directly to your wall, or fasten it to a piece of plywood first.

Rust-Free Tools

If your small hand tools are prone to rusting, apply a light coat of 3-In-One oil or WD-40 and wrap them up in a heavy-duty canvas tool roll.

Source: Order tool rolls from Lee Valley Tools Ltd.; (800) 871-8158. Part numbers: 67E01.01, 6-Pocket Canvas Roll, \$8.75; 67E01.02, 9-Pocket Canvas Roll, \$9.75; 67E01.03, 12-Pocket Canvas Roll, \$11.75.



Square Corner

Store delicate squares in a safe, convenient place. These brackets have sloped tops so the squares stay put if the rack is jiggled. Make the back at least 1-in. thick. Your tools are easier to grab if they sit well away from the wall. **AW**



by Rick Christopherson

Appliance Garage



ART DIRECTION: JOEL SPIES • PHOTOGRAPHY: MIKE HABERMANN • ILLUSTRATIONS: DAN WESTERBERG

CLEAR OFF YOUR COUNTERTOPS!

Hide your appliances behind extra-wide bi-fold doors.

An appliance garage provides functional storage for the hodgepodge of appliances that clutter kitchen countertops. Close the doors, and everything is out of sight. Open the doors, and the appliances are at the ready.

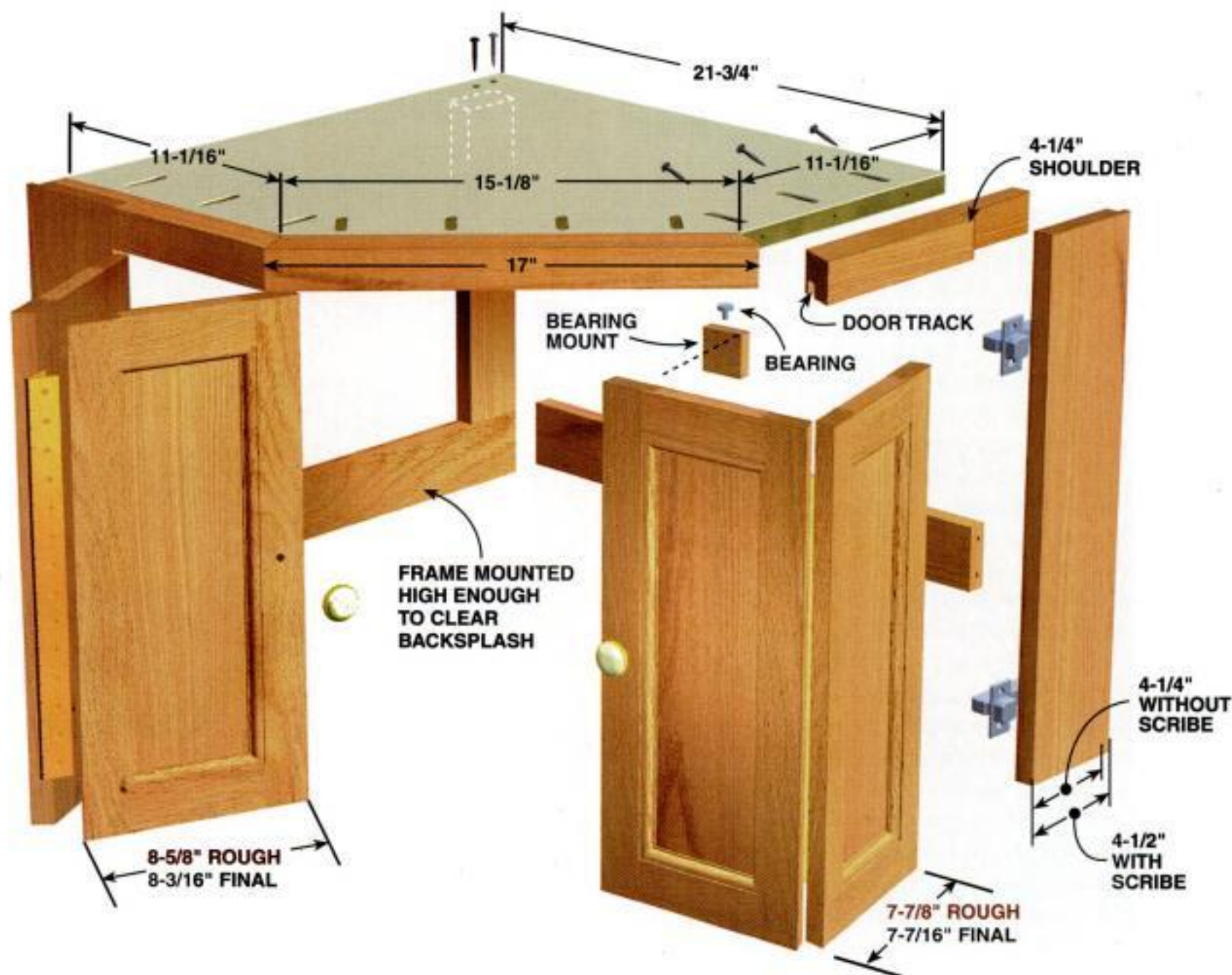
Unlike most appliance garages that have a roll-top tambour door, this bifold door design provides twice the opening size, is easy enough to build in a weekend, and



costs less than \$100. For smooth operation, a roller bearing and routed track guide the doors.

Most factory-built corner cabinets are 24-in. on each side with a 17-in. diagonal face. Measure yours to verify the size. If your cabinets are a different size from those in this story, you can resize the dimensions following the instructions in "Resizing Your Garage," p. 64.

FIG.A APPLIANCE GARAGE EXPLODED VIEW



Cutting the Top

To cut the top of the appliance garage, start out with a 21 3/4-in.-square piece of plywood or melamine-coated particle board. From this you need to cut the 45-degree face using the dimensions shown in Fig. A. If you don't have a sliding table on your tablesaw, you can use the miter-slot in your saw's table as a guide (Photo 1).

After the top is cut, drill for pocket holes across the front three edges, as shown in Photo 2. These pocket holes are used to secure the face frame.

Making the Face Frame

The face frame stock is 1 1/2-in. thick by 2-in. wide, and has 4 1/4-in. shoulders on each end where the frame meets the



1 **CUT THE PLYWOOD TOP** at 45 degrees using a 3/4-in. strip of scrap wood as a guide in your saw's miter slot. Screw the guide strip to the underside of the plywood. *Saw guard removed for photo clarity. Use yours!*

side stiles. The material is made from two pieces of 3/4-in. stock (48-in. by 2 1/8-in. by 3/4-in., and 39-in. by 2 1/8-in. by 3/4-in.) face-glued together. One piece is shorter than the other to create the shoulders. The stock is oversized to allow for trimming. Center the 39-in. piece onto the 48-in. piece and glue it so there is a 4 1/2-in. shoulder on each end. After the glue is dry, joint one edge so the pieces are flush. Rip and joint the other edge to 2-in.

Next, trim the ends of the board so the two shoulders are 4 1/4 in. long. With the miter saw set to 22 1/2 degrees, cut the face frame parts from this stock. I cut my joints slightly long at first to check the angles. When the joints are tight, I make the final cut to length without changing the saw's settings.

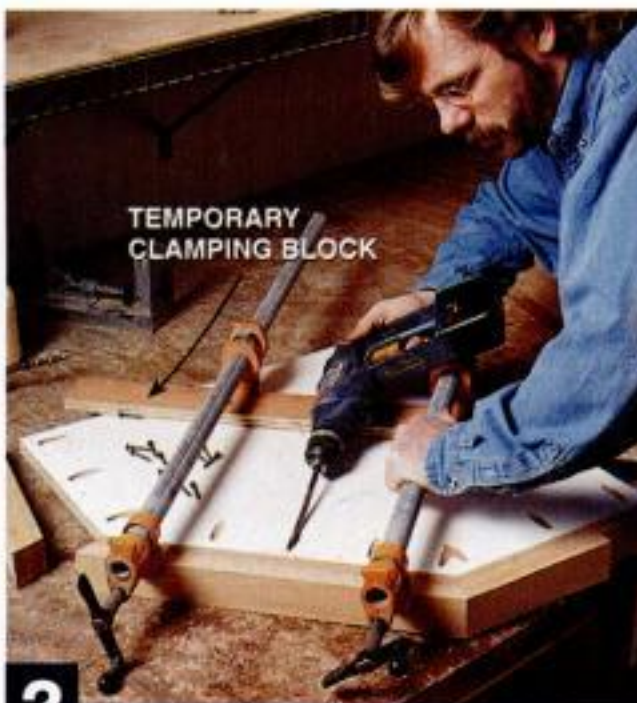
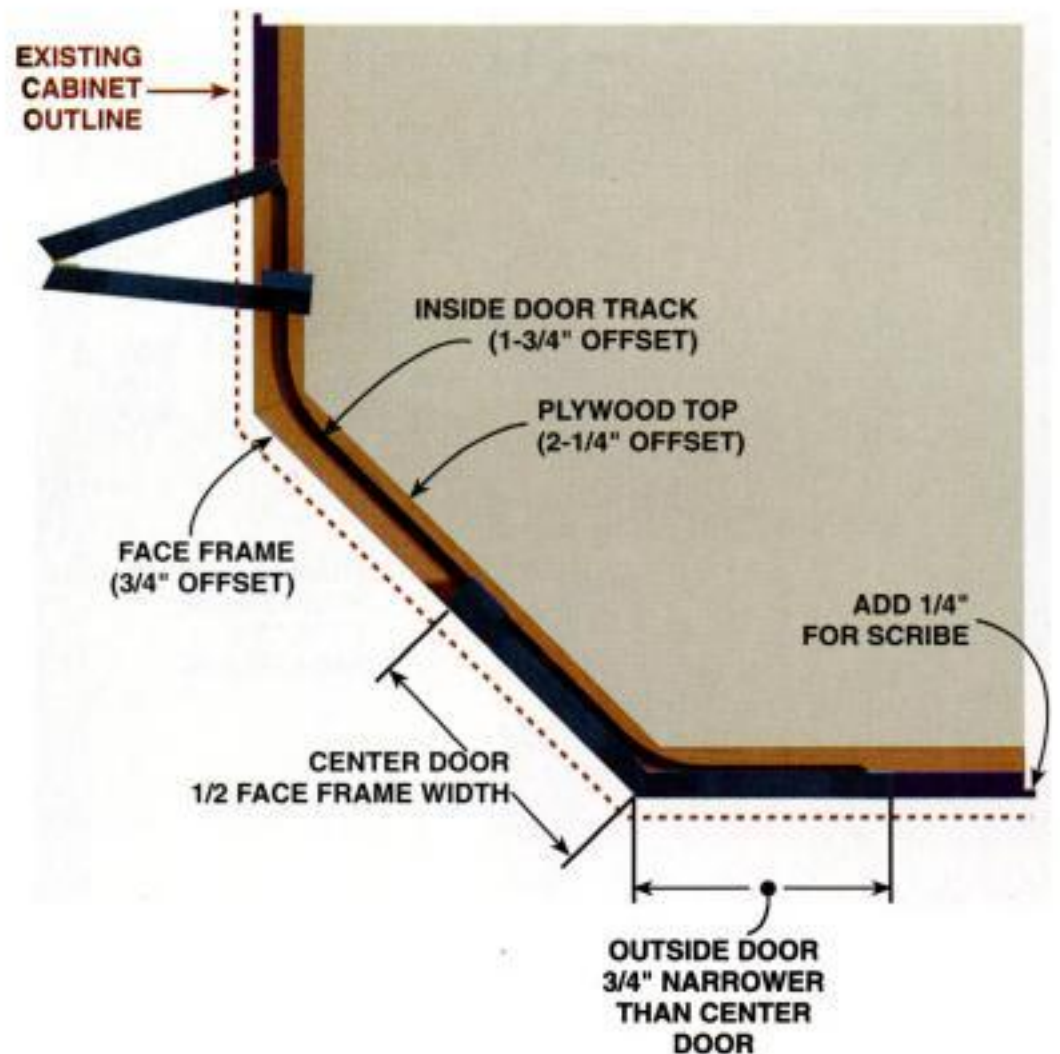
RESIZING YOUR GARAGE

If your existing diagonal corner cabinet is not the same size as discussed in this story, you will have to modify the dimensions of the garage. The easiest method for changing the dimensions is to draw them out on a piece of plywood.

Draw the size of your existing corner cabinet on a sheet of plywood, then draw three offset lines at $\frac{3}{4}$ -in., $1\frac{3}{4}$ -in., and $2\frac{1}{4}$ -in. set-back from the first. Because the appliance garage is $\frac{3}{4}$ -in. smaller than the existing cabinet, the $\frac{3}{4}$ -in. offset line is the front of the face frame and doors. To determine the size of the bifold doors, measure the length of the $\frac{3}{4}$ -in. offset line across the front and divide by two. This will be the width of the center doors. The outside doors are $\frac{3}{4}$ -in. narrower than the center doors. (Remember to make your doors $\frac{3}{8}$ -in. oversized for trimming.) Mark the width of the outside doors on the plywood. The width of the cabinet stiles can then be measured from this plywood template, but add an extra $\frac{1}{4}$ -in. to this measurement for the scribe (see "Installing the Garage" p. 66).

The $1\frac{3}{4}$ -in. offset line gives you the dimensions of the template for routing the door track, and the $2\frac{1}{4}$ -in. offset line gives you the dimensions for the top of the cabinet.

DRAW THESE LAYOUT LINES to determine the dimensions of your appliance garage.



2 **INSTALL THE FACE FRAME** to the top using pocket-hole screws. The clamps hold the frame in place while the screws are driven in.

Installing the Face Frame

Using pocket-hole screws to secure the face frame to the top is the fastest and easiest method. After applying glue to the edges, clamp the right-hand frame to the plywood, and drive in the screws. The end of the frame should be flush with the back of the plywood. The top edges should be flush as well.

Next, attach the center part of the frame. Screw a clamping block to the top of the plywood, but make sure your screws don't poke all the way through the plywood top. With this in place, clamp the middle frame the same way you did the side frame (Photo 2). Finish with the left-hand frame piece.

Routing The Door Track

To rout the door track into the bottom

edge of the face frame, you need a $\frac{9}{16}$ in., top-bearing pattern bit for your plunge router (see Sources, p. 66). You'll also need to make a template for the router to follow.

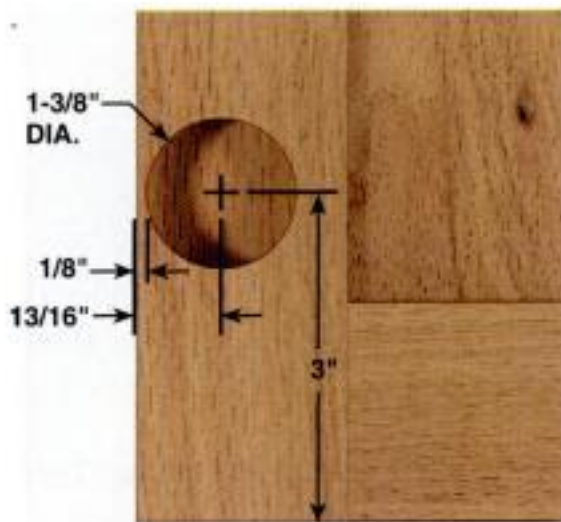
Cut a piece of scrap plywood for the template which is 1-in. inset from the front of the face frame. Next, round the corners of the template with a 4-in. radius, using a smooth, sweeping motion with your belt sander.

Position the pattern 1 in. back from the front of the face frame, and clamp it down. Add spacers under the template for clamping.

Routing from left to right (counterclockwise), make several shallow passes until the depth of the dado is about $\frac{1}{2}$ -in. (Photo 3). Don't let the router wander—jogs in the track will interfere with smooth door-roller operation. When completed, soften the sharp

FIG. B HINGE CUP LOCATION

BORE THE HINGE-CUPS in the door stiles at the position shown.



edges of the track and sand the inside of the dado.

Side Stiles and Frames

The vertical sides of the cabinet (the stiles) determine the height of the garage and support the doors. The length of the stiles should be $\frac{1}{8}$ -in. to $\frac{1}{4}$ -in. shorter than the distance from your countertop to the upper cabinet.

Rip the stiles to $4\frac{1}{2}$ -in. wide ($\frac{1}{4}$ -in. wider than the face frame shoulders), and cut them to the length needed. Then rabbet the back edge $\frac{1}{4}$ -in. wide by $\frac{1}{2}$ -in. deep to make scribing the cabinet to the wall easier.

When screwing the stiles to the face frame, angle the screws as shown in Photo 4 to draw the side joint tight. Because the doors attach to these stiles, it is very important that they are mounted square to the frame.

Using 2-in. frame stock, assemble the mounting frame (Fig. A) to the cabinet. Use pocket-hole construction to hold the frame together.

Building the Doors

This garage has a frame-and-panel door design to complement the existing doors. It takes two doors to make up each bifold. The outside doors are $7\frac{7}{8}$ -in. wide, and the center doors are $8\frac{3}{8}$ -in. wide. These dimensions are $\frac{3}{8}$ -in. oversized and will be trimmed off when the bevel is cut. The door

height should be the same as the opening size. You'll trim the doors later when you square them.

After the doors are built, lightly sand them to flush-up the edges, but don't soften any of the corners yet. Joint one edge from each door. After measuring the cabinet to determine the size of each door, bevel-rip and joint the other edges at $22\frac{1}{2}$ degrees to fit the opening. After the doors are the proper width, square the tops and bottoms so each door is the same height.

Using a $1\frac{3}{8}$ -in. Forstner bit, bore $\frac{1}{2}$ -in.-deep holes in the two outside doors for European cup hinges, positioned as shown in Fig. B. Then install the continuous (piano) hinge to the bifold pairs. To simplify the installation of the hinge, I taped the doors together tightly (Photo 5) before screwing the piano hinges in place.

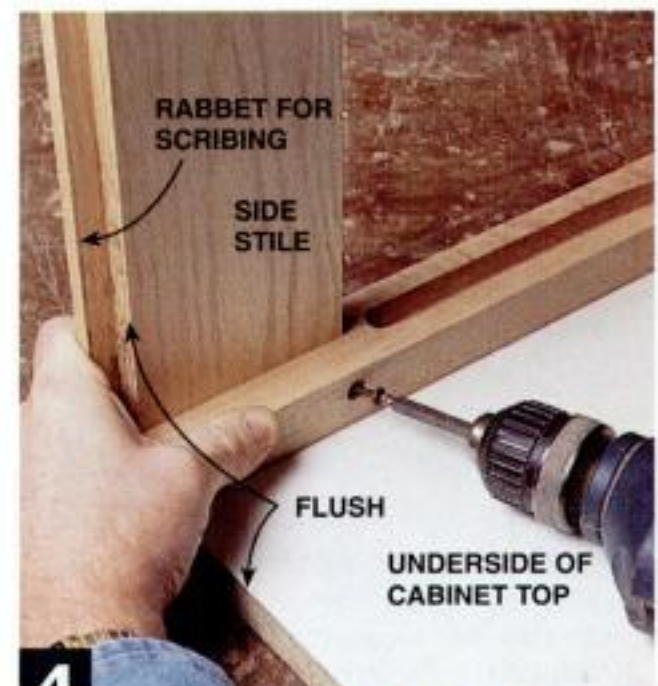
Next, plane a piece of $1\frac{1}{2}$ -in.-wide stock to $\frac{1}{2}$ -in. thickness, and cut two pieces $1\frac{1}{2}$ in. by $1\frac{1}{2}$ in. by $\frac{1}{2}$ in. Glue and clamp these pieces to the back side of the center doors (Fig. A). Make sure they are flush to the top and the outside edge where the bearings will be mounted.

Installing the Doors

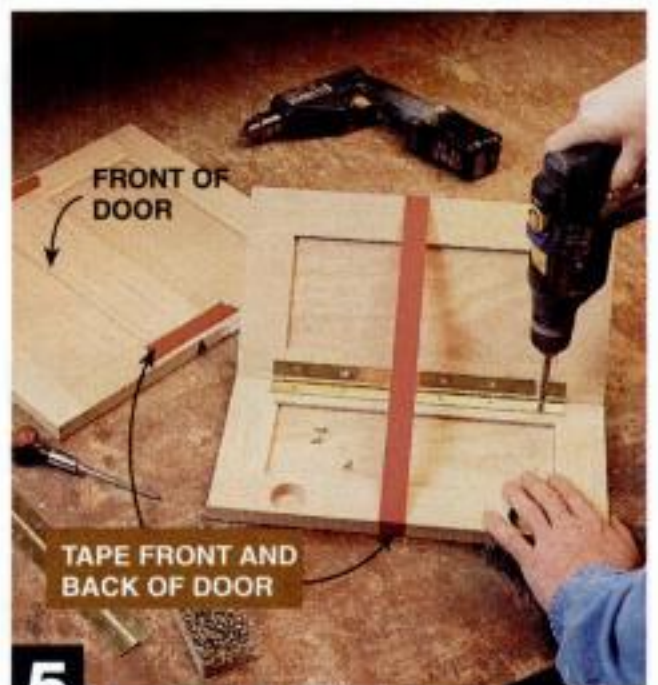
I used European cup hinges for the doors because they have 3-dimensional adjustment capabilities. Cup



3 ROUT THE DOOR TRACK using a $\frac{9}{16}$ -in. pattern bit and template. Make several passes to reach the final depth of $\frac{1}{2}$ in. The hold-down clamps also serve as guide stops for the stopped dado.



4 SCREW THE STILES TO THE FRAME using screws tilted at a slight angle to draw the side joint tight.



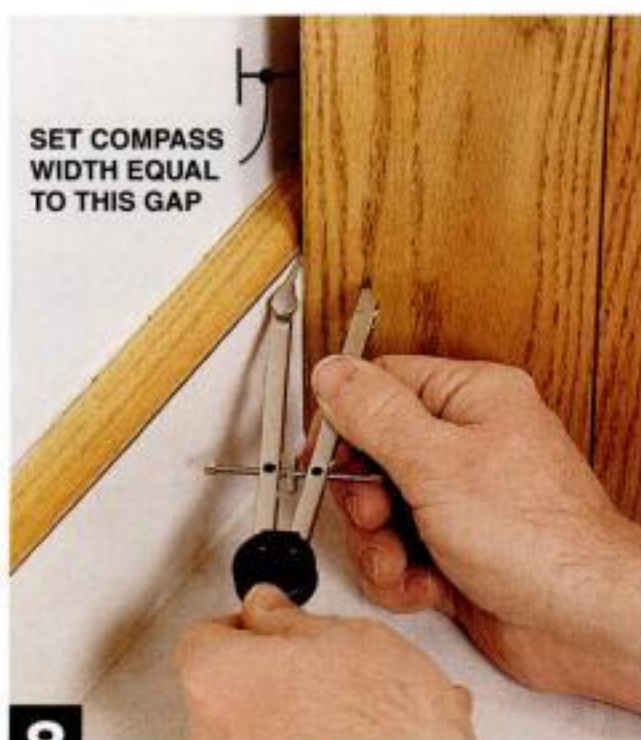
5 INSTALL THE PIANO HINGE by taping the door joint closed.



6 **INSTALL THE HINGE BASEPLATES** by attaching them to the hinges and fastening them to the stiles. Rough-adjust the hinges so the doors don't bind. *Appliance garage turned upside down.*



7 **MARK THE BEARING LOCATIONS** using tape and a marker. Stick the bearing to the tape and locate it to the rear face of the dado. Mark the front edge of the face frame and transfer these locations to the door.



8 **ROUGH-SCRIBE THE CABINET** to the existing back splash using a compass and a coping saw. After this is cut out, re-scribe the cabinet for final fit to the wall.

hinges come in two parts—the hinge, and the baseplate. After predrilling the screw holes, screw the hinges to the doors. The baseplates have a small tab on the back that lines up with the edge of the face frame stiles. The easiest method for locating the baseplates is to attach them to the door hinges, place the door in position, and screw the baseplates to the cabinet (Photo 6).

With the doors mounted on the cabinet, locate the position of the track bearings. You have to determine the front-to-rear spacing to ensure the doors are flush to the face frame when closed and also the side-to-side placement so the doors don't bind when fully open. I found that a piece of clear packing tape made a good marking gauge. For the front-to-rear placement, I stuck the bearing to the back of the tape, and inserted it into the dado slot with the bearing touching the back wall of the dado. With a marker I traced the front corner of the face frame, as shown in Photo 7. To mark the side-to-side placement of the bearing, I placed the tape and bearing at the end of the track, fully opened the door, and marked where the edge of the door lined up with the tape.

Using the tape as a template, transfer these positions to the top corner of the door, and drill a hole for the bearing's screw. Because the forces on the bearing are side-to-side, you can mount it by just driving a No. 10 by 1-in. machine screw into the edge of the door.

Finishing the Garage

Sand the garage cabinet completely

and soften any sharp edges. When you sand the doors, don't soften the miter joint corners unless the doors are closed. If you soften these corners separately, you will have a visible gap in the bifold. (If you use melamine, be careful not to scuff the surface—the wood stain will discolor it.)

To match the stain color with existing cabinets, take one of the original cabinet doors to a full-service paint store and have them custom-mix a stain to match.

Installing the Garage

The first step is to scribe the garage cabinet to fit the wall. I started by making a rough scribe to fit the existing back splash, as shown in Photo 8. This allowed the garage to be placed closer to the wall for a more accurate final scribe. The garage is 1/4-in. oversized, so remove as much of this as needed when fitting it to the wall.

Locate the studs in the wall, and pilot-drill screw holes through the mounting frame. When you screw the cabinet to the wall, be careful not to rack the garage out of square, this will cause the doors to fit poorly. After the garage is in place, install molding to conceal the gap between the garage and the upper cabinet.

Finally, adjust the doors. There are three adjusting screws on each hinge. The front screw is used to flush the door with the face frame. The middle screw moves the door up and down, and the back screw adjusts the side-to-side placement of the door.

Now shove the toaster, the mixer, and the blender in the garage and shut the door. You've got counter space! **AW**

SOURCES

1/2-in. door bearing (part No. 196-0800); \$5.99, plus \$5.95 S&H

3/16-in. pattern router bit (part No. 104-0992); \$22.99, plus \$6.95 S&H

35 mm hinge installation kit, includes 35 mm (1 3/8-in.) Forstner bit and drilling guide (part No. 400-2021); \$19.99, plus \$5.95 S&H

Above items available from Eagle America, (800) 872-2511.

Grass 3303 hinges and 4.3 mm baseplate; available from Constantine's; (800) 223-8087; \$5.10 each, plus S&H.

Hammer Your Own Copper Hardware

by David Olson

IT'S A FACT. Hardware doesn't have to come from a catalog. You can make your own. The raw materials are inexpensive—\$80 for the whole project. You won't have to buy lots of special metalsmithing tools, because most of the things you'll need are already in your shop. Learning the techniques for working copper can be rewarding and fun. Annealing and work hardening were new to me, and may be to you, but cutting, hammering, and drilling are familiar to woodworkers.

"...the decorative quality of such things is really wonderful."

—Gustav Stickley

WORKING COPPER IS A BLAST!

I was pleased with the very first copper piece I made, and my results kept getting better the more I practiced. Once you're familiar with the techniques, you'll be able to make all the hardware for the Stickley-style sideboard on p. 50—or just about any Mission or Arts and Crafts style piece of furniture in a couple of weekends. If you decide to try making your own, I guarantee that you will enjoy the process and be thrilled by the results.

MATERIALS AND SOURCES

For the sideboard on p. 50 you'll need 2 sq. ft. of 48-oz. copper sheet stock (.064 gauge) for hinge straps and backplates, 3 ft. of $\frac{3}{16}$ -in. copper rod stock (AISI grade #110) for bails, 10 in. of $\frac{1}{2}$ -in. by $\frac{1}{2}$ -in. copper bar stock for posts, and 10 in. of 4-gauge copper grounding rod for post pins (Photo 19). Sheet metal and architectural metal fabricators are often willing to sell the small amounts of sheet stock you'll need. Rod and bar stock is harder to find. Try salvage yards or order through the mail (see Sources, p. 73). Grounding rod is available anywhere electrical wiring supplies are sold. You'll also need pickling flux and silver solder, and perhaps a patinizing solution (see "The Look of Aged Copper," p. 72). All of these things are also available through the mail (see Sources, p. 73).

TOOLS

The only specialized tools you'll need to work the copper are hammers and a punch, something to pound on, a heat source, and places to heat and cool the metal.

You can buy real metalsmithing hammers (about \$25 apiece, see Sources, p. 73), or use some elbow grease and make your own from inexpensive 16-oz. ball peen hammers (\$6 each). Be sure to wear eye protection when you try this.

Reshape one flat hammer face into a shallow dome (Fig. A, Planishing Hammer) using a disc or belt sander. The shape of the dome determines the size of the mark. I found a $\frac{3}{16}$ -in.-dia. mark the most attractive. Some areas that need texture are too small for the planishing hammer, so I domed the tip of a length of steel rod (Fig. A, Mini-planisher). Shape the face of the second hammer into a shallow-domed rectangle that slopes toward the handle (Fig. A, Forming Hammer). To quickly get the rectangular shape on this one, I cut away the unnecessary steel with a $4\frac{1}{2}$ -in. cut-off wheel in my grinder/sander before moving to the disc sander for final shaping. You can do this whole job on the disc sander, but it will take longer. A third hammer face remains flat. Smooth and polish all of these faces with an orbital sander, working through sandpaper grits up to 600. Any blemishes left on the hammer faces will be transferred to the copper.

To achieve a crisp texture on the copper you must hammer it on a hard surface. Wood is not hard enough. I used a piece of $\frac{1}{2}$ -in.-steel plate for the hinge straps and backplates (Photo 2) and a massive steel block for the bails (Photo 13). I bought both at a salvage yard for next to nothing. Raising the crowned shape of the hinge straps and bolt heads can be done using a piece of maple $1\frac{3}{4}$ in. by 4 in. by 12 in. (Photo 5) as a forming block.

You'll need a high-output, self-starting torch (\$35) and a tank of MAPP gas (\$7) to get the copper hot enough to anneal it—propane won't do. I made my own annealing tray by filling an aluminum cake pan with pumice stones (\$5.50, see Sources, p. 73) and used a plastic container for the quenching bath.

TEXTURING SHEET COPPER

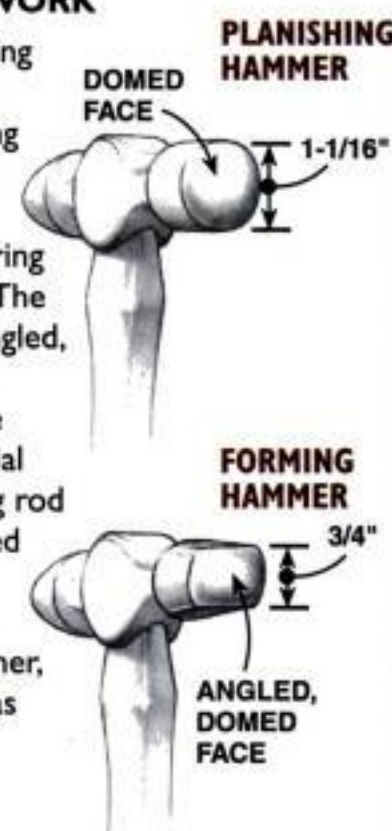
The backplates for the pulls and the long hinge straps are cut from sheet copper, then hammered with modified ball peen hammers and other simple tools to create a textured pattern on the metal.



SAW THE HARDWARE pieces following paper patterns fixed to the copper sheet with spray adhesive. Copper is soft enough to cut on a bandsaw using a general-purpose, fine-tooth blade. Centerpunch all drill hole marks on the patterns, smooth all burrs and refine the edges with abrasives or files. Remove paper and adhesive residue, then polish the copper faces with 400-grit wet/dry sandpaper.

FIG. A HAMMER HEAD SHAPES FOR METAL WORK

Make your own metalworking hammers by reshaping standard ones. The planishing hammer has a shallow domed face and is used to recreate the dimpled texturing found on period hardware. The forming hammer, with its angled, rectangular, shallow-domed face moves the metal in line with the handle. It is essential for lengthening and tapering rod stock, and it can also be used to create texture with an oval shape. The shallow-domed punch, a mini-planisher, is used to texture tight areas inaccessible to the larger planishing hammer.



FORMING HAMMER

3/4"

ANGLED, DOMED FACE

MINI-PLANISHER



FIG. B
FULL-SIZE PATTERNS
FOR BACKPLATES,
BAILS, STRAPS,
AND POSTS

**DRAWER BAIL
AND BACKPLATE**

7/32" HOLES FOR
BAIL POSTS

DRILL TWO 3/16"
HOLES, THEN FILE
KEYHOLE SHAPE

3/16"

1/8" HOLES
FOR SCREWS

**DOOR BAIL
AND BACKPLATE**

13/64" HOLES
3/16" DEEP

WASTE
(SAW KERF)

POSTS

RAISED
CENTER

HINGE STRAP



PLANISHING
HAMMER

2

STEEL
SURFACE

CENTERPUNCHED
HOLE

CREATE A
HAMMERED texture by
striking the copper with
a planishing hammer on
a flat steel surface. Be
sure to hammer the
face—the side with the
centerpunched holes.
Practice hammering on
scraps so you can get a
feel for the metal and
develop a hammering
rhythm. Slightly
overlapping each stroke
creates a nicely
balanced look.



FORMING
HAMMER

3

TEXTURE THE EDGES of
the backplates with a
forming hammer to create
a distinct border texture.
After texturing, drill holes
for screws and bail posts.
Chamfer the bail post holes
(Fig. D) and flatten the
screw holes on the
backside of each plate
(Fig. F). Cut out the
escutcheon hole in the
door backplates last.

THE ANNEALING PROCESS

Copper is a malleable metal, soft enough to be worked easily. It can be hammered around forms or into molds, bent, stretched, or textured. However, as it is worked, it loses its malleability and becomes "work hardened." Fortunately, some 6,500 years ago, at the beginning of the Copper Age, our ancestors discovered that heating work-hardened copper to a high temperature restores its malleability. This process is called annealing.

It may be necessary to anneal the same piece of hardware several times when forming the strap hinges and when working the rod stock to make the bails. It's important to anneal whenever you feel the copper becoming work hardened—you'll notice spring-back in the metal and see that it doesn't respond as well to your hammering.

Annealing leaves a residue called firescale. Heating the backside of each piece will minimize the amount of firescale that gets on its face.

After annealing, all surfaces must be thoroughly cleaned with 400-grit wet/dry paper before they can be textured.



ANNEAL THE COPPER as you work by heating it with a MAPP-gas torch until it glows a medium red. Once it loses its color, quench it in water. An aluminum cake pan filled with pumice stones works great as an annealing tray. The pumice stones don't absorb heat, so it gets concentrated on the copper.

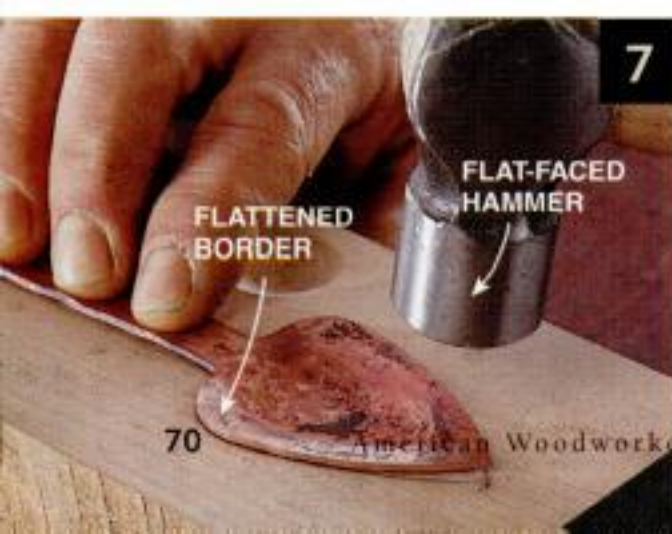
SHAPING THE HINGE STRAPS

These straps create the look of a real strap hinge, but they are strictly decorative: The doors are hung on standard butt hinges and the long copper straps are fastened to the door fronts with screws and tacks. They have a raised shape which is created by hammering them into a wooden form.



MAKE A FORMING BLOCK by carving a cavity in a thick piece of maple with a ball mill chucked in a drill (Fig. C). The convex shape of the hinge strap is achieved by hammering it into this cavity.

6 POUND AN ANNEALED strap into the forming block to create the raised center. Use the forming hammer. The strap will bend dramatically as it is worked, but you can flatten it by gently tapping its top side with a non-marring mallet. Anneal the copper when it becomes work hardened (see "The Annealing Process," above).



7 FLATTEN THE PERIMETER of the spoon tip with a polished, flat-faced hammer to create the border around the raised center.

HAMMER TEXTURE MARKS onto the convex profile at the tip of the freshly annealed hinge strap. A ball peen hammer held in a vice serves as a stake—an anvil for texturing a curved object. Make sure each blow of the planishing hammer is centered on the stake hammer below. As you work, move the hinge strap, not the hammer, for each blow. Use the forming block to flatten the tip if it distorts.





USE A STEEL ROD with one end shaped and polished into a shallow dome to texture the transition from the rounded center to the flat border of the spearhead. The planishing hammer is too big to work this small radius. Use the forming hammer to add border texture around the edge of the spearhead to match the backplates.



TEXTURE THE ROUNDED shaft of the hinge strap with the forming hammer. Use a 1-in. wide piece of $\frac{1}{4}$ -in. steel with rounded edges as a stake and orient the texturing along the length of the shaft. You can add the distinctive edge texture to the shaft using this stake. Finish the flat end of the strap with backplate-style texturing and edging. Drill $\frac{1}{8}$ -in. screw holes after texturing is complete.



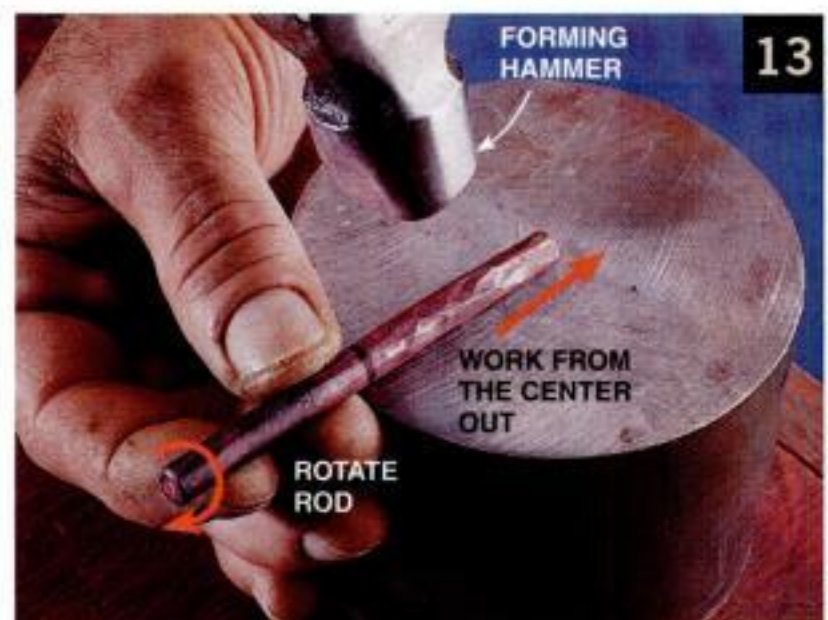
HAMMER PENNY-SIZED, polished copper discs into a spherical cavity in the forming block with the ball peen hammer. Center a steel tack in the concave backside and silver-solder it in place.

MAKING DOOR AND DRAWER BAILS

Bails are made from lengths of copper rod. These pieces are lengthened and tapered by hammering, with frequent annealing to keep them soft. When finished, they fit into small posts, which are riveted to the backplates.



12 THE $\frac{5}{16}$ IN. COPPER ROD (1), cut 3 in. L for the door bails and 3- $\frac{1}{2}$ in. L for the drawer bails, is annealed (2), lengthened, and tapered (3). When finished, each rod has been lengthened by 1 in., to either 4 in. or 4- $\frac{1}{2}$ in. Pins are filed onto the ends (4). Then the rods are bent, first at their ends (5), then in the middle (6).



POUND AROUND the annealed rod with the forming hammer to lengthen and taper it. Work from the center out, and rotate the rod with each blow. It will take four to five courses of pounding and annealing to achieve the final length and the desired taper.



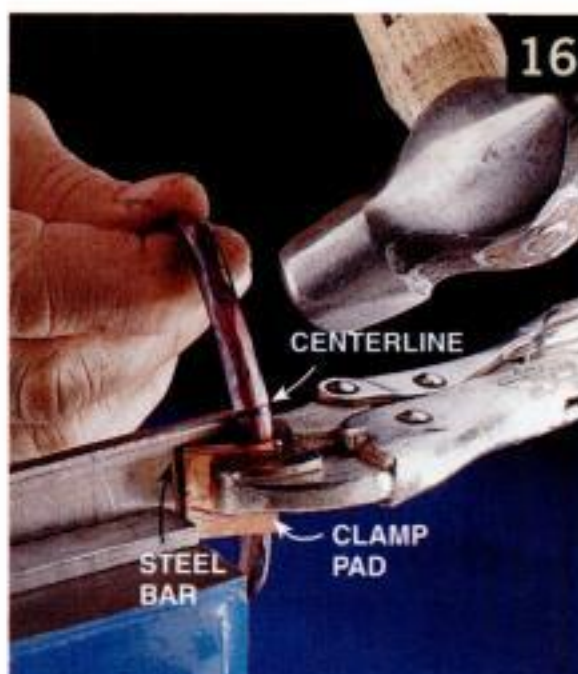
FILE A $\frac{3}{16}$ -IN. DIA. PIN on each end of the lengthened and tapered rod. Tape all but the last $\frac{1}{4}$ in. of each end to locate the position of the pin and to protect the rod from being marred when clamped between the vise jaws. If a smooth surface is desired on the bails, make it now by sanding.

**FIG. C
FORMING
BLOCK
PROFILE**



POUND THE FRESHLY annealed rod over the rounded corners of angle iron pads with a forming hammer. The bending point is determined by aligning a mark $\frac{7}{16}$ in. from each end of the rod with the upper face of the angle iron pad. Strike the rod at a point some distance away to start and work toward the bend as it is made.

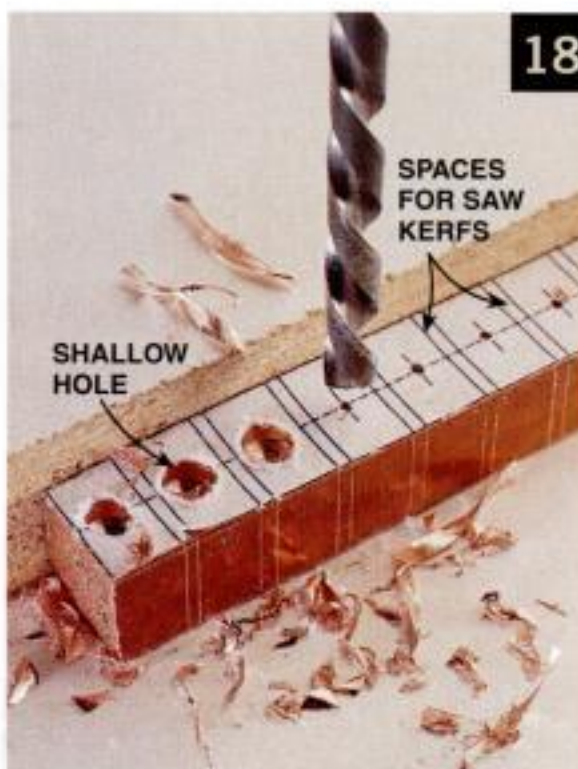
The corners of the angle iron have been rounded to define the inside corner of the final bend.



START THE BEND of the door's V-shaped bail by pounding it, freshly annealed, over a 1-in. x $\frac{1}{4}$ -in. steel bar clamped so its edge is slightly below the bail's centerline. Anneal the bail when you sense work hardening. Frequent annealing assures that bends occur where you want them. Repeat the process of annealing and bending until the final V-shape is attained. Make sure the pins align.



SLIGHTLY FLATTEN the face of each bail, with emphasis at its center. Hard lines can be softened with the flat-faced hammer. The U-shaped drawer bail pictured was bent around the hardwood form shown behind it. You can bend this one by hand. Align the centerlines, and press the bail over the form. Anneal often.



DRILL HOLES in copper bar stock that has been divided into $\frac{1}{4}$ -in. sections, leaving room for saw kerfs between them (Fig. A, posts). These shallow holes, which are centered in each section, will have pins soldered into them. After drilling, carefully saw between each post from the pin end, stopping two-thirds of the way through. This establishes the individual posts, but keeps them connected and easy to handle.

THE LOOK OF AGED COPPER

Although it's strikingly beautiful when highly polished, the hardware will look even better if it has a mellowed patina. There are two approaches to achieve this:

You can patinize the surface chemically with a commercially available patinizing solution (see Sources p. 73). Pour the solution into a glass or plastic container and immerse the piece of hardware in it. The longer you leave the piece immersed, the darker it will become. When the effect you want is reached, put on a pair of rubber



gloves and remove the piece from the bath. (Don't touch the wet surface with your bare fingers—you'll leave a mark).

Bury the piece in sawdust, press gently to wick away excess solution and set it aside to dry. Use steel wool to highlight the texture or areas that would be polished by use. A coat of paste wax will add luster. If something goes wrong, you can remove the patina entirely with steel wool and start over. It may take several tries to get the look you want. The hardware on our Stickley-style sideboard (p. 50) has a chemically patinized finish.

The other approach is much easier, and it always works—just let it age naturally. Within a few months, the polished shine will be replaced by a mellow tone that will continue to improve over time. This is the method recommended by Gustav Stickley himself. If you make the hardware before you build the piece it's meant for, the hardware will have mellowed to the perfect patina by the time the piece is built. **AW**

- 19** MAKE POST PINS by rounding the end of clean 4-gauge copper grounding wire with a disc or belt sander before cutting off a 1/4 in. length. Make at least 14 pins, each with a rounded end.



SOLDER THE PINS in place. First coat all pieces with flux and hammer the pins in place. Place a sliver of solder at the junction of each pin and post. Then heat the bar, holding the torch on the side opposite the solder, until the solder flows into the joints. Heat the metal, not the

copper, and don't overheat. After soldering, sand the pins so they're slightly longer than the thickness of the backplates. Then drill shallow 5/32-in. dia. holes in the end of each one to facilitate riveting (Photo 22 and Fig. D).

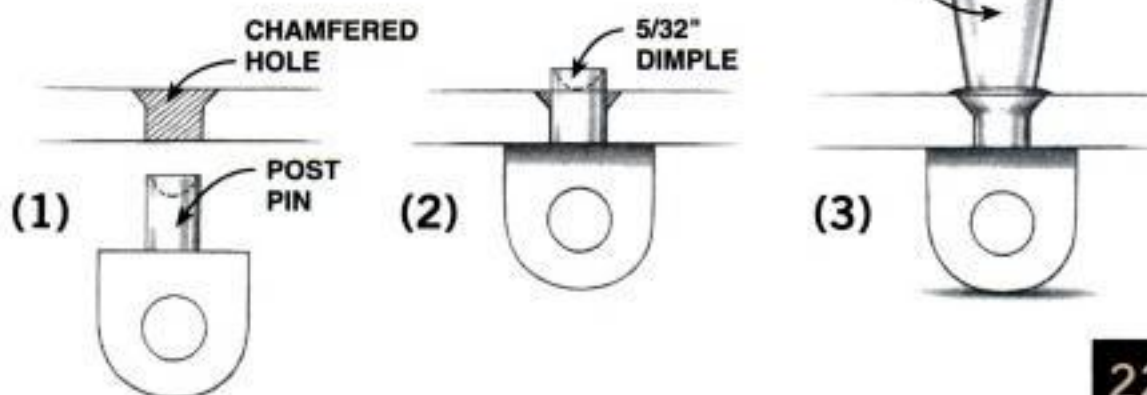
ENCOURAGING WORDS FROM MR. STICKLEY

"...metal work is one of the most interesting of the crafts to the home worker who possesses skill and taste and, above all, a genuine interest in making for himself the things that are needed either for use or ornament at home, and anyone who takes it up and discovers its possibilities is likely to go on with it indefinitely."

—Gustav Stickley

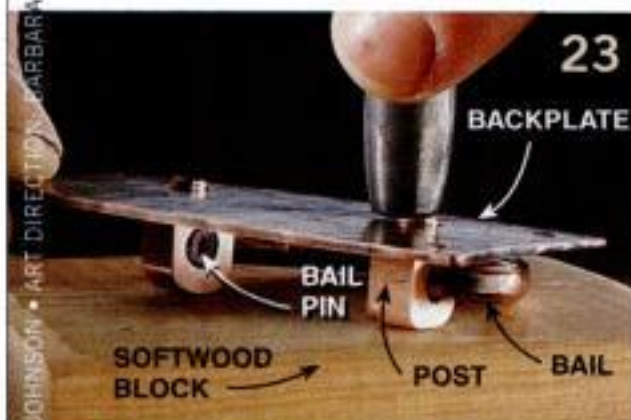
FIG. D

The post pin fits through the hole in the backplate (1) and stands slightly above it (2). When hammered with a punch, its hollowed tip mushrooms out and fills the chamfered cavity of the hole, securely riveting the post to the backplate (3).



ROUND THE TOPS of the connected posts with a belt sander. Let the bar ride in the unsupported area between the front roller and platen. While still in bar form, finish all exposed surfaces to 400 grit, then cut them apart.

- 22** THE FINISHED POST has a 1 5/16-in. hole drilled through its center for the bail. All surfaces are sanded with 40-grit sandpaper.



23

RIVET POSTS to the backplate. First position posts on the pins at the ends of a bail. If the bail pins are properly bent, the posts will align parallel to one another. Make necessary adjustments before

positioning them on the backplate. Work on a softwood block so the bail holes in the posts are not distorted. If you don't have three hands, get help from a friend.

SOURCES

Copper sheet, bar, and rod stock:
MSC Industrial Supply Company
75 Maxess Rd.
Melville, NY 11747
(800) 645-7270

Metalworking tools, soldering and patinizing supplies, pumice stones:
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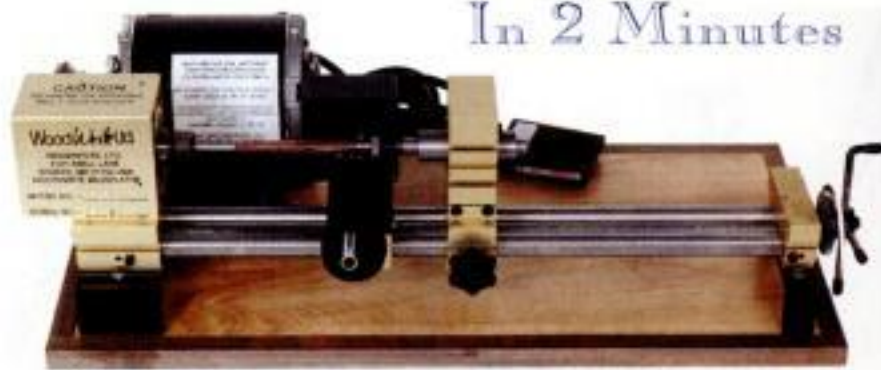
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Composing a Tabletop

Two ways to create a beautiful top.

The top is the first thing people will see when they admire a table you've made. The selection and arrangement of the boards is a testament to your skills and sensitivity to the beauty of wood. If you take the time to study wood at the lumberyard and cut your boards with care, you will be able to compose them into an elegant arrangement.

The grain pattern of every board is unique. But its overall figure is a result of how the board was sawn from the tree (Fig. A). As you sit at the drawing board, thinking about your table and its top, consider these two basic choices of wood figure:

CATHEDRAL FIGURE. In this top you emphasize the long arches of flatsawn wood. This cut is the most commonly available kind of lumber but also the most likely to distort unless it's properly dried.

STRAIGHT FIGURE. Here you see the long, straight lines and flashy rays of quartersawn or radially sawn wood, which expands and contracts the least and is the most stable. Quartersawn wood is not readily available in most species, but you can saw your own in your shop.

Before you leave the drawing board, make a bill of materials and a full-size drawing of the tabletop. You might sim-

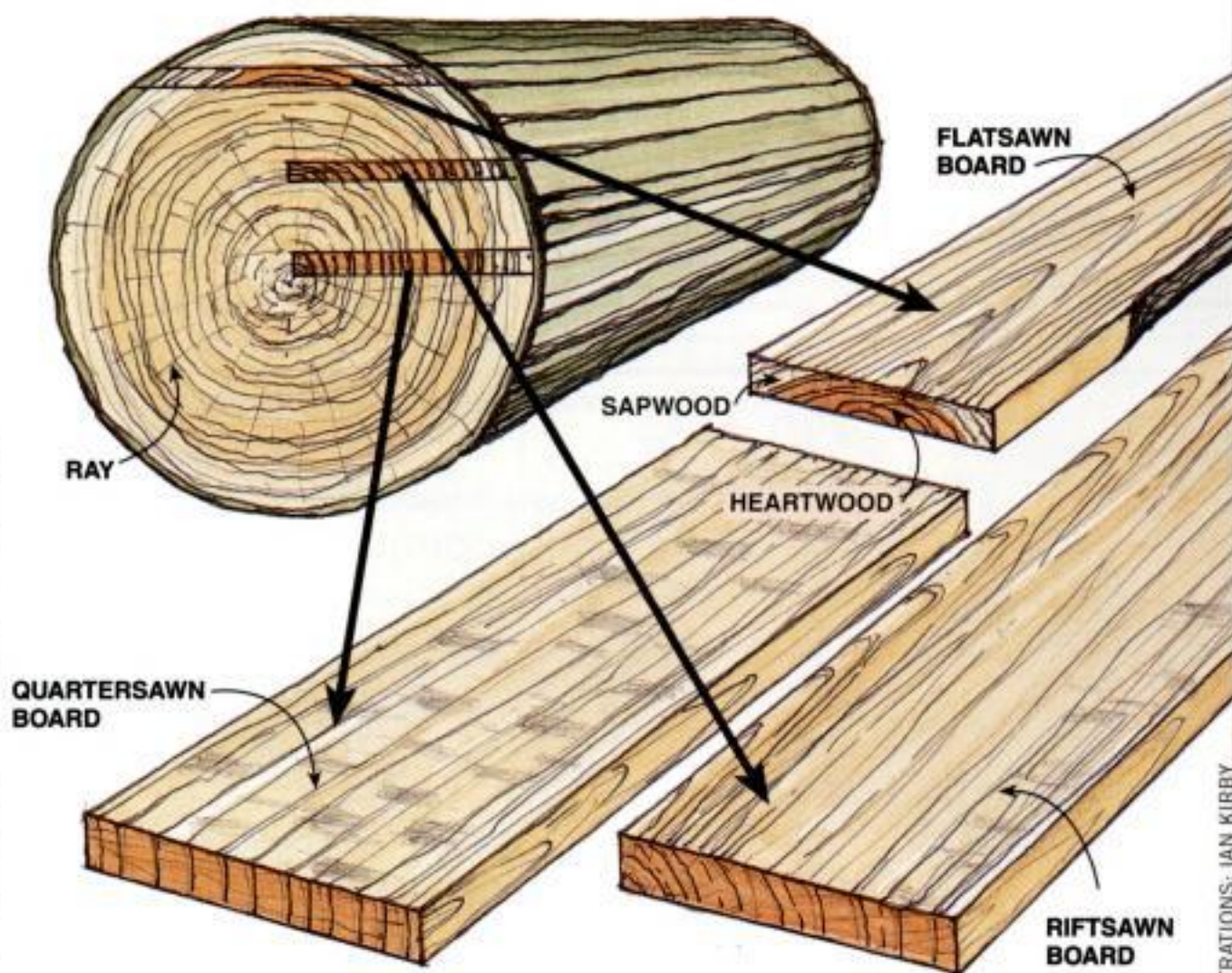


FIG. A

STUDY THE END GRAIN OF A BOARD to see where it was cut from the tree. The angle at which the saw intersected the tree's annual rings and rays determines the type of figure you see on the face of a board. You can predict what the surface of a rough-sawn board will look like by reading the end grain.

ply chalk the outline on a 4x8 sheet of plywood. You'll use this drawing as a guide throughout the process of harvesting your boards and composing them into a beautiful expanse of wood.

At the Lumberyard

The lumber pile is where desire meets gritty reality—you probably won't find the wood you've imagined, so you have to be flexible and make the most out of

what you can get.

Go to the lumber pile with a tape measure and pad of paper, a 12-in. straightedge (to check for cupping), a crayon or chalk (to sketch a plan for harvesting your top right on the boards), and a knife or block plane. If you've got a moisture meter, take that too.

At a large lumberyard you'll find boards stickered in piles or stored in bins. Most will be rough-sawn and hard

to decipher. Is that light patch sapwood or not? Is there any quartersawn figure in the board? Answers to both of these questions will come from studying the end grain of the board to reconstruct how the board was sawn from the tree.

You might be able to choose the boards you want, but more likely you'll have to buy from the top of the pile. At a specialty dealer, you'll probably find the wood already planed on both sides so you can see and select the figure, but it

will come at a higher price.

You're looking primarily for color and figure in a stack of lumber. To see the color, plane a little patch. Wet it to see how it might finish up. If your boards don't match in color, don't lose heart. Take the long view—time and exposure to light evens out most color variations in heartwood. Look carefully for sapwood. It's generally a distraction in a top made of dark-colored heartwood. Reject boards with lots of sapwood or plan to saw it off.

White sapwood may not be a problem in light-colored species.

If the figure of a board you like doesn't run parallel to the side of the board, don't worry. You will be able to harvest the look you want back in the shop.

Moisture Content

Try to get wood that has been kiln dried to 6 to 8 percent moisture content and stored indoors since it left the kiln. This wood is likely to remain flat and stable.

BUILDING A TOP WITH CATHEDRAL FIGURE

If you've got what rose to the top of a lumberyard pile, genuine run-of-the-mill boards, most of them will be flatsawn. Discard boards that bow or twist, then sort through the rest for the arches of cathedral figure that catch your eye.

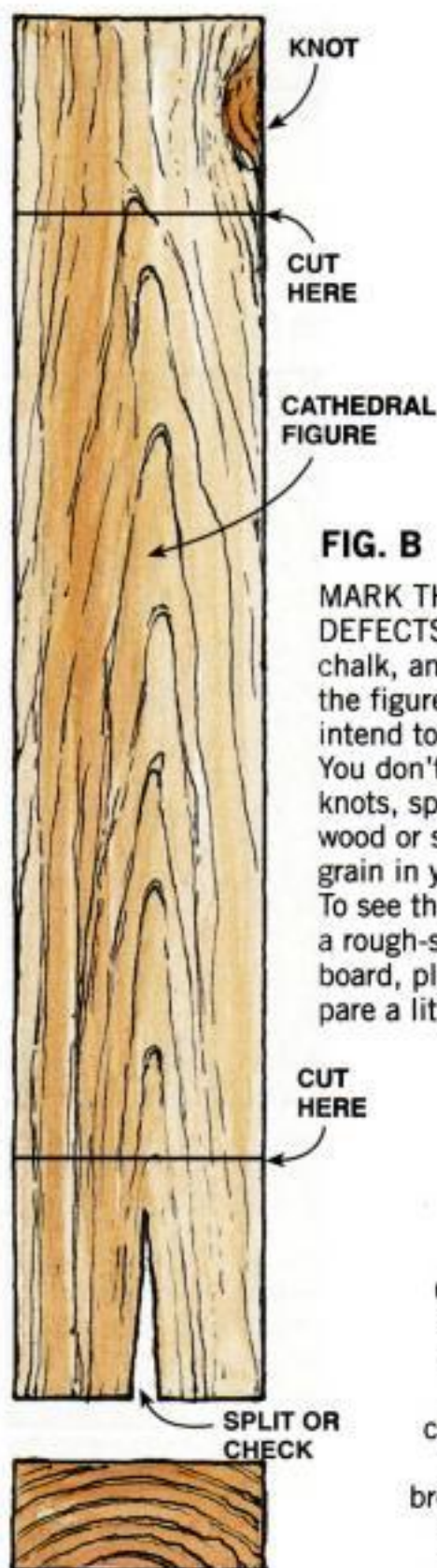


FIG. B

MARK THE DEFECTS with chalk, and isolate the figure you intend to harvest. You don't want knots, splits, sapwood or short grain in your top. To see the color of a rough-sawn board, plane or pare a little patch.

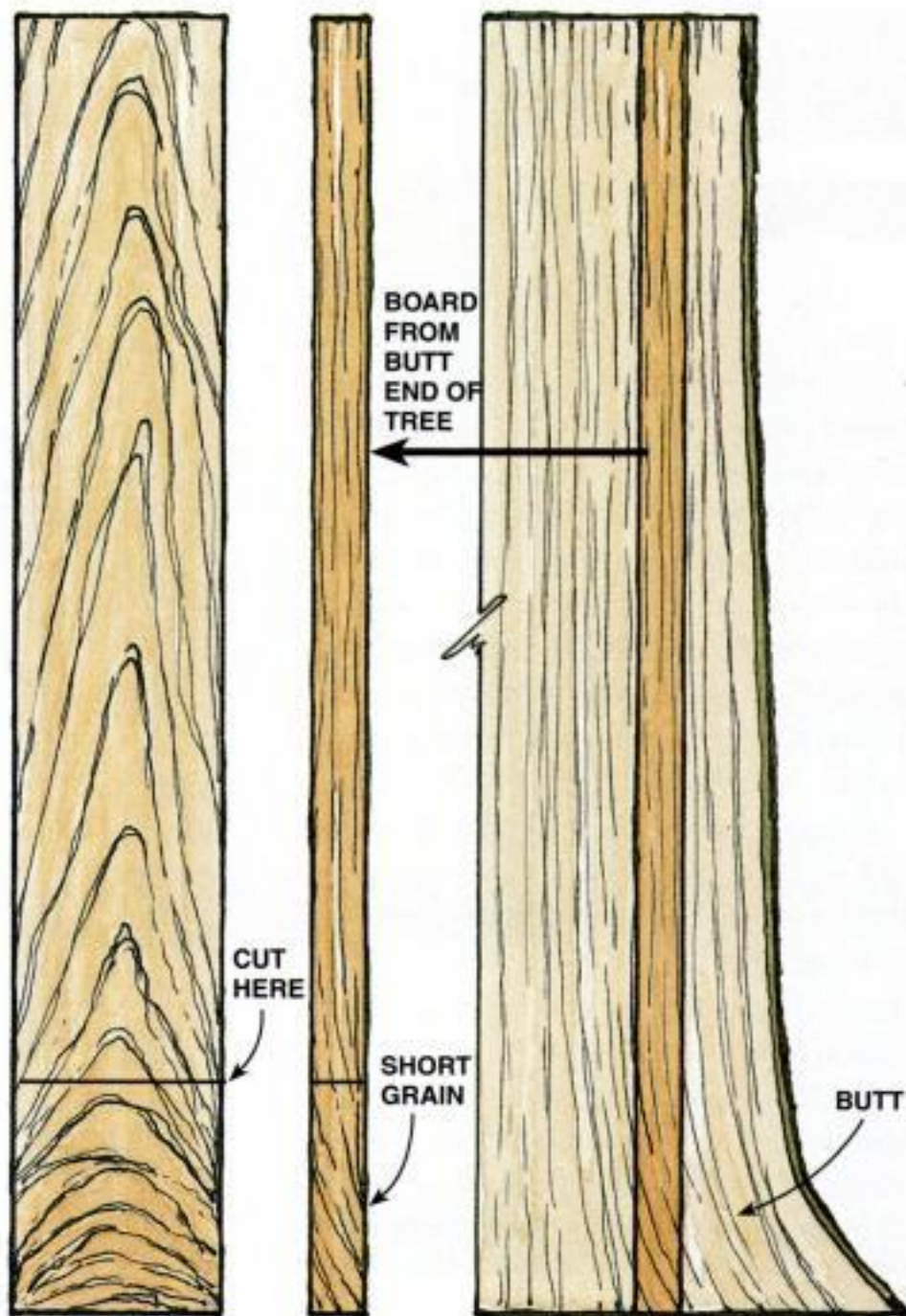


FIG. C

CUT OFF SHORT GRAIN at the end of a board. Look at the edge for slanting short grain indicating the board came from the butt end of a tree. Short grain produces broad arches on the face of a board that don't blend well with good cathedral figure.

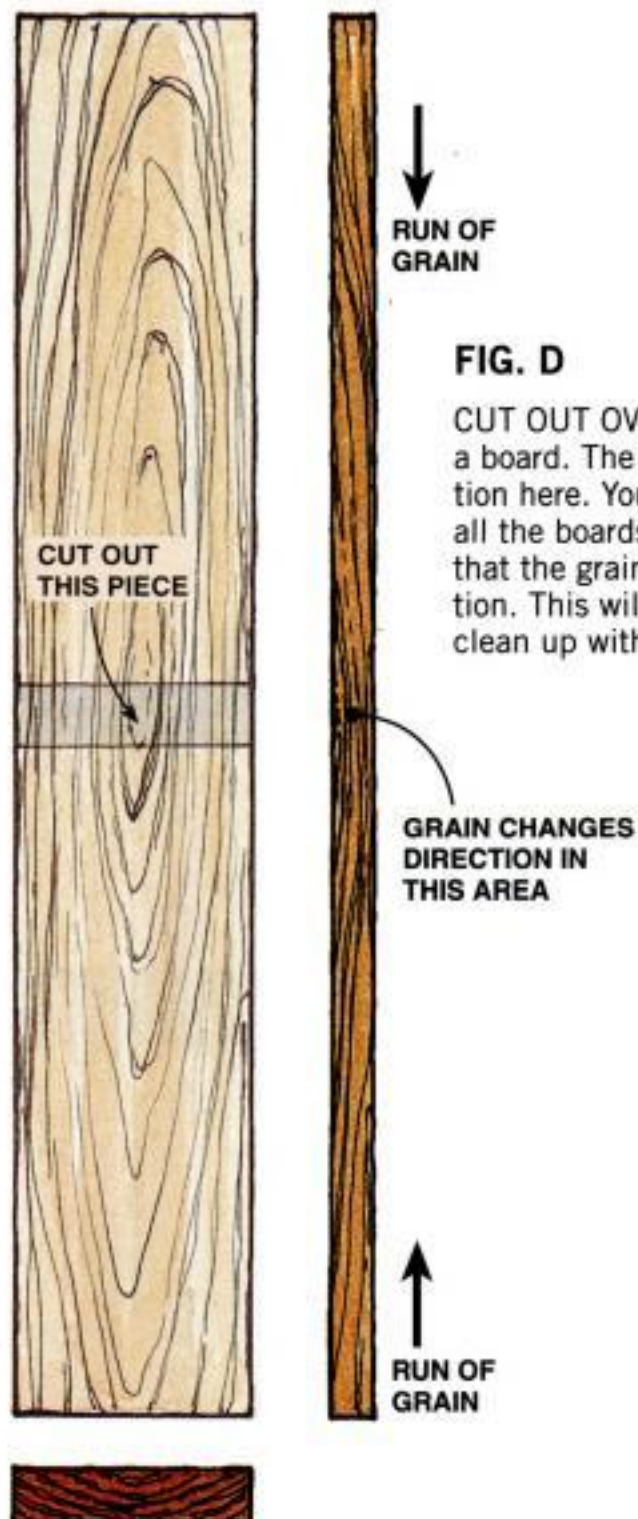


FIG. D

CUT OUT OVALS in the middle of a board. The grain changes direction here. You may want to arrange all the boards in a cathedral top so that the grain runs in one direction. This will make it easier to clean up with a hand plane.

CENTER OF CATHEDRAL FIGURE

USE THIS WOOD FOR OTHER PARTS



FIG. E

SNAP A CHALK LINE down the center of the cathedral figure on a rough-sawn board. Draw parallel lines the same distance from either side of the centerline to lay out prime boards for the top. (Leave an extra inch in length so you have plenty of options in composing the top.) The offcuts may be used for rails or stretchers, but don't crosscut the board until after you've marked all the wood. Then cut the board on the bandsaw or with a jigsaw.

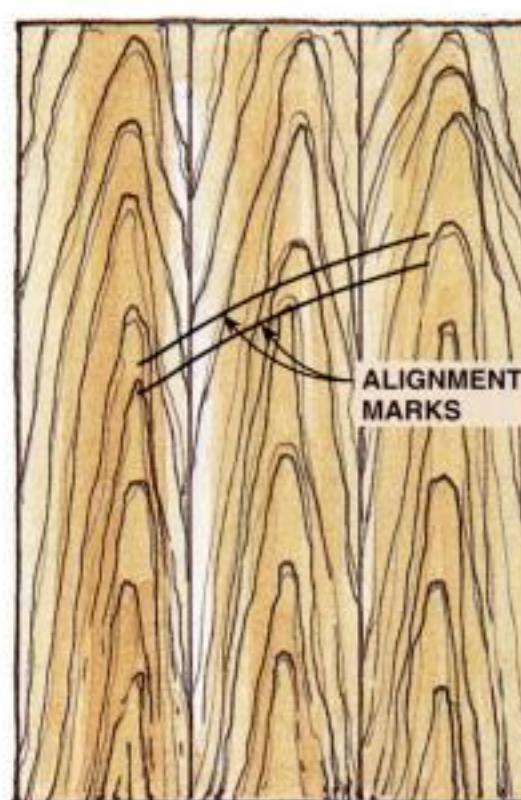
SAW ALONG THESE LINES

UNPLANNED FIGURE



RANDOM WIDTHS

SELECTED FIGURE



ALIGNMENT MARKS

EQUAL WIDTHS

FIG. F

SELECT AND COMPOSE your cathedral top to create a balanced, harmonious arrangement. Begin from the center and work out to the sides. You may want a single board in the center, or a glue line separating a symmetrical pair of boards. Add matched pairs of boards to either side. Slide them by each other until the cathedral figure balances out. Mark all the wood before you saw any of it to length. Take your time and number each board. Arrange the boards on your full-size drawing as you work.

When you've arrived at a good arrangement, draw a pair of sweeping lines across the surface of the top. Use these lines to realign the boards when you glue them up.

You won't have to worry about a top cupping if you use kiln-dried wood and finish both sides. Some woodworkers insist on placing all the bark sides or all the heart sides up. Others claim that you should alternate heart and bark sides. This disagreement is a hold-over from the days of air-dried wood and uncertain moisture content. With dry wood, it doesn't matter what arrangement you choose. You're free to go for what looks best.

If you're not sure about the moisture content of the wood at the lumberyard, go ahead and buy it, but don't plan on making your top right away. Back in the shop, harvest the top boards and other parts you'll need and cut them at least $\frac{1}{4}$ -in. oversize in length and width. Don't thickness plane the boards. Pile the wood indoors on a flat surface with $\frac{3}{4}$ -in. wooden stickers separating each board. Let the wood acclimate for a couple of months. Then plane everything flat and square. **AW**

BUILDING A TOP WITH STRAIGHT FIGURE

Choose either quartersawn or riftsawn wood if your table design calls for a straight-figured top. Quartersawn wood is least likely to distort. It expands and contracts less than flatsawn wood.

Quartersawn wood can be quite striking in species with clearly visible rays, like oak, maple, cherry, or lacewood. You see a broad cross section of the rays as they exit the face of the board. The rays form a random pattern that contrasts with the board's straight figure. The figure in riftsawn wood resembles quartersawn, except the rays are very small.

Quartersawn red and white oak should be relatively easy to find, but other species aren't routinely cut on the quarter. You can harvest your own quartersawn wood from riftsawn boards or thick flatsawn lumber.

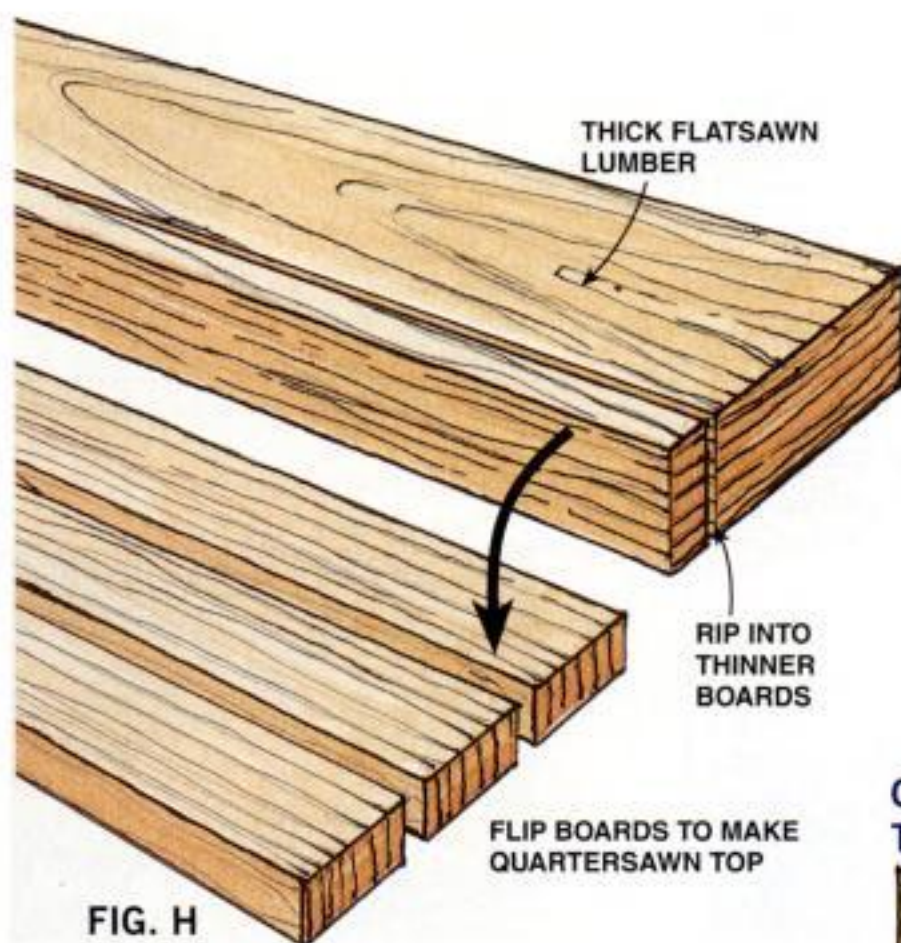


FIG. H

RIP THICK FLATSAWN LUMBER into thin boards to create your own quartersawn lumber. The most dramatic ray figure is found in boards with rays that are nearly horizontal to the surface. You can tilt your tablesaw blade to follow the angle of the rays in search of the best figure. You will lose a bit in width after milling the boards. For most species, it's worth the extra work.

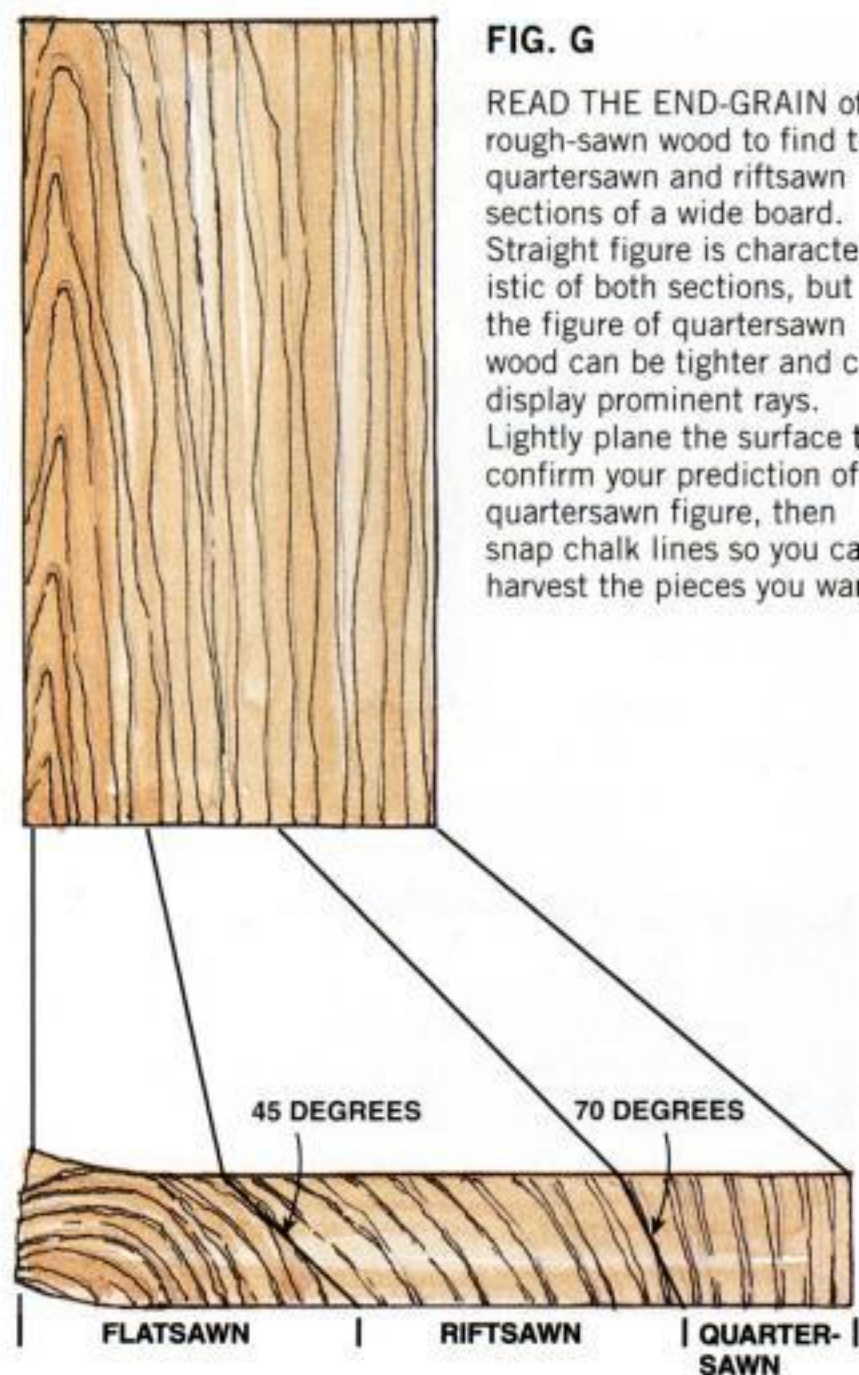


FIG. G

READ THE END-GRAIN of rough-sawn wood to find the quartersawn and riftsawn sections of a wide board. Straight figure is characteristic of both sections, but the figure of quartersawn wood can be tighter and can display prominent rays. Lightly plane the surface to confirm your prediction of quartersawn figure, then snap chalk lines so you can harvest the pieces you want.

GRAIN NOT ALIGNED TO EDGES



ALIGNED GRAIN, BALANCED FIGURE



FIG. J

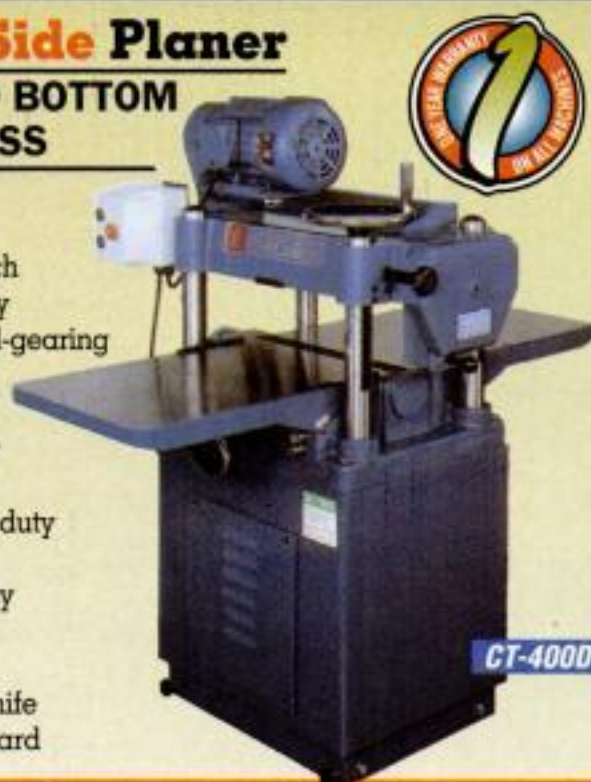
COMPOSE THE QUARTERSAWN TOP symmetrically about its centerline for a harmonious result. Pay attention to the overall pattern of the ray figure. It can be quite prominent when the top is finished.

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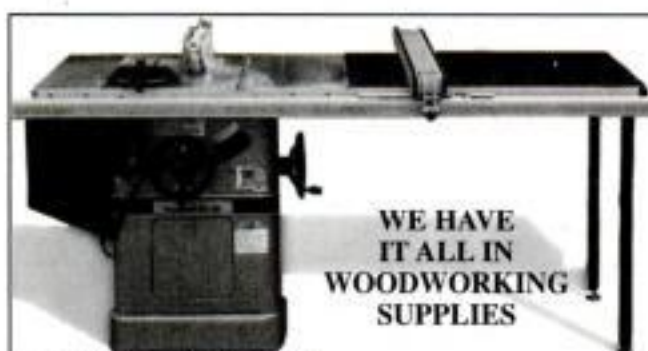
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Delta Sliding Table Attachment

Easier handling of large panels.

How do you crosscut big pieces? I mean really big pieces—tabletops, cabinet sides, countertops. Sure, you can use a circular saw or jig saw and then clean up the cut with a router or sander. But this is mighty slow work. If you cut lots of big stuff, Delta's Sliding Table Attachment (model 34-555) might be the answer.

Attaching the rig to my Delta Contractor's Saw was straightforward, but I did have to cut a few inches off the left-hand end of the rip fence rail. If you're putting the table on a saw other than a Delta, you may have to drill and tap some holes, as well.

The fence can be positioned on the front or back of the table, depending on the size of the piece you're cutting. In the front position, it angles to 45 degrees. Ball bearings and a handle allow the table to slide easily. When not being used as a sliding table, remove the fence, and lock the table in place.

With the fence on the front of the table, I could crosscut to 24-in. wide, and angle the fence in one direction. The positive stops locate the fence accurately at 0 degrees and 45 degrees. With the fence to the rear of the table I could crosscut to 36 in., but only 90-degree cuts can be made in this position. The stop block, which you can set directly (no tape measure needed), is easily recalibrated with blade changes, and works great with the fence in the front or back position.

To get the fence completely out of

the way for other tablesaw operations, you have to remove it along with the lock bolts that hold it down. Sliding the fence off the table is no big deal, but backing out the lock bolts gets a little old. I ended up consolidating my operations to make sure I had all my ripping done, then put on the table fence for all my crosscutting.

The rods from the sliding mechanism stick out about 12 in. on the operator side of the saw. That took some getting used to. That's where I stand when I'm ripping! I ended up repositioning myself to the right of the rip fence. Also, cutting the rip fence rail for attachment means

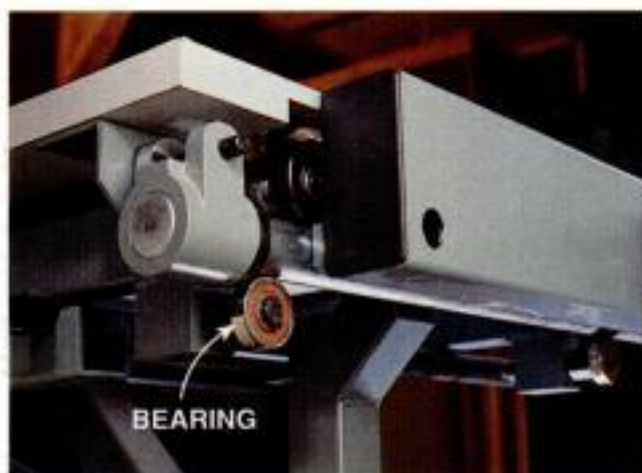


DELTA'S SLIDING TABLE attachment makes it easy to crosscut wide material, especially at an angle.



FOR EVEN GREATER CAPACITY, move the fence to the front of the table.





BALL BEARINGS make for smooth operation. Cams on the bearings allow you to level the system. When not being used as a sliding table, lock the mechanism in place.

you lose some capacity for ripping to the left of the saw blade.

Bottom Line

This is a great tool for a small cabinet shop. It's more compact and less expensive than big panel saws, but gives you speed and accuracy in cutting large panels and plywood. It's hard to beat the ease with which you can cut just a few inches off the end of a 24-in. wide, 8-ft. long piece of plywood, using this tool. It will cost you some floor space, and once on, it should stay on. However, if you only infrequently cut bigger panels, you'd probably be better off with a shop-made crosscut sled (see AW #40, p. 31.)

PROS

- + 24-in. and 36-in. crosscut capacity, depending on fence position
- + angle cut wide pieces
- + good stop block for repetitive cuts

CONS

- increases footprint of saw
- rip fence rail may need to be cut, diminishing rip capacity to left of blade
- time consuming to remove fence

PRICE: \$350

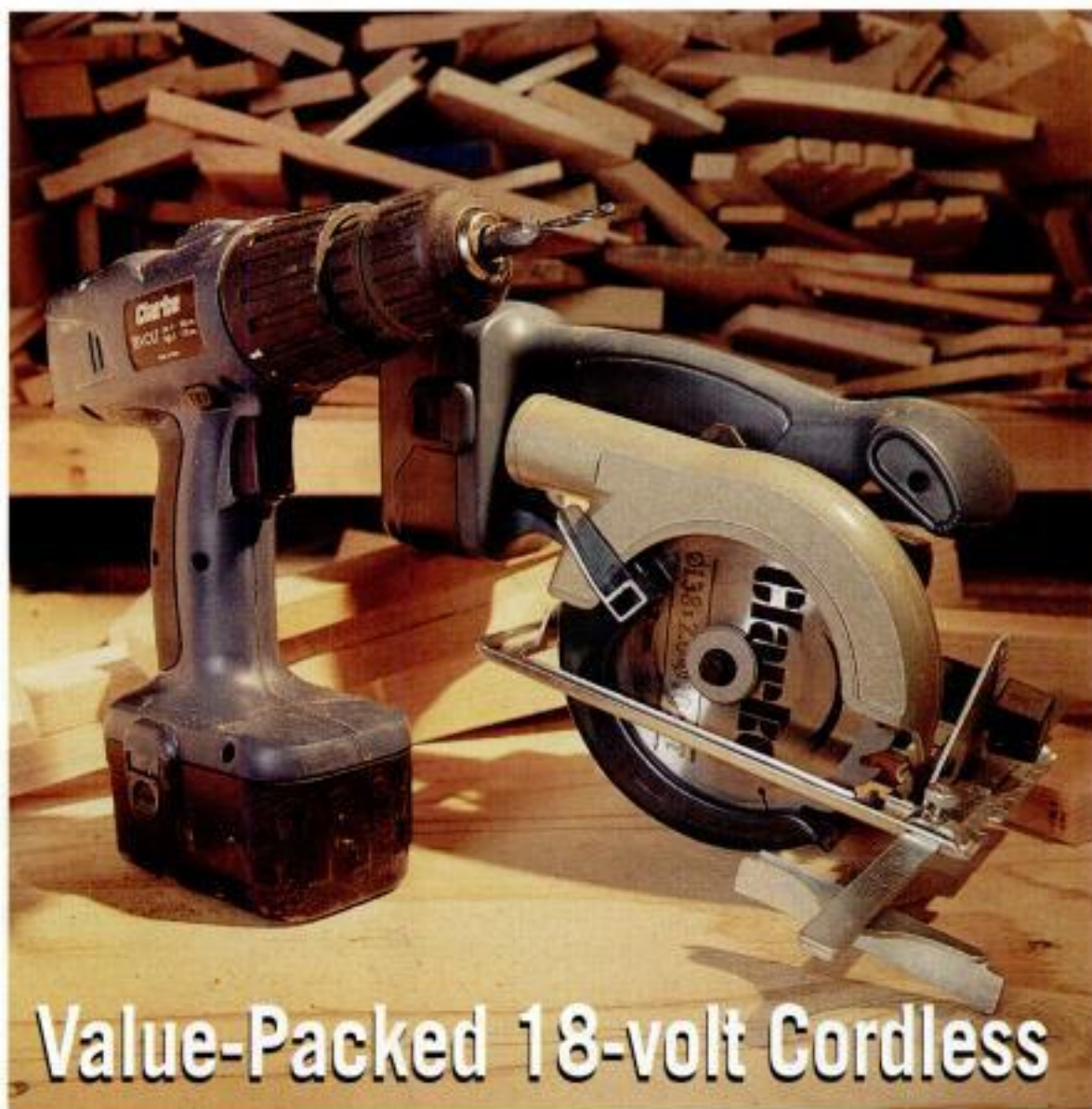
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Value-Packed 18-volt Cordless

Have you considered buying an 18-volt cordless drill/saw combo package, but balked at the price? If so, here's a deal: Clarke's 18-volt set, model PCK1800, includes two batteries, charger, and of course a drill and 5¼-in. saw—all for \$255. Clarke is a new name to most woodworkers, but it's a familiar brand in the U.K., and have been selling other types of tools in the U.S. since 1985. The drill has 16 clutch settings and two speed ranges. It uses a ⅜-in. keyless Jacobs chuck. The saw came with a blade, and it easily handles material up to 1½-in. thick (its capacity). It made plenty of cuts before running out of juice. A full recharge takes about 1 hour, and the charger will shut itself off when the battery is ready.

Call Clarke at (419) 352-2299 to find a retailer near you.

Product Reviews



No-Adjust Bandsaw Guide

If you don't like fussing with the guide blocks on your bandsaw, check this out. PS Wood's Stabilizer (manufactured by Carter) eliminates the need for the upper and lower guide blocks and thrust bearings. Your blade runs against a groove on the circumference of a bearing. It's only for blades up to 1/4 in., so you'll have to go back to your old guides for larger blades.

It's a little strange to see your blade run without any guides, but it works great with any type of blade. It's excellent for intricate scrolling work. I did find, though, that if I turned too aggressively, the blade popped out of the groove, but when I relaxed cutting pressure it went back in. The guides are brand-specific, so you have to order one for your particular saw.

PS Wood Machines (800) 939-4414

Cost: \$70, plus \$5 S&H includes a free low-tension bandsaw blade.

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It's an age-old question, that Wagner's new moisture meter, the L607 Dual Depth Proline, can answer. Plus it'll tell you the dryness of water-based finishes.

The meter is pinless. (Some moisture meters have pins, which actually penetrate the wood.) Simply place the meter on your material, and it reads the moisture content at a depth of 1/2 in. Be sure to hang on to the owner's manual. That's where you'll find the conversion chart for specific species of wood. The meter is factory calibrated to correctly read the moisture content of Douglas Fir. You need to refer to the species adjustment chart to make the correction for any other wood. But it's easy.

The meter also reads surface moisture, so you can use it to determine if your water-based finish is sufficiently dry to recoat. Some users of water-based finishes like to quantify the dryness of the finish before recoating. (Others simply give the finish plenty of time to dry.)

The only drawback to this meter is price. If you don't need the finish-moisture feature, you can find good moisture meters from several manufacturers (including Wagner) for less than \$200.

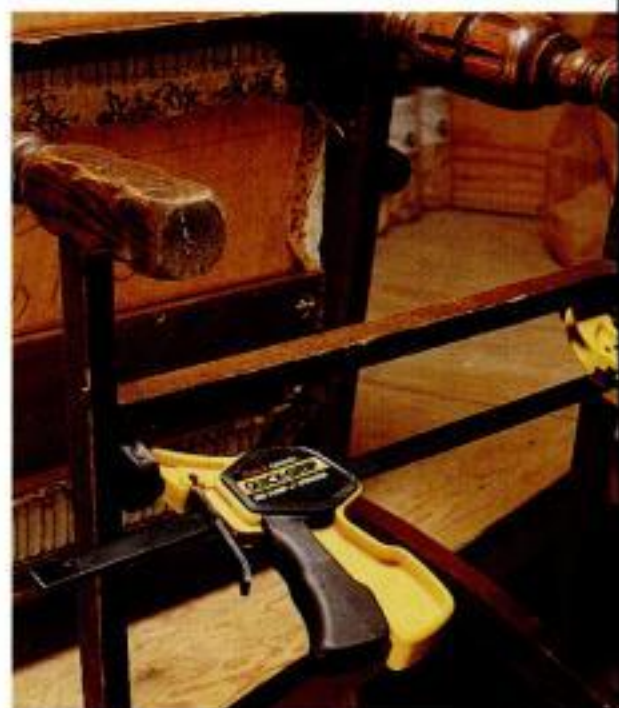
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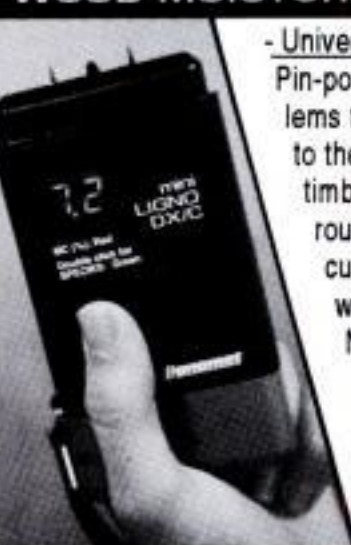


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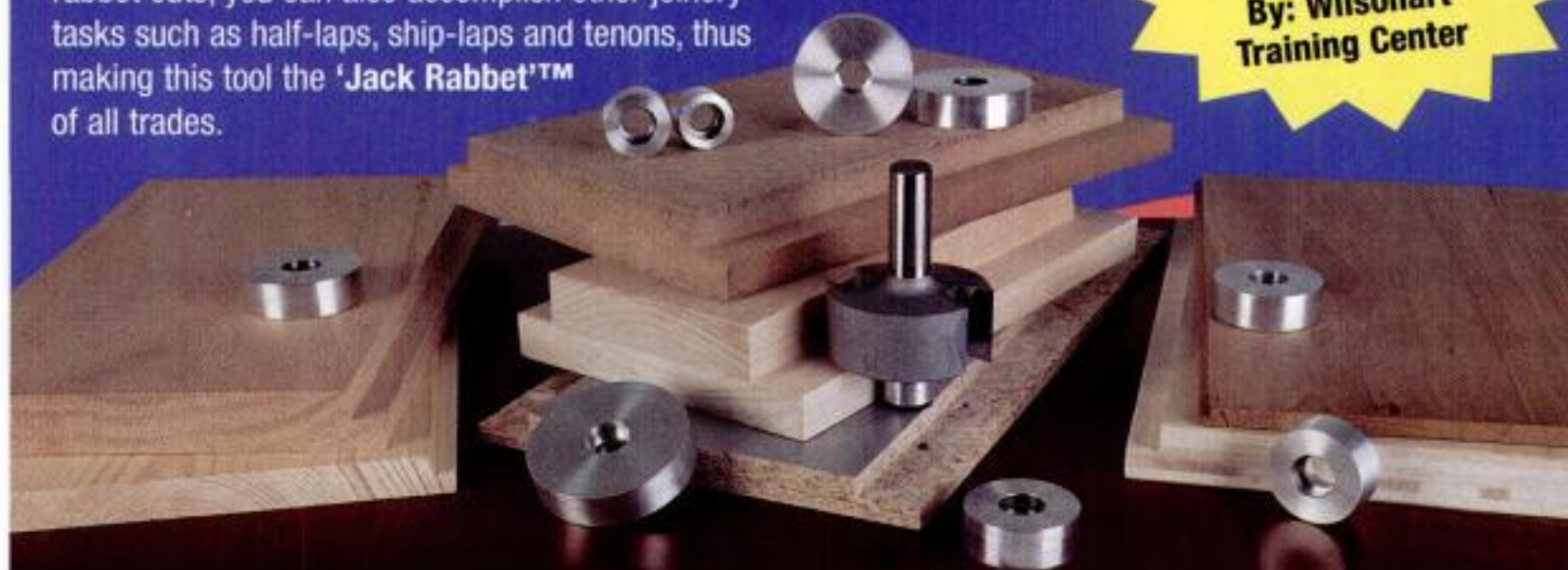
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Some of our favorite woods have large, open pores on the surface. Mahogany, walnut, teak, koa, ash, oak, and rosewood all fall into this category. With these and other woods you have a choice; apply a thin finish that lets the pores show, or use pore filler to create a glass-smooth, pore-free surface. Which you choose is strictly a matter of taste, but if you go for the second option, known as a "filled finish," you need to know about pore fillers.

What Is a Pore Filler?

Pore filler, also called semi-paste filler, is a thick mixture of inert solids and resin that can be packed into wood

pores. The inert solids are usually ground-up sand, but they can be powdered rock (talc or pumice) or wood dust (called wood flour). The resin in the mix acts as a binder to keep the solids together and stuck in the wood pores.

In theory, you could fill the pores by building up layer after layer of finish and sanding it back. However, this is a very tedious process, and is likely to result in pores showing up again some months later as the finish packed into them shrinks. Pore filler is a quicker and more reliable path to the same end.

Filler does not shrink after it dries. As a result, once applied, it levels the entire surface of the wood, pores and

all. Don't confuse pore filler with wood putty, which is a thicker mixture meant for filling gouges and dings in wood. Pore filler is too thin to fill large gouges, and putty is too thick to fill pores easily.

When to Use Them

On woods with very fine pores, such as maple, cherry, poplar, and most softwoods, filler isn't necessary. On large-pored wood, filler can be used for two main reasons: To create a level base for the finish; and to create color contrast.

Gloss finishes and solid colors benefit greatly from a level finishing surface.



FIG. A

The pores of red oak are large enough to see and feel even through a finish (left). Pore filler levels the surface of the wood so it looks and feels smooth.



1 WORK FILLER INTO THE PORES by rubbing with a white nylon pad. White pads are the finest of the nylon abrasives, containing only talc. If the filler sets up too fast, spray it with water to keep it workable.



2 SQUEEGEE the excess filler slurry from the surface, while it's still wet. A credit card makes a great squeegee. Let the filler dry completely before sanding.



3 CLEAN a profiled edge using a credit card cut to match the profile. Curved surfaces and inside corners are the toughest areas to clean of excess filler. Credit cards can be cut and filed so they can get into tight areas.

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ITEM 37056-2SMA

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Just Finishing



4 **SAND** with 220-grit, self-lubricating sandpaper to remove the dried filler from the surface. This is an important step. Any filler left on the surface shows up when the piece is finished, so be thorough.



5 **WIPE** the surface clean with a cloth dampened with water (about as damp as a healthy dog's nose) to remove the last bit of sanding dust and it's ready to finish.

When pores show under these finishes they tend to detract from the elegant appearance. Even worse, when you try to polish a high-gloss finish with open pores, the rubbing compound will often pack into them, leaving you with an unsightly mess. When you finish open-pored woods with either a solid color or with a gloss finish, use pore filler first.

A colored pore filler can either change the overall color of the wood or create an interesting contrast between the wood and its pores. A pore filler that is darker than the general color of the wood creates contrast between the pores and the background wood. This makes the wood appear darker and adds richness and character to the wood by making the pores more obvious (Photo 7). The same is true of a light pore filler. It creates contrast while making the wood lighter in color. And while wood purists may blanch, using pore filler colored to contrast with typical wood tones can create stunning effects that Mother Nature never imagined (Photo 6).

Oil vs. Water

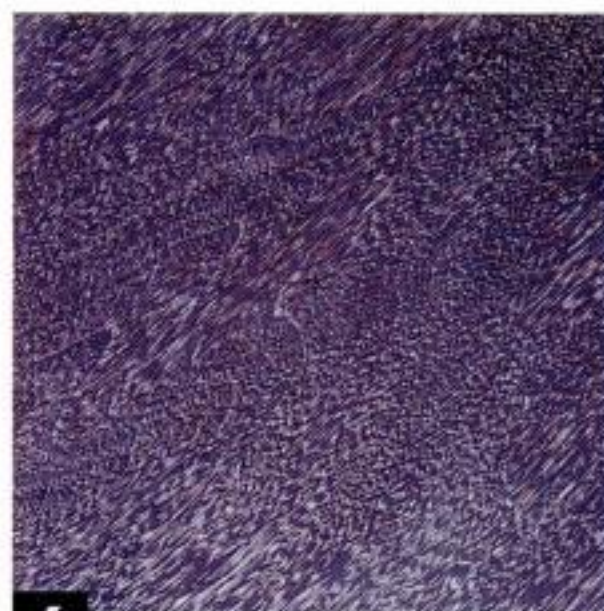
Pore fillers are sold both in oil-based and water-borne varieties. They both do the same basic job, but water-borne fillers have several advantages. They have fewer annoying fumes, dry faster, and are compatible with virtually any finish: water-borne, oil-based, shellac or lacquer.

Water-borne pore filler is available in a wide range of typical wood colors or neutral (a pale ecru color). If you find it necessary, you can alter the colors yourself using UTCs (universal tinting colors), which come as thick liquids or pastes. UTCs can usually be found at a well-stocked paint or home store, or at woodworking specialty stores. UTCs usually slow down the filler's drying time.

Applying Water-borne Filler

Instead of brushing, I scrub water-borne fillers directly into the wood using the finest nylon abrasive pads—the white ones. Gray pads are the second finest, and will do in a pinch. The pad lets me get the filler onto the wood and pack it into the pores all in one step.

As soon as I get it scrubbed in, I squeegee off all of the excess with a



6 **AN EYE-CATCHING LOOK** can be achieved by using a colored filler that contrasts with the natural tones of the wood (above, top) or by applying contrasting-colored pore filler over a colored, sealed surface (above). Use 320-grit sandpaper to remove the filler without disturbing the color below.



7 **DARK-COLORED FILLER** makes the sample on the right appear darker than its companion, which has neutral filler. Both samples came from the same mahogany board.

plastic scraper or old credit card. Once the excess is squeegeed off, I let the filler dry. In a few hours, depending on the humidity, I can go back, sand the surface, clean off the sanding dust with a cloth dampened lightly with water, and the piece is ready for finish.

NEW: Clear Water-Borne Fillers

Within the past year, a new product has hit the market that offers the option of filling pores without adding any color whatsoever. For some woods, like figured koa and walnut (Photo 8), the incredible beauty of the wood is only dulled by stain, even when it is only in the pores. For such woods, this new filler is a delight.

Of the two I have used, one looks and feels more like a mousse or an airy wax, while the other is a runny paste. Both are easy to use and dry quite fast,

often in under an hour, depending on humidity. Apply them the same way as other water-borne fillers. The one drawback I have found is that they shrink quite a bit during drying, and for effective filling, you need to make two, or more applications. **AW**



8 A CLEAR FILLER

on walnut allows a glass-smooth surface without effecting the natural range of color in the wood.

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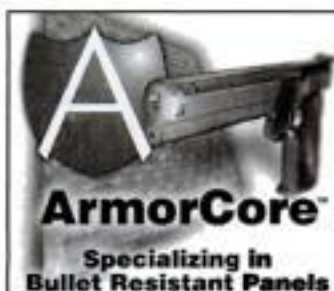


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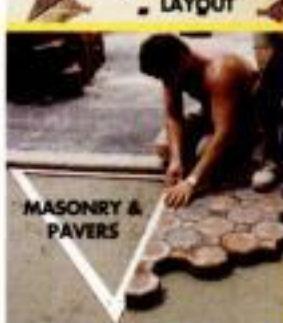
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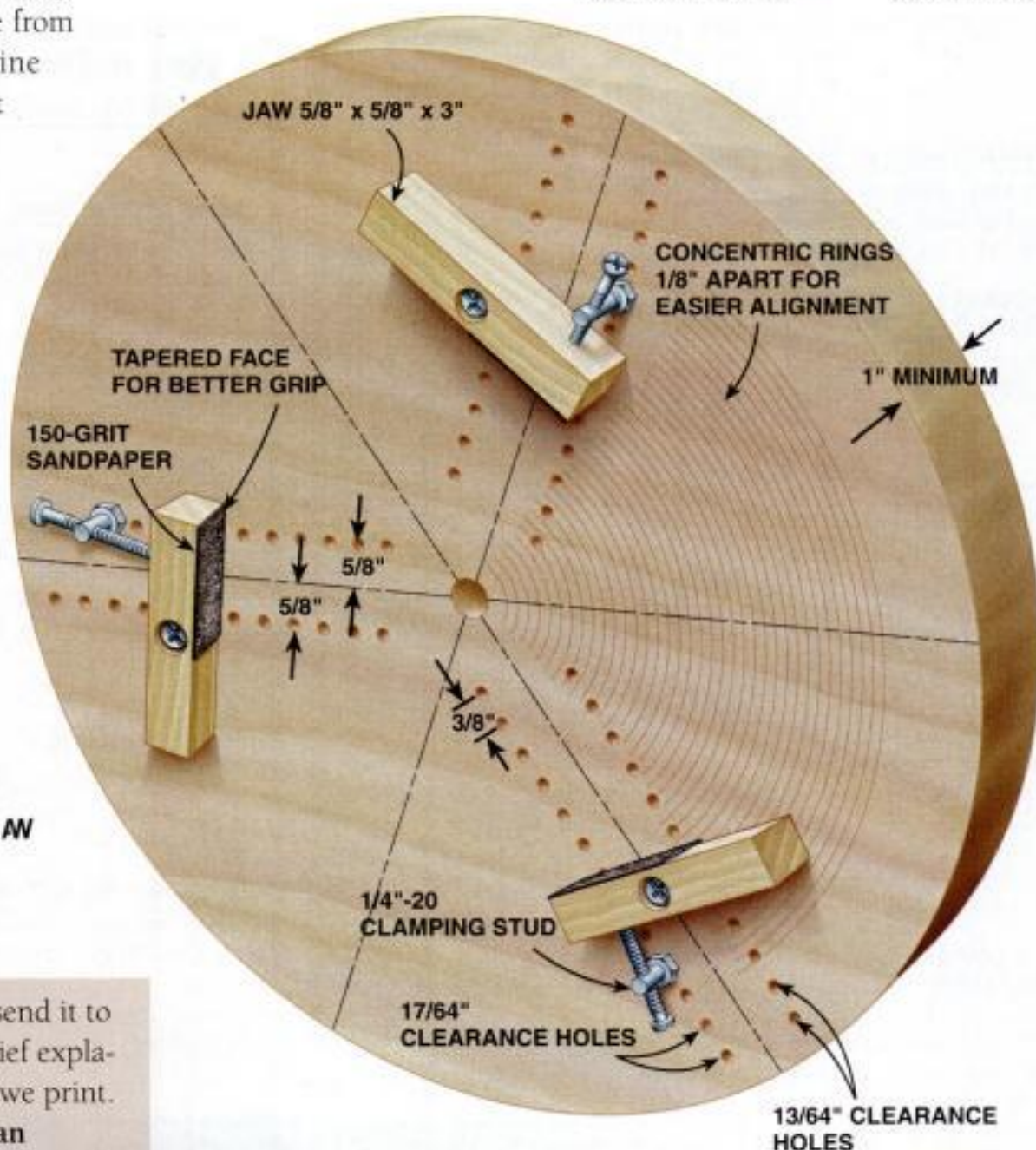
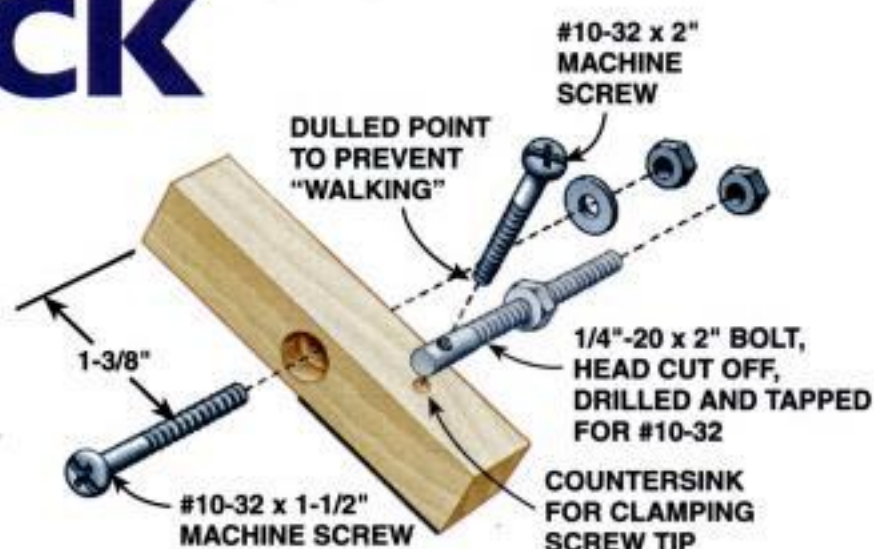
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