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JUNE 1993 #32

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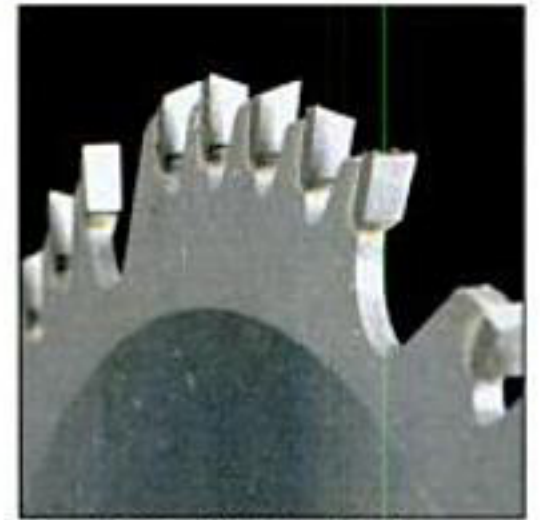
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MAKING MISTAKES

I'll never forget the first time I got my hands on a router. The setting was junior-high shop class and I was 14. I was building a flintlock rifle from scratch (boys will be boys) and I was patiently cutting the lock-plate mortise in the stock with chisels and gouges. There I was, contently chopping away, pleased at how closely I could cut to the line.

"Sloan!" boomed a voice from above. "You're wasting your time." My reverie shattered, I looked up to see the shop teacher (we called him "Breath") looming over me, arms akimbo, ready to pounce. "A router's the tool for *that* job, my boy."

Next thing I knew I had my hands on the handles of a sleek, silver router. "Don't go too fast," was all the instruction Breath gave me. I flipped the switch and hung on for dear life as the router roared up to speed. Then I started to cut. "Neat," I thought. "It cuts a perfectly flat-bottomed . . . Oh S—!"

It was too late. The damage was done. Hours of work had been ruined in an instant. I grieved for a week and then patched up the damage (with hand tools of course). Breath avoided me for weeks after that and nearly 10 years went by before I picked up a

router again. But when I did, I remembered the lesson I'd learned: To feed *against* the rotation of the bit.

Mistakes are a part of woodworking. Everybody makes them. Here at our office, we celebrate truly noteworthy screwups by awarding "The Brittle Brush Award for Excellence in Craftsmanship." This coveted plaque—a paintbrush embedded in a disc of epoxy gunk—gets

passed along to the next staff member who does something dumb in the shop.

The Brittle Brush Award is our way of putting mistakes in their proper perspective—minor setbacks with the potential to teach you a valuable lesson and challenge your problem-solving skills.

You can't avoid screwups completely

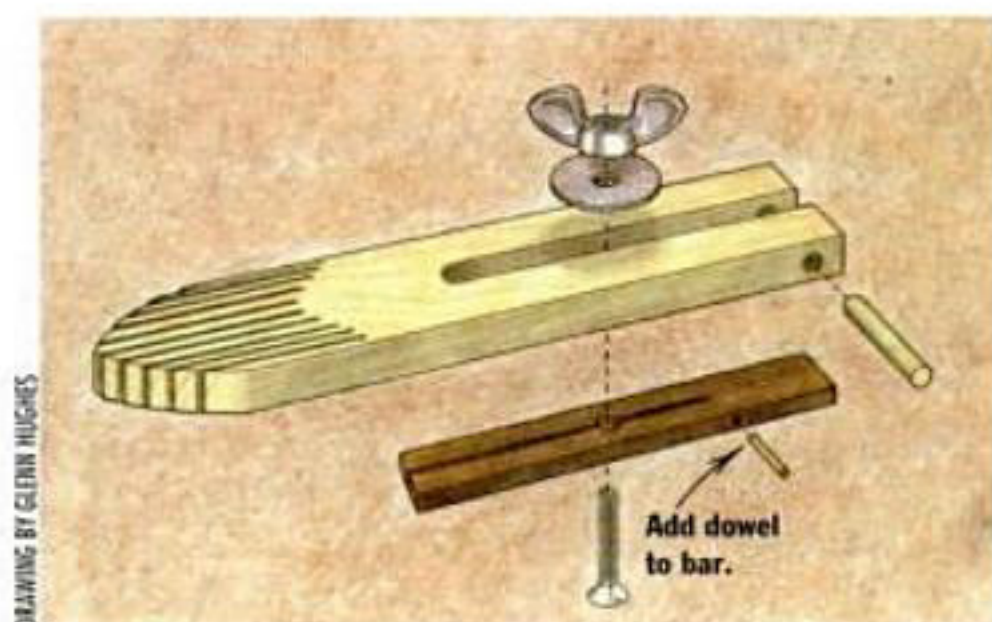
but you can adopt ways of working that will minimize mistakes. Cultivate patience, focus and caution in the shop. Respect your tools and materials and listen to what they're telling you as you work. As you continue to grow as a craftsman, you'll find you make fewer and fewer mistakes.

David Sloan
Editor and Publisher



MITCH MANDEL

LETTERS



Reinforced Feather Board

Congratulations to Jim Cummins on the miter-slot feather board article in AW #31. I am planning to build one and would like to suggest that the hard-board bar be reinforced against splitting by inserting a $\frac{3}{16}$ -in. dowel across the width, just behind the expansion slot.

Vin Clarke
Wilmington, DE

Three Phase Advice

Your comments on 220-volt operation of motors ("Q&A," AW #30) did not make clear that such operation is only possible if the nameplate on the motor states so. No motor should be used at a voltage more than 10 percent above or below the nameplate rating. [Also] dual voltage motors require the correct connection of the windings at the motor junction box or terminal strip.

Another point is that a motor designed for 110/220-volt operation is not inherently more efficient at 220 volts. The only cost or operating efficiency to be gained is at installation when choosing the higher voltage lets you use smaller [gauge], less-expensive wire.

John T. Kaetz Jr.
Bessemer, AL

Timber Exports Aren't a Problem

Your response about timber cutting and environmental concerns ("Q&A," AW #31) is way off base. First, the amount of timber exported by the

United States that is then manufactured into a product and sold back to us is quite small. In fact, one out of every two trees in the United States is cut for pulp and papermaking.

The idea that Japanese or German companies can buy U.S. timber cheaper than U.S. companies is also false. Often

they pay more, especially when shipping costs are included. These companies can sell the wood product back to us cheaper than we can make it [because] they have modern plants, government loans for efficient equipment, limited pollution controls and taxes, and a keen sense of marketing.

With the number of people we have on the Earth, we must damage the environment if we are to provide food, homes and an opportunity for working. Hopefully, we have professional foresters and government officials who decide the trade-offs regarding forest harvesting. And they are doing a good job. Overall, U.S. forests are in better shape than any time in the last century.

Eugene Wengert
Professor, wood processing
University of Wisconsin

One Vote for Wrinkled Look

Re: "Wrinkled Look is Out" (AW #31, "Letters"). I must vehemently disagree

Correction

Last issue's announcement of the American Association of Woodturners' National Symposium June 25-27 in Purchase, New York, listed the wrong telephone number. To register, call (612) 484-9094.

with Bryan Kopesky and support the sorts of cover pictures you have in general. I'd much rather see a real woodworker looking like he's doing real woodworking than someone who looks like he's nicely posed in an ironed shirt. Stick with the real stuff.

Derek Roff
Albuquerque, NM

Cutting Remarks

The design of the chop saw station on the April magazine cover (AW #31) is questionable. You've created a Rolls Royce with a Yugo stop. It is very similar to the one featured in my video, "Mastering Woodworking Machines," with one important difference. I use the FastTrack aftermarket aluminum stop system, which consists of an aluminum stop and track which is screwed to the edge of the fence board.

Copying an aluminum system is inappropriate because the design works wonderfully in metal but not in wood. There are a number of design flaws [in your stop], including the thin maple lip and the vertical carriage bolt. A better stop could easily be designed using a metal hinge, plywood and a toilet bolt, but it would never be as good as a metal system.

Mark Duginske
Wausau, WI

FastTrack is available from Garrett Wade. Mark Duginske is co-designer of the FastTrack stop system.

Saw Guards Aren't the Key to Safety

Re: "Don't Drop Your Guard" ("Letters," AW #31). I do not use a blade guard, [but] after 50 years of using a tablesaw I still have 10 fingers. I know the safest way to do what I'm doing: Know where the blade is at all times,

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LETTERS

know where your hands are in relation to the blade at all times and give what you are doing your undivided attention at all times. If you drop one of these [rules] you are going to be seriously injured.

John Ingham
Punxsutawney, PA

It's true that most stock tablesaw guards are a pain in the butt and many woodworkers remove them, but we don't endorse this dangerous practice. If you value your fingers, we recommend you buy one of the excellent aftermarket guards available from Biesemeyer, Delta and HTC Products. These "overhead" guards mount on most saws and are very convenient to use.

Gel Stain Rejoinder

Although what Bob Flexner says about some gel stains is true (AW #31),

that they do hide grain, I've found that the gel stain from Clearwater Color Co. does not have that tendency. It works much differently than most of the products you show and I don't think it should have been grouped with the rest.

Jim Crook
JC Craftworks
Doylestown, PA

Bob Flexner states that all gel stains (AW #31) do not penetrate wood as deeply as their liquid counterparts, and that all gel stains, even those that only contain dyes as colorants, will obscure natural wood grain characteristics.

While I cannot speak about the other gel stains pictured and cited in the article, the assertions regarding non-penetration and grain hid-

ing of all gels simply do not hold true for our products.

The Clearwater Color Co. Smooth & Simple Wood Stains are water-based, non film-forming dye stains which provide deep, even penetration and superior grain-enhancing properties.

M. Jane McKittrick, president
Clearwater Color Co.
Easton, PA

What's on your mind? We value your comments, complaints and corrections. Send your letters to: "Editor," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098, or telephone your message to us at 215-967-7776. FAX: (215) 967-8956.

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Q & A

Hollow Chisel Backs

Q *After years of sharpening I've nearly worn away the hollow on the back of my favorite Japanese chisel. Is there some way to regrind the hollow? Also, what do you think about hollowing the back of a Western chisel?*

Peter Mickel
Flagstaff, AZ

A You shouldn't try to re-create the hollow on the back of Japanese chisels for a very simple reason: There isn't enough material to do this without destroying the chisel.

Japanese chisels are formed from laminated steel (see AW #18). The soft, top layer is the thickest and acts like a shock absorber for the thin, hard cutting steel underneath. The hollow is forged into this second, harder steel, and that means once the hollow is gone, any attempt at grinding a new one will expose the soft portion of the chisel. After that, the cutting edge will not have any hard steel behind it for support and will likely bend or break when you strike the chisel with a mallet.

I would never grind a hollow in my favorite Western chisel (an old Buck Brothers) because, like all Western chisels, the cutting edge isn't as tough as the Japanese variety, and once hollowed it would bend or break during use.

For more on Japanese chisels, refer to my book, *Japanese Woodworking Tools: Their Traditions, Spirit and Use* (1984, Taunton Press, Newtown, CT 06470).

Toshio Odate
Author, sculptor and shoji maker
Woodbury, CT

Clogged Super Glue Bottles

Q *Every time I buy a bottle of cyanoacrylate adhesive ("super glue") the nozzle clogs up after a couple of weeks. What's the trick for keeping the nozzle from clogging? And what's the best way to store it?*

Willard Schell
Orono, ME

A To prevent clogging, you can rap the bottom of the bottle on a flat surface after use. This clears most of the glue in the nozzle before it sets. However, if you're like me, you'll eventually forget, and the tip will become plugged. My fail-safe method is to soak several tips from old cyanoacrylate bottles in a can of acetone, which is the solvent for this type of glue. When one tip clogs, I simply trade it for a clean one from the can. (A word of warning: acetone is both toxic and flammable, so keep your nose away and store it in a safe place.)

To store this glue, keep the cover on your bottle, and place it in a cool spot when not in use. Unopened containers should be stored in a freezer to prolong shelf life, but once your adhesive turns "syrupy," it's time to get a new bottle.

Incidentally, projects glued together with cyanoacrylate glue can be taken apart by soaking them in a pan of acetone. Be careful, however, since acetone has a tendency to bleach dark woods.

Stephen Blenk
Turner
Sequim, WA

Warped Tabletops

Q *I have a 5-ft.-dia. maple tabletop that was stored in a damp area. As a result, the top has cupped on the underside. Is there a quick-fix that doesn't involve hours of tedious labor?*

George A. Ashby
Kentville, N.S., Canada

A The prevailing wisdom on straightening a warped top like this is to place it in the sun, concave side down, until it returns to its original flatness. A few woodworkers claim that wetting the underside helps to speed up the process. After the wood has straightened out, check its moisture content (MC). If it's fairly high, say 12 percent or so, clamp the top flat with cauls and store it in a warm, dry place until it drops to around 8 per-

cent. Since you live in a maritime province, the average indoor equilibrium MC of furniture wood is in the 8 to 9 percent range, so you don't want it any drier than that. After the top is dry, apply a finish to the top's upper and lower surfaces. This way seasonal movement will occur at an even rate.

When building a large surface such as a tabletop, you can prevent warping by using quartersawn stock and by making sure that the underside gets as much finish as the top, show side.

Ellis Valentine
Associate editor

Preventing Bubbles In Water-Based Finishes

Q *When I brush water-based finishes I have trouble getting a smooth surface. I've tried disposable foam brushes as well as polyester and nylon bristle brushes. No matter what brush I use I still end up with foamy bubbles.*

Walter Weir
Brandon, MS

A The type of brush you use is not the problem. The particular water-based finish you use and the weather determine whether or not you'll get bubbles.

Most water-based finishes brush smoothly in ideal weather conditions (70°F, 40 percent humidity). But many have bubbling problems when it's colder or hotter than that, the kind of weather we usually get when it's time to lay down that perfect finish. If you're getting bubbles when the temperature is below 70°F, dry off your brush with a clean cloth and run your brush back over the finish to pick up as much of the excess as possible. The idea is to make the finish as thin as possible. Do the same when the temperature is above 80°F, although in hotter weather the finish tends to dry so fast that it becomes difficult to go back over it with a brush. If this happens, thin the finish in the can by adding 10 percent water.

If you're still getting bubbles, switch

Q & A

to another water-based finish. Of the 10 or so I've tried, I find that Zar, Benjamin Moore, General Finishes, and Hydrocote Brushable are the best when the weather isn't.

Bob Flexner
Woodworker and furniture restorer
Norman, OK

Rust On Machines

Q My shop is damp in the summer and even though I run a dehumidifier continuously, the cast iron tables of my machines get little rust spots on them. I wax the tables about twice a year with paste wax. Is there a better way to prevent this?

R. Jay White
Perdido, FL

A First, check the type of paste wax you're using: Not all paste waxes are the same. I've had good success with Minwax. Avoid products that contain silicone (such as automotive waxes and talcum powder) because the

silicone can migrate into your workpiece and cause finishing problems.

Before waxing, do some prep work on the surface you're trying to protect. It should be as smooth as possible. The goal is to remove most of the small pits in the metal because corrosion will recur rapidly in these areas. To smooth a surface, use silicone carbide paper (relax—this is a "friendly" type of silicone), polishing to 600 grit.

I suggest you beef-up your waxing regimen to once a month, and for a surface that gets daily use, once a week. Check the shop for any source of chlorine (bleach, swimming pool additives and sidewalk salt) and relegate it to the shed outside. This stuff attracts rust like flies to . . . well, you get the picture.

Carl Dorsch
Research engineer
Pittsburgh, PA

WHERE TO FIND IT

Teflon (in rolls or sheets up to 12 in. wide) is available from Small Parts Inc., 13980 NW 58th Court, Box 4650, Miami Lakes, FL 33014, (305) 557-8222.

Hardwood dowels in oak, walnut, cherry and mahogany are available from Woodworker's Supply, 1125 Jay Lane, Graham, NC 27253, (800) 645-9292.

Mother-of-pearl for inlay work is available from Stewart-MacDonald Guitar Shop Supply, 21 N. Shafer St., Box 900, Athens, OH 45701, (800) 848-2273.

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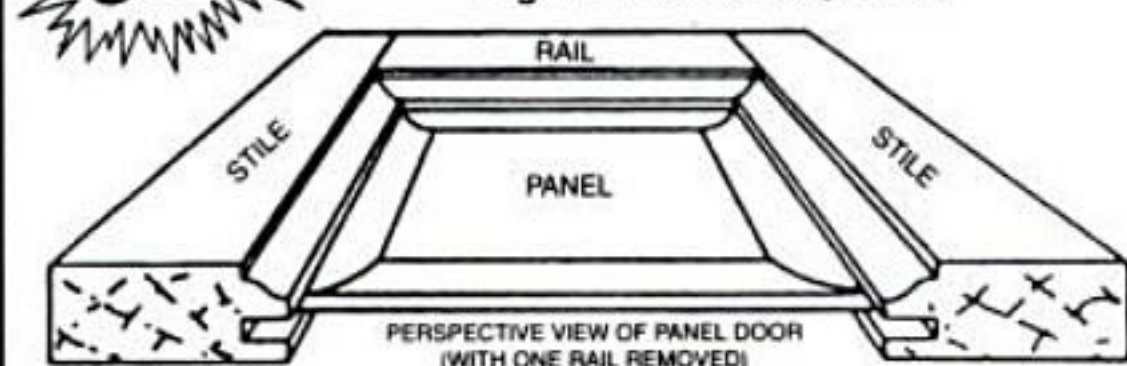
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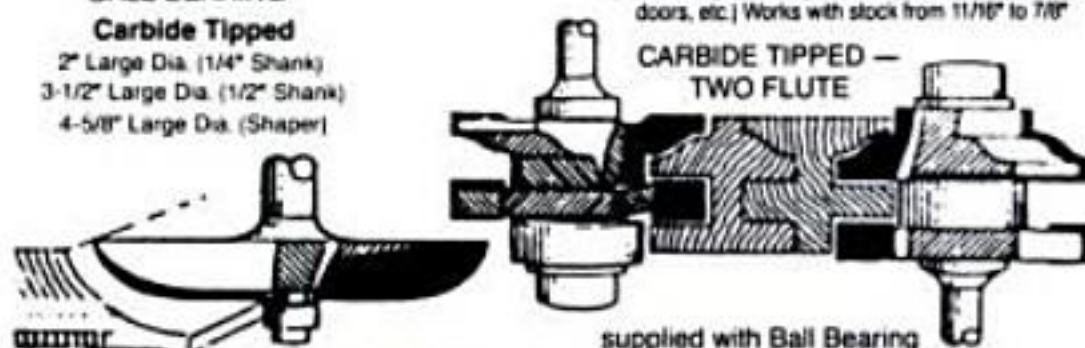


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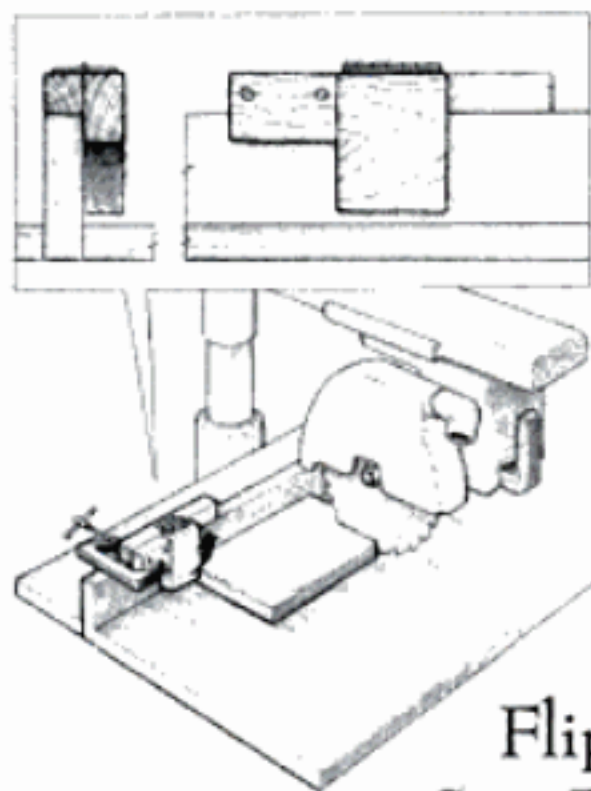


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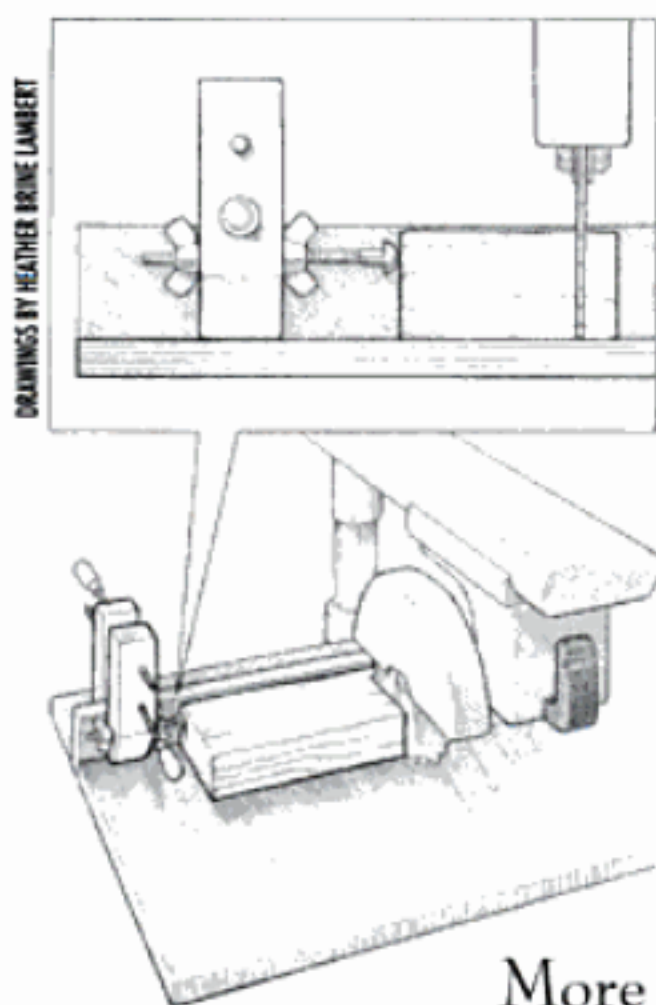
TECH TIPS



Flip-Up Stop Block

I always use this adjustable stop, made with a simple cabinet hinge, when cutting a number of pieces the same length on a radial arm or chop saw. I flip the stop up, square one end of the stock, then turn the workpiece around and trim it to length with the stop down. All I need to do to reposition the stop block is slack the clamp and slide it along the wood fence.

Richard Hooton
East Gadsden, AL



More on Stop Blocks

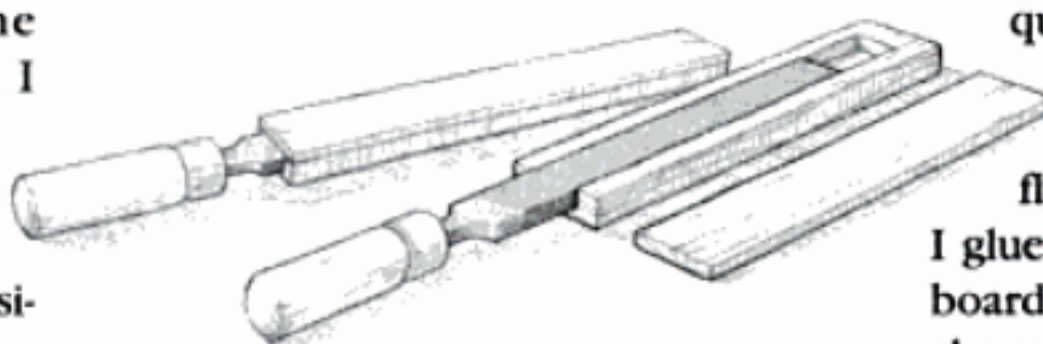
Instead of clamping a stop block to the fence on my radial arm saw, I use a modified 6-in. wooden hand screw. I roughly set the hand screw then fine-tune the position by moving the head of a 1/4-in. round head machine screw that fits in a hole drilled in one arm of the clamp. Wing nuts on either side of the screw hold it in place once I've adjusted it.

I.R. Kevbane
Amarillo, TX

Save the Band-Aids

When wood carving, I protect my thumb from my razor-sharp knives with a finger cut from a glove. A \$2 pair of canvas and leather work gloves gives me 10 thumb protectors. I also find these protectors help me better grip the work.

Stan Borup
Covina, CA



Wood File Case

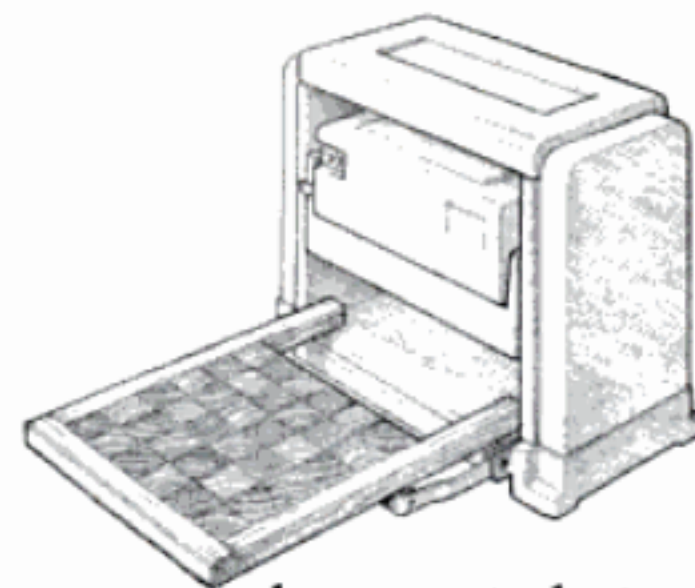
Do you keep your files jumbled together in a drawer where they can take expensive nicks out of each other? If the answer is yes, try these simple scrapwood file cases. I make each one in two halves, first tracing the outline of the file or rasp onto the surface of one piece of wood. After routing out a hollow, so the file fits loosely, I glue on the other half.

Carl Yarowski
Columbus, OH

No Sweat Brass Polishing

Before installing brass hardware on any of my projects I first toss it into a vibrating case polisher to clean it. These devices are intended for cleaning ammunition cartridges before reloading and consist of a container of fine talcum powder attached to an electric motor. It's the vibration produced by this motor that does the cleaning and polishing. The machine is very effective for cleaning nooks and crannies that are impossible to reach with a brush or rag. Even better, there are no caustic chemicals involved, nothing to wipe off, and no elbow grease. I bought mine at a sporting goods store where you'll find several different sizes and brands.

Michael Chilquist
Pittsburgh, PA



Planing End Grain Cutting Boards

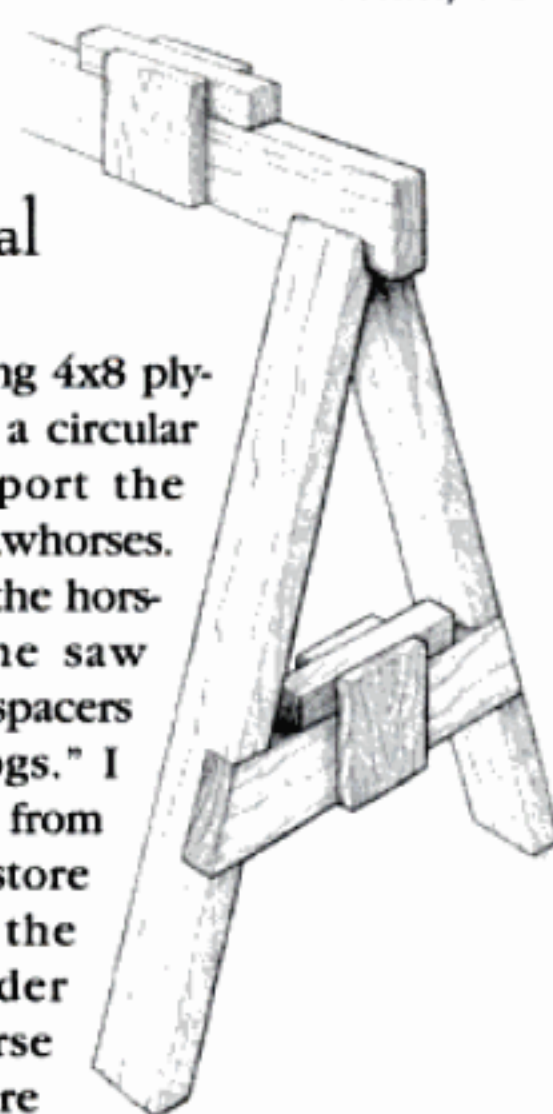
When making end grain cutting boards 10 in. or 12 in. square, I surface them in a thickness planer. However, this can be dangerous: If the surface of the cutting board is uneven (as it's likely to be), the infeed rollers may not adequately grab the wood before the planer knives strike it. If this happens, the board can come flying back at you. To prevent this, I glue wood strips to each side of the board. The strips extend about 1/8 in. above the surface of the cutting board and about 6 in. beyond the front edge of the board. This gives the rollers something solid to hold onto as the board feeds through the planer. I also glue a strip to the rear edge of the board so the knives don't tear out the grain at the rear edge of the cutting board. I leave the three strips on until I've finished sanding and then bandsaw them off.

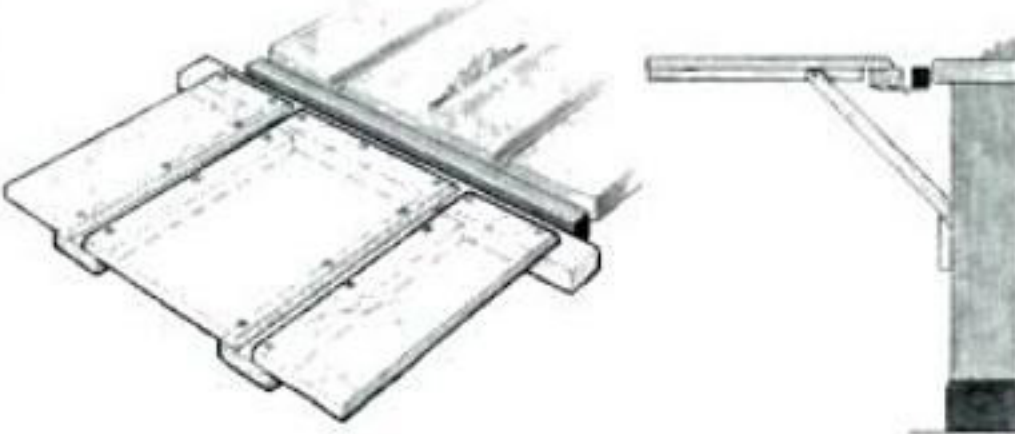
Todd Bayer
Bethel, VT

Sacrificial Dogs

When cutting 4x8 plywood with a circular saw I support the sheets on sawhorses. To protect the horses from the saw blade I use spacers or "saw dogs." I make these from scrap and store them on the brace under the sawhorse when they're not needed.

Ronald Johnson
Madison, AL





Drop-Down Feed Table

When ripping long planks I often found if I used a roller support it ended up in the wrong place—or I managed to tip it over. So I decided to make a hinged outfeed table that drops down out of the way when not in use. I first ripped a 20-in. by 24-in. piece of $\frac{1}{2}$ -in. plywood into three sections. Then I glued and screwed these to two 1x4 pieces of hardwood creating slots that matched the miter gauge slots on my tablesaw. I then hinged the whole assembly and attached it to the back edge of the saw table as shown. The final step was to bevel the front edge of the new outfeed table so a workpiece wouldn't hang up when I push it across. Two legs support the extension table when it's in use, then fold up and out of the way when it's down.

Derek Roff
Albuquerque, NM

Testing, Testing...

When gluing up a large assembly, I like to test the strength of the glue by gluing a couple of pieces of scrap together at the same time. Then when the glue has cured, I try breaking the test pieces apart. If they come apart too easily it warns me that either the glue has reached the end of its shelf life, I mixed it carelessly or the shop was too cold when I glued up.

Kara Brine
Avon, CT



Tack Extractor

I needed a tool to remove tacks embedded in old lumber, so I took a worn-out jointer blade and ground one end to a round. Then I wrapped the other end with twine to make a handle. This little tool works so well that I keep finding new uses for it.

Louis Lopez
Plano, TX

TECH TIPS

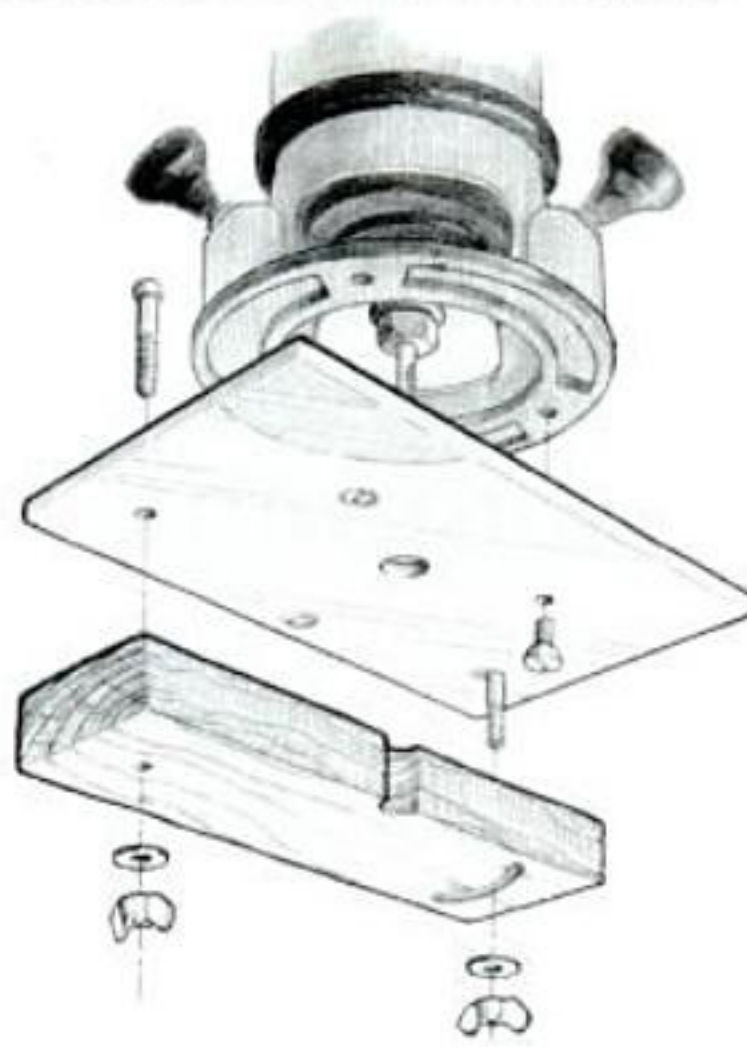
Overhead Storage

When a crowded city runs out of room it expands upwards. I apply the same logic when storing clamps in my basement shop. I clamp hand screws directly to the overhead joists and fasten C-clamps to a board screwed to the bottom edge of a joist. Spring clamps are best clipped onto a thin board screwed to the side of a joist.

Carl Dorsch
Pittsburgh, PA

Custom Router Fence

Frustrated by my inability to steadily feed wood past the bit in my router table, I took the router out of the table and combined it with this adjustable

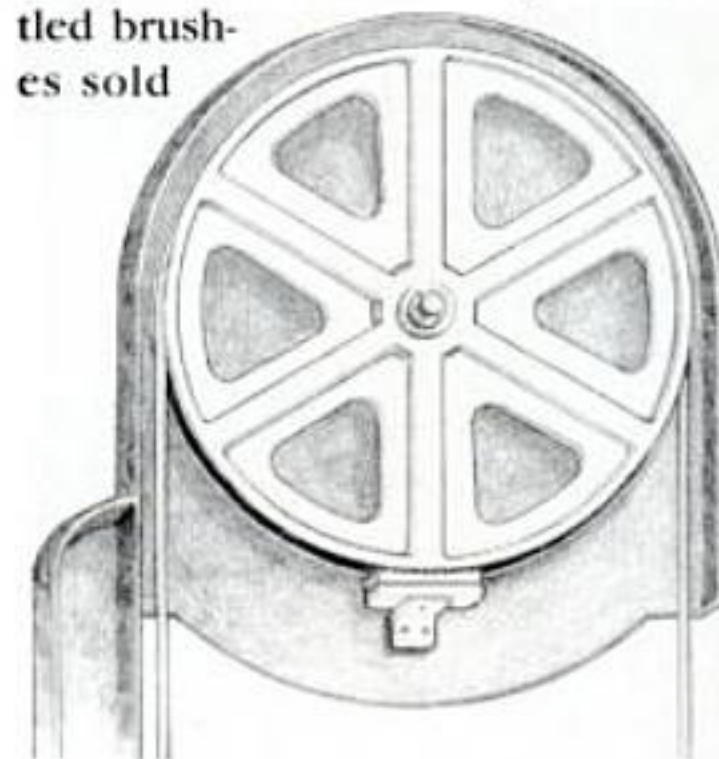


fence. The fence attaches to the base of the router and lets me control a cut while using the router freehand. The assembly has a Plexiglas base with four holes drilled for the baseplate screws and a larger one, in the center, for the bit. The fence is hardwood with a curved slot at one end, as shown, for adjusting the width of the cut. I drilled undersized holes through the Plexiglas so the two $\frac{1}{4}$ -in. bolts I used fit snugly. A couple of wing nuts with washers make the fence easily adjustable.

John McDonald
West Newbury, MA

Born-Again Brushes

Bandsaw wheels can soon get out of balance if pitch and sawdust are allowed to build up on the rubber tires. I've found that the small, bronze-bristled brushes sold



to clean suede leather shoes are ideal for keeping the tires clean. Mount one on the upper wheel, and one on the lower with steel corner brackets. You'll find that the brushes not only keep the tires free from gummy sawdust but also remove any static electricity which can cause problems in very dry climates.

Donald Kinnaman
Phoenix, AZ

Dealing With Defects

How to get the most out of your lumber when sapwood, knots and other defects mar the surface? I make templates for the parts of my furniture out of $\frac{1}{8}$ -in. hardboard. Then I can lay out the parts on the lumber by tracing around the templates, missing the defects and so minimizing waste. I keep the templates in case I want to make the same piece of furniture again.

W. Curtis Johnson
Corwallis, OR

Know a better way of doing something? Designed a clever jig? Send your woodworking tips, along with a sketch or a snapshot to: "Tech Tips," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. We'll pay you \$50 if we publish your tip.

CARBIDE SAW BLADES

How To Pick The Right Blade For Your Job

BY DAVE SELLERS



Plenty of choice here. There's a type of carbide blade for any cutting job in your shop.

MITCH MANDEL

When it's time to buy a new saw blade, there's a compelling reason to pick carbide over high-speed steel. Carbide blades can handle the toughest material and will keep working up to 50 times longer between sharpenings, giving you more and better cuts for your cash. But that's where the easy choices end.

There's such a flood of carbide blades on the market (Systimatic alone offers 30 different 10-in. blades) and so many variables that you can quickly get bogged down in a swamp of terminology, prices and advertisers' claims.

If you're like me, you just want to know how to choose the right blade for the type of woodworking you do, and how many blades you really need to buy. I decided to find the answers to

those questions by talking to a number of blade manufacturers and woodworkers, and visiting a nearby factory. (See sidebar, page 27.) The research convinced me that while no one saw blade will be perfect for all applications, you can buy reasonably good blades for less than \$60, and you can probably get by with just two or three if you choose wisely.

In this article I'll help you make those choices by detailing the common types of blades. Then I'll discuss how to tell a quality blade from an inferior one. And finally, I'll recommend some blades for use on your tablesaw, miter saw and radial arm saw. One note: I'll mention specific brands here but I won't endorse any. The only fair way to compare brands would be to run

dozens of blades until they turn dull, and that falls beyond the scope of this article. That said, let's look at the types of blades you're most likely to see.

Common Types Of Blades

The most basic way to categorize blades is by the shape and configuration of their teeth, called the grind. The "Tooth Talk" sidebar (opposite page) explains how the four common tooth grinds differ, but here's what each does best:

Blades with "Flat Top" (FT) grinds are ideal for fast ripping, especially in rough, thick, contrary timber—the stuff that binds other blades to a smoking halt. They'll also produce perfect grooves along the grain and if sharp will make the best corner spline and finger

joints. They don't crosscut or miter well and will leave the edge of a piece of plywood frayed like a paintbrush.

Blades with "**Alternate Top Bevel**" (ATB) grinds are the first choice for crosscutting and for working plywood. Their teeth shear the wood, providing smooth cuts and reducing surface splintering. They're versatile enough to rip and miter too, though they won't rip as fast as an FT grind. AW contributing editor Jim Cummins says he keeps one on his saw 90 percent of the time.

Blades with "**Alternate Top Bevel & Raker**" (ATB&R) grinds are considered all-purpose blades. They'll do rips and crosscuts equally well, but they can't make either cut as effectively as the grinds mentioned above. These "combination" blades always have been thought of as good compromises for the woodworker who does a variety of cuts and doesn't want to change blades all the time. But several of the experts I talked to argued against buying one. They said ATB&R blades haven't proven to cut any better than a standard ATB blade.

Blades with "**Triple Chip**" (TC) grinds are best for cutting man-made materials such as particleboard, plastics, non-ferrous metals and solid surface synthetics like Corian, all of which tend to be very abrasive. However, when crosscutting they may splinter the edges of solid wood.

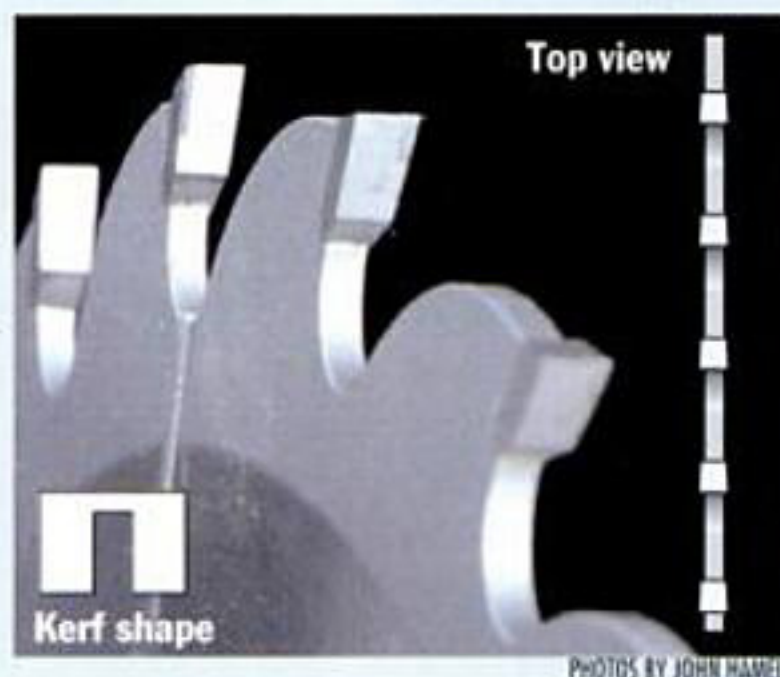
Beyond these major categories of blades, manufacturers have developed hybrids for special purposes. I'll mention two of them here. The "**High ATB**" blade has ATB teeth that are beveled at a steep angle (30° to 40°), which makes it a good choice for cutting thin veneers, delicate laminates and melamine coated particleboard (MCP). The sharp high points of the teeth slice cleanly through splintery material, but they'll also dull much sooner than teeth with less acute angles and they may scratch the side of the cut—especially if the saw arbor or the blade has runout. "It may seem contradictory," says Fred Garms, product manager for DML, "but duller blades (those with more blunt profiles) stay sharp longer."

Another special purpose blade is the "glue-line rip blade" (Systimatic markets one as model 1620 and FS Tool as

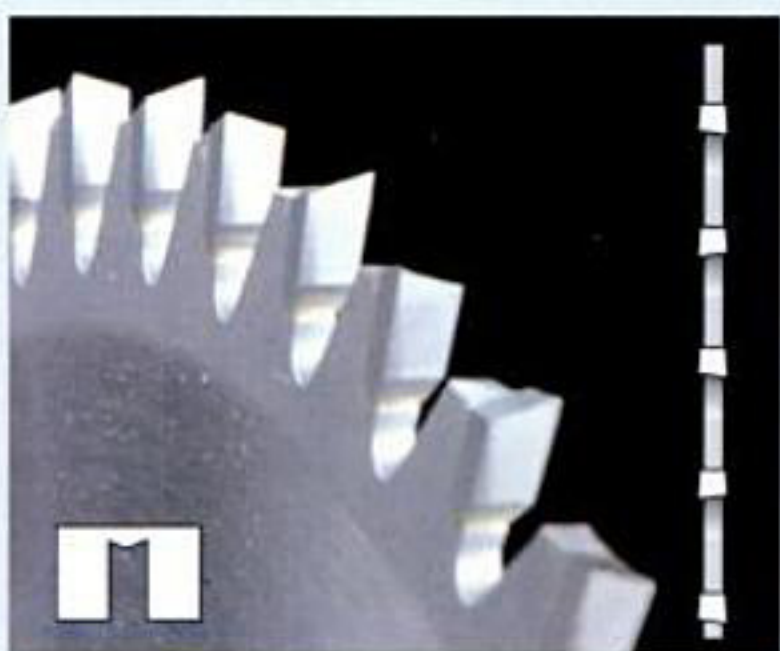
TOOTH TALK

A Look At the Basic Shapes and Angles

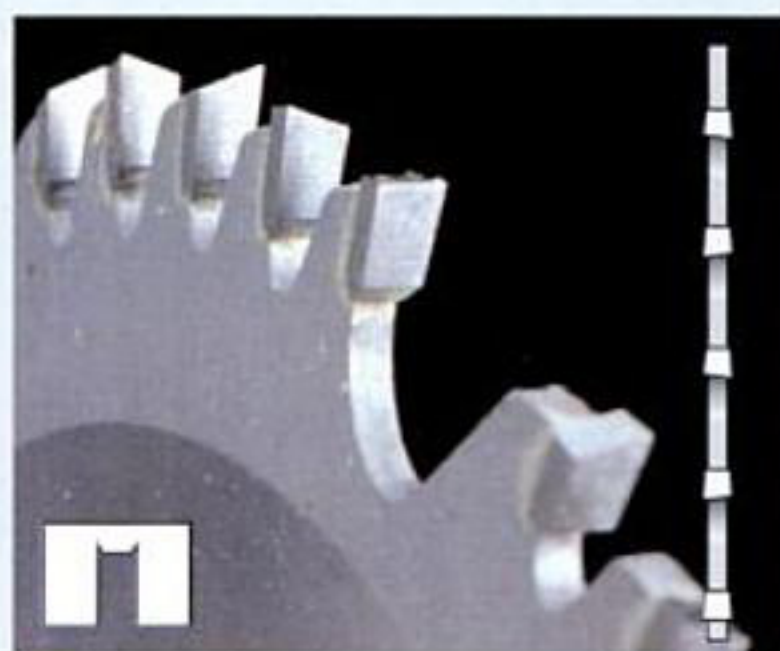
Although the steel body or plate is the backbone of a saw blade, it's the teeth that ultimately make the cut. And it's in the configuration of the teeth, or grind that you find the greatest differences between blades. Here are the four most common grinds and how each one works.



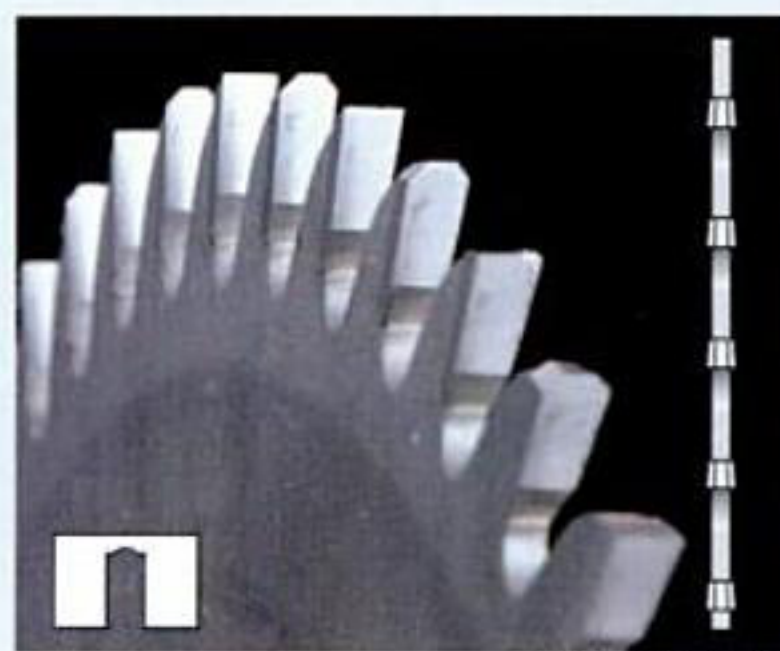
Flat Top (FT), or raker tooth grind has chisel-like teeth that chop into wood, tearing rather than slicing fibers. Won't dull as quickly as sharper pointed grinds, and is easy to sharpen. Removes large amount of wood rapidly, so it's configured with fewer teeth and large gullets to handle a bigger chip load efficiently. Best for fast ripping.



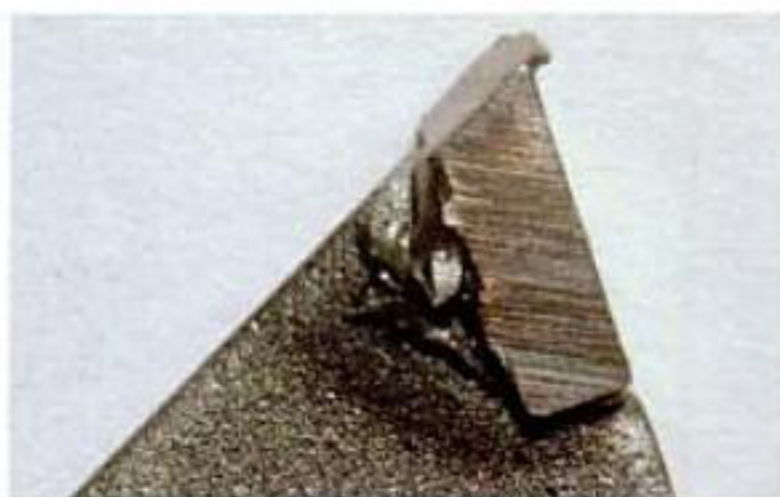
Alternate Top Bevel (ATB) grind has the tops of teeth angled to create points, with alternate teeth pointing in opposite directions. Sharp teeth sever fibers cleanly and prevent tearing or splintering, but points of teeth wear more quickly than other grinds. Most suited for crosscutting or mitering.



Alternate Top Bevel & Raker (ATB&R) grind features a flat-top raker tooth which is followed by four ATB teeth, and preceded by a large gullet. It's capable of ripping and crosscutting equally well. Can rip faster than regular ATB blade, but will cut rougher.



Triple Chip (TC) grind has two-tooth pattern: first tooth chamfered on each top side; second tooth is flat top raker. Chamfered tooth cuts center of kerf, while raker tooth cuts edges. TC grind has blunt profile that stays sharp longer than others. Good for abrasive, man-made materials.



Good and bad blades: Poor brazing and rough grind marks on tooth at left are a tip-off to a cheap blade that will never cut smoothly. At right is the smooth brazing and fine grinding common on a high-quality blade.

model L22), which manufacturers claim rips so cleanly you won't need to joint your edges before gluing. These blades have a TC grind with few teeth, a high hook angle and very shallow side clearances. (See Fig. 1.)

The Number of Teeth

Besides tooth configuration, the other major factor that determines what type of cutting a blade does best is the number of teeth. Really, there are only four things to keep in mind:

- Ripping requires fewer teeth than crosscutting.
- Cutting soft, light material requires fewer teeth than hard, dense material.
- Cutting thin material safely requires more teeth than thick material.
- A blade should have enough teeth to keep at least two but never more than four teeth in the cut while sawing.

What Determines Quality?

Just as a pricey BMW sedan is likely to outshine an inexpensive Hyundai coupe, more costly saw blades generally will cut better and last longer than less-expensive ones. So the first way to separate the wheat from the chaff is to look at price.

I've arbitrarily divided 10-in. carbide blades into three broad groups: economy, consumer and industrial/professional. These aren't strict classifications, but most of the people in the industry I talked to agreed they work as general guidelines.

Economy blades tend to come in blister packs and the 10-in. ones cost \$5 to \$20. Jim Brewer, product manager at Freud, calls them "disposables" and advises against buying these blades for anything but rough carpentry.

Consumer blades cost roughly \$25 to \$50 and provide good overall

quality. These blades rate in the B range for quality of cut, durability and length of time between sharpenings.

Industrial/professional blades contain the best materials and are made with the most attention to quality control. Here are the A+ blades that have the flattest plates, produce the finest cuts and last the longest between sharpenings. You can expect to pay top price for professional blades—in the \$50 to \$150 range.

Now that I've talked about the importance of price, I'll throw you what seems like a curve: You're crazy if you buy one blade *solely* because it costs more than another. That's because in the end the quality of manufacturing determines how well and for how long a blade cuts, and price isn't always a reflection of quality.

So how do you recognize good manufacturing? Let's start with the foundation of every blade, the saw plate.

Good saw plates will be nearly dead flat. In fact, in an extensive test of blades that AW columnist Michael Dresdner conducted a few years ago, the two attributes that distinguished the top performers were plate flatness and fineness of tooth grind.

Flatness is most important because your saw blade serves as a reference surface for everything you cut, and if the plate is warped or wobbles even a bit

THIN-KERF BLADES

With their thinner teeth and plates, thin-kerf blades are touted as a sort of low-fat alternative to the average carbide saw blade. They cut a kerf that's about $\frac{3}{32}$ in. thick (compared with the $\frac{1}{8}$ -in.-thick kerf common on regular blades) and that has several advantages.

Foremost, it reduces the amount of material removed, so you don't need as much horsepower to cut well. One editor here, who's still married to the $\frac{3}{4}$ HP motor on his belt-driven table saw from the 1930s, noticed an immediate difference when he switched to a thin-kerf blade.

But thin-kerf blades aren't just for small saws. Another editor uses one on his 3 HP Bridgwood tablesaw and swears by it. He says he can rip 2½-in.-thick oak effortlessly and it's even good for jointing the edges of veneer.



A thin-kerf blade, left, requires less horsepower and wastes less wood than a regular blade, right.

You'll also find a thin-kerf blade is a good choice if you're working some expensive exotic species where you're worried about wasting precious wood.

But thin-kerf blades aren't a magical answer to all your woodworking needs. They tend to heat up more easily under heavy cutting than standard blades, which can cause distortion and wobbling. So if you use one you'll have to monitor feed rate closely and work carefully when cutting dense woods. If wobble is still a problem you can consider installing blade stabilizers, those machined steel discs that you fit on the saw's arbor shaft to stiffen the saw plate. The one drawback to blade stabilizers is they limit the depth of cut.—D.S.

under pressure, you're never going to get clean cuts. (Keep in mind that even the straightest blade won't run true if your saw is poorly tuned.) You can check a plate for flatness the same way inspectors at the Forrest blade factory do. (See sidebar, page 27.) Just set a straightedge on the plate and hold the plate up to a light. If more than the tiniest sliver of light peeks under the straightedge, don't buy it. A quality blade should have no more than 0.004 in. of runout, and top of the line blades will be even better.

Another factor that affects how straight a blade will run through a board is how it is *tensioned*: a process during manufacture of compressing a thin ring of the steel on the plate. (See Fig. 1.) Tensioning counters the stresses of centrifugal force and heat that could distort the blade in use. You can tell blades that have been roll tensioned (the most common form) by the contrasting shaded ring around the rim. (See Fig. 1.) Some manufacturers also hand tension blades with a hammer, but they usually grind off the tell-tale dimples which show that this work has been done.

The **arbor hole** also can be a tip-off of the blade's quality. You want the hole perfectly sized. The best blades have arbor holes that have been precisely ground or reamed to size and it's easy to note signs of this. You just feel the hole. It should have smooth sides and sharp edges. Reject a blade with a rough or burred hole, or one that's bent in on one side. This means the hole was probably stamped on a press and it may be oversized or located imprecisely.

Grinding Shows Quality

The other major sign of blade quality is how the teeth have been sharpened. (See photo, opposite page.) Some manufacturers sharpen with progressively finer diamond wheels up to 600 grit. Other manufacturers stop at coarser grits. And on cheap blades the teeth may have a dull, granular appearance, which means they haven't been ground at all. This will become readily apparent if you use a hand magnifier to examine grind marks when you're shopping.

As far as the composition of the teeth goes, manufacturers choose car-

FIG. 1: BLADE ANATOMY

Tension ring counters distortion due to centrifugal force and heat.

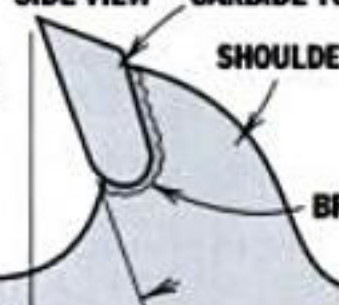
Expansion slots reduce warping due to heat buildup.

FRONT VIEW



Side clearance minimizes tooth contact with wood, reducing friction.

SIDE VIEW



CARBIDE TOOTH

SHOULDER

BRAZING

HOOK (RAKE) ANGLE

Positive hook angles cut more aggressively than negative ones.

Gullets evacuate chips and sawdust after teeth cut.

bide according to the type of work each blade is designed to do. Blades with the hardest carbide (C4 grade) are great for cutting abrasive materials like MDF and particleboard because C4 resists dulling best. But it's more likely to chip if you drop the blade or handle it carelessly. Softer carbide (C2-C3 grade) has higher impact strength (toughness), which can be a blessing for some applications. "Hidden knots can chip a hard carbide tooth sooner than a softer, tougher tooth," says Jim Brewer of Freud.

Surprisingly, it's not abrasion that dulls carbide the quickest; it's the heat and acids in the wood that break down the cobalt binder that holds the carbide particles together. The moral: Don't let your blade overheat, and keep it clean.

Recommendations

So now that we've gone over the basics about blades, your next question is *which* should you buy? The chart on the next page gives suggestions for the tablesaw, radial arm saw and miter saw. You'll see there's not much difference in the type of blade recommended for the saws, but blades for the radi-

al arm saw should have a low or negative hook angle and fewer teeth so they'll be less prone to jam in the work or jerk toward you. Negative hook blades on a miter saw will also produce the cleanest exit cuts (on the bottom and back of your workpiece).

How *many* blades you buy will depend on what you want to spend. Kelly Mehler, a professional furniture maker in Berea, Kentucky, gets by most of the time with just two blades on his tablesaw: an industrial quality 30-tooth ATB blade as an all-purpose blade, and for smoother cuts a similar blade with 40 teeth. "When my saw is really tuned well, I can get a glue joint rip right off the saw with that blade," says Mehler.

Jim Cummins, who owns a frame-making shop in upstate New York, takes a different tack: "For your tablesaw, buy a 30-tooth ATB with a small top bevel, maybe 5°, and a 40-tooth with a 15° top bevel," he advises. "You'll leave one or the other on the saw most of the time and have a good back-up when one's out being sharpened. Then get a rip blade for times when you do a lot of ripping, and a 60-tooth TC blade for fine crosscutting."

BLADE RECOMMENDATIONS

There are three general factors to consider when buying a blade: the type of machine you have, the type of material you'll be cutting, and the type of cutting you intend to do (rip or crosscut). This chart offers recommendations giving consideration to each of these factors. Beyond this, keep in mind:

- The lower the hook angle of the teeth, the smoother and slower the blade will cut and the greater the feed pressure you'll need to apply.
- The greater the number of teeth the smoother and slower the blade will cut.

Type of Cut	Tablesaw	Radial Arm Saw	Power Miter Saw
Rip (solid wood)	FT or ATB 20-40 teeth	FT or ATB 20-40 teeth	N.A.
Crosscut (solid wood)	ATB 60-80 teeth	ATB 40-60 teeth ^{(A) (B)}	ATB 60-80 teeth
Plywood	ATB 60-80 teeth	ATB 40-60 teeth	ATB 60-80 teeth
Veneered Panels	ATB or TC 60-80 teeth ^(C)	ATB or TC 40-60 teeth ^(C)	ATB or TC 60-80 teeth ^(C)
Particleboard MDF, Plastic, MCP, etc.	TC 60-80 teeth ^(B)	TC 40-60 teeth ^(B)	TC 60-80 teeth ^(B)
All-Purpose	ATB&R or ATB 40-60 teeth	ATB&R or ATB 40-60 teeth	ATB 60-80 teeth

FOOTNOTES:

- (A) Low or negative hook angle reduces likelihood of saw-carriage kickback.
 (B) Low or negative hook angle produces least tear-out on bottom surface.
 (C) ATB blades with high bevel angles will cut cleanest but dull quicker than TC blades.

I'll offer some recommendations that are keyed to budget. If you can afford three blades, I'd recommend a 40-tooth ATB for most of your work, a 24-tooth FT for heavy ripping and a 60- or 80-tooth TC blade for man-made materials. If you don't want to spend that much, forget the TC blade. And if you're going to buy just one blade, a 40-tooth ATB is a good choice.

What to Pay

Finally, let's address how much you should spend. Cummins offers a seat-of-the-pants formula. He says, take the cost of your saw, divide it by three and that amount is the total you should spend on the two or three blades you need to buy. That's one way to approach it. A more general guideline is if you're looking for a good compromise between quality of cut and low price, buy from the *consumer* category. And if you're looking for the finest cut available, the greatest durability and the longest life between sharpenings look to the *professional* category where you can expect to pay \$50 to \$150 per blade.

Whichever blades you decide to buy, make sure you keep them sharp. When a blade starts to dull it begins wearing much faster and that reduces its life dramatically. ▲

DAVE SELLERS

is an assistant editor of AW.

Thanks to tough new European standards, the carbide saw blades sold in this country are getting safer to use.

The standards, which were developed as part of Europe's shift to a common market economy, require that blades and tool bits be designed to reduce kickback. Sold in the United States as anti-kickback blades, these blades have a saw plate that is configured with a protruding shoulder behind each tooth. (See photo.) The high shoulders limit the bite of the teeth so they are less likely to dig in and throw the workpiece back. The

SAFETY BLADES



High shoulder extensions limit the depth of cut to minimize kickback on this rip blade.

minus is the high shoulders slow the feed rate, although this isn't an issue unless you rip at a feed rate in excess of 18 fpm (feet per minute).

Another safety innovation is the negative hook angle (0° to -10°) blade. On radial arm and sliding compound miter saws, the low hook angle limits the tendency for the blade to ride up on the work and jerk toward you. On miter saws, they counter the blade's tendency to catch the stock and throw it. In our test of sliding compound miter saws (AW #31), we found negative hook angle blades cut less aggressively than regular blades.—D.S.

SOURCES

Carbide saw blades are available from:

▶ Amana Tool Corp.
(800) 445-0077

CIRCLE #601

▶ CMT Tools
(800) 531-5559

CIRCLE #602

▶ Delta International Machinery Corp.
(800) 438-2486

CIRCLE #603

▶ DeWalt Industrial Tool Co.
(800) 433-9258

CIRCLE #604

▶ DML Inc.
(800) 233-7297

CIRCLE #605

▶ Eagle America
(800) 872-2511

CIRCLE #606

▶ Forrest Manufacturing Co. Inc.
(800) 733-7111

CIRCLE #607

▶ Freud USA Inc.
(800) 334-4107

CIRCLE #608

▶ FS Tool Corp.
(800) 387-9723

CIRCLE #609

▶ General Saw Corp.
(800) 772-3691

CIRCLE #610

▶ Grizzly Imports
(800) 541-5537 west
(800) 523-4777 east

CIRCLE #611

▶ LRH Enterprises
(800) 423-2544

CIRCLE #612

▶ Oldham/US Saw
(800) 828-9000

CIRCLE #613

▶ Sears
(See your nearest Sears store)

CIRCLE #614

▶ Systimatic
(800) 426-0000

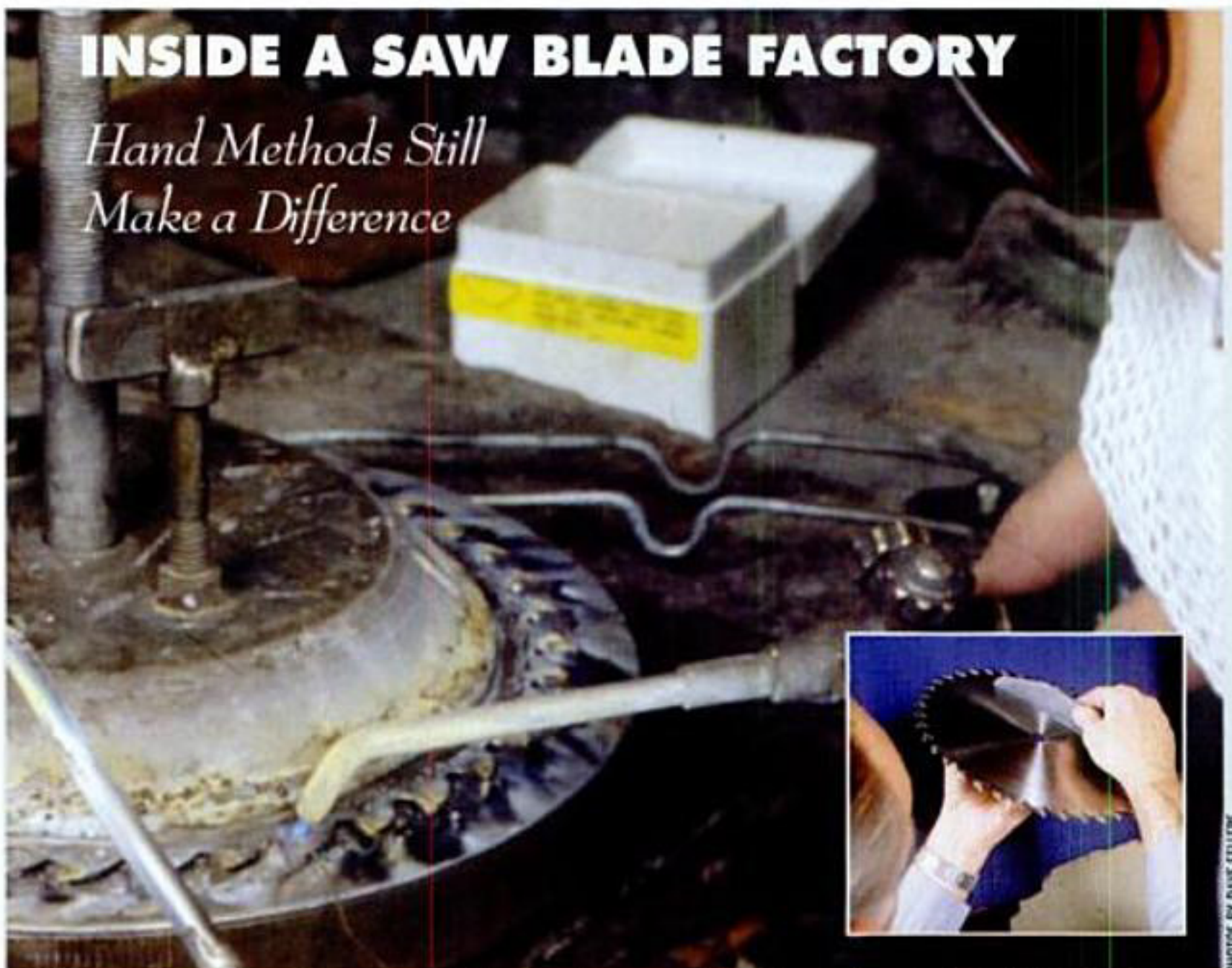
CIRCLE #615

▶ Vermont American
(704) 735-7464

CIRCLE #616

INSIDE A SAW BLADE FACTORY

*Hand Methods Still
Make a Difference*



PHOTOS BY DAVE SELLERS

At Forrest, workers braze carbide teeth to saw blanks by hand. Each blade is checked for flatness and straightened by hand.

Jim Forrest knows saw blades. He lives, breathes and probably dreams saw blades. And he's spent a good part of his life thinking about what it feels like to be a carbide tooth plowing through a chunk of wood.

This became clear to me during a recent visit to the small Clifton, New Jersey, manufacturing plant that Forrest founded in 1946. Here, about 50 employees produce around 25,000 Forrest-brand carbide saw blades a year. That's a small output compared with some manufacturers. But this small scale allows Forrest to incorporate some handwork into each blade that helps the company sustain a reputation for high quality and performance.

Much about the factory suggests Forrest does this the old-fashioned way. The interior looks like a scene out of the 1950s, with no computer-aided design equipment in sight. The secret to success apparently is in Forrest's attention to sweating the fine details of blade making.

Like many other blade makers, Forrest purchases saw plates from an outside vendor. After that, the company carries out all the manufacturing steps in house, adhering to exacting standards. The hard C4 carbide teeth are hand-brazed to the plate (see photo), which is then heat-treated to relieve any stresses

that may have built up in the metal. Jim Forrest claims his skilled workers can do the brazing as fast as a machine can.

Probably the most important measurable standard for these blades is their flatness. Forrest consistently holds the runout at the rim of every blade to between 0.001 and 0.002 in. Maintaining this tolerance starts with a grinding process that ensures the plate is perfectly flat to begin with.

After brazing, the quest for flatness continues with "hand straightening." A skilled worker checks for flatness by holding a straightedge on the blade while it's in front of a bright light. (See inset photo.) If the worker sees a sliver of light passing through, he gently bends the whole blade on a special arbor press to "tweak" it into perfect flatness. Forrest told me it takes about six months for a person to develop the necessary eye and delicate touch on the press to do this job well.

Finally, workers grind the carbide teeth to shape on machines fitted with progressively finer grits of diamond grinding wheels. I looked at the top edge of a tooth under a 40-power magnifier and understood why their 600-grit final grind is important—the cutting edge was incredibly straight and smooth.—D.S.

BY
**ELLIS
WALENTINE**

FLATTENING A BENCHTOP

*A Few Hours' Effort With a Sharp Plane
Will Improve the Accuracy Of Your Work*

A workbench isn't very complicated. It sits there quietly, accommodating all the daily demands and indignities you inflict—whether it be whacking chisels into it, or bombarding it constantly with glue and finish. But while a workbench usually endures such human abuse quite well, gravity and humidity changes can cause it to sag, cup, twist and bow.

When a bench develops these problems, it's no longer reliable as a reference surface for doing such things as checking the squareness of an assembly. Worse, if you try to glue up on a twisted bench, you're likely to end up with a twisted frame. And boards will surely rock as you plane them.

These things affect the accuracy of your work as well as the enjoyment of your craft.

The solution is to flatten and refinish the benchtop.

It's a simple and rewarding process, and won't take more than half an afternoon to do. Just follow the steps listed below.

Step 1: Checking It Out

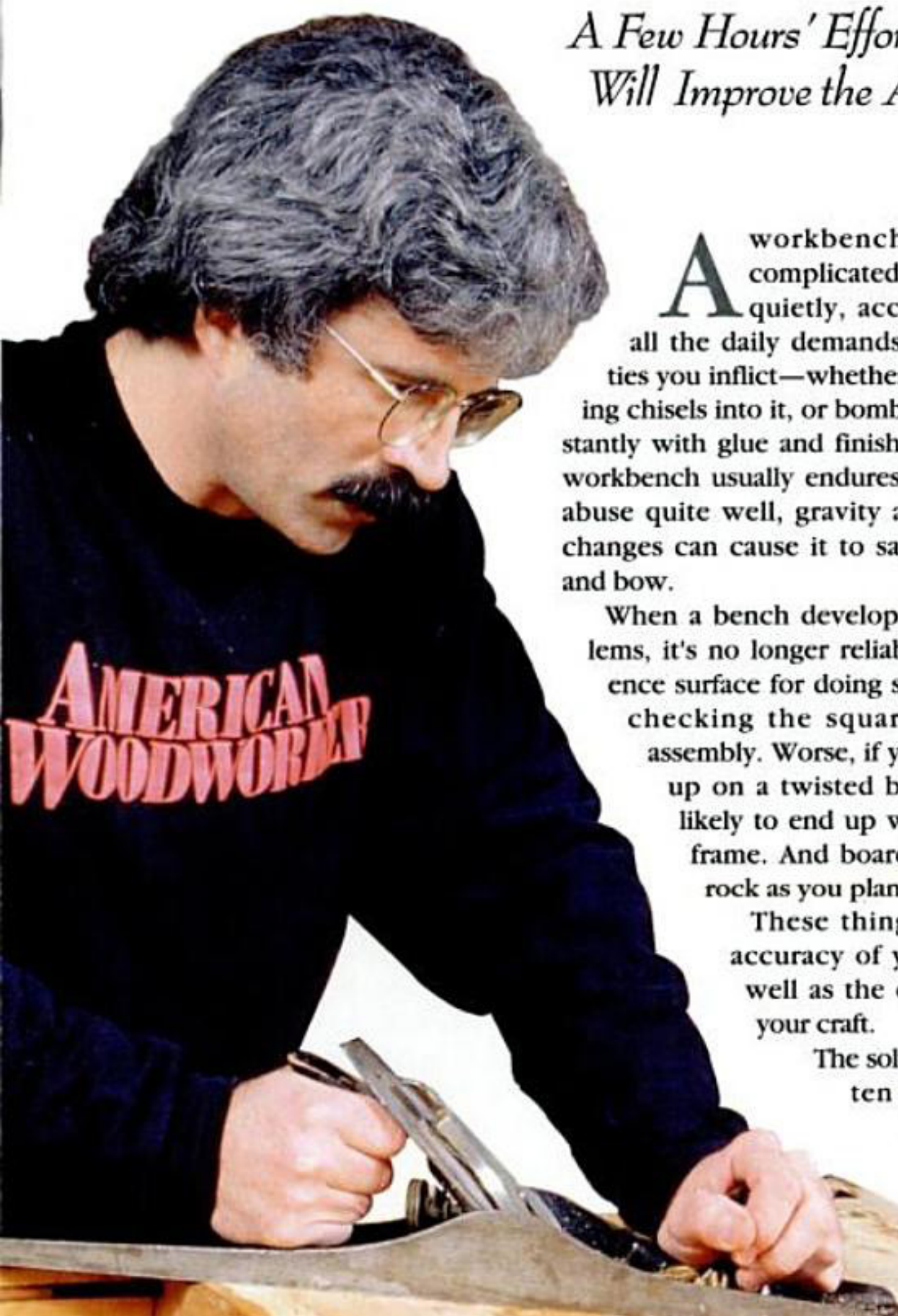
Begin by gathering some information. You'll need to find the high spots so you can level them first. If the bench is warped, bowed, cupped or twisted, there will be high spots somewhere—at opposite corners, along the edges or in the middle. To find them, all you need is a pair of winding sticks (see photo, opposite page), a long straightedge and a good eye.

If you don't have a pair of winding sticks, you can make them quickly from any dry, stable wood—quarter-sawn if possible. The sticks may be any width and thickness, just so the edges are straight and parallel. Make them at least as long as your bench is wide. Some people like to bevel the top edges and darken the bevels with a felt-tipped pen to make the edges stand out when sighting across them.

Set the winding sticks on their edges across the ends of the bench and sight across them from a distance of about two feet. (See photo, opposite

page.) Any twist will show up as misalignment of the top edges of the sticks.

Make



a few more sightings by moving one or both sticks to different locations along the bench. Mark the high spots with a pencil or crayon. To check for bow and sag along the length of the bench, use your long straightedge.

Step 2: Preparing the Benchtop

The object of this step is to remove everything that can dull—or wreck—your plane blade. If the top has a heavy film finish, like polyurethane, strip it off with paint remover. Otherwise, a good wiping with naphtha or mineral spirits will remove built-up wax and oils. Next, get rid of foreign bodies. Metal is the worst threat, but who knows what you'll find? Remove or set nails, screws and miscellaneous shrapnel. If you miss any, guess who sharpens the plane iron?

Step 3: Flattening the Benchtop

Now select your weapon. The Great Equalizer here is the jointer plane. If you don't have one you can do this job with a smooth plane or jack plane, but it'll be harder to get the bench flat over long expanses because of the shorter length of the plane sole. When you sharpen the plane iron, round the corners slightly to minimize ridges in the top where your strokes overlap.

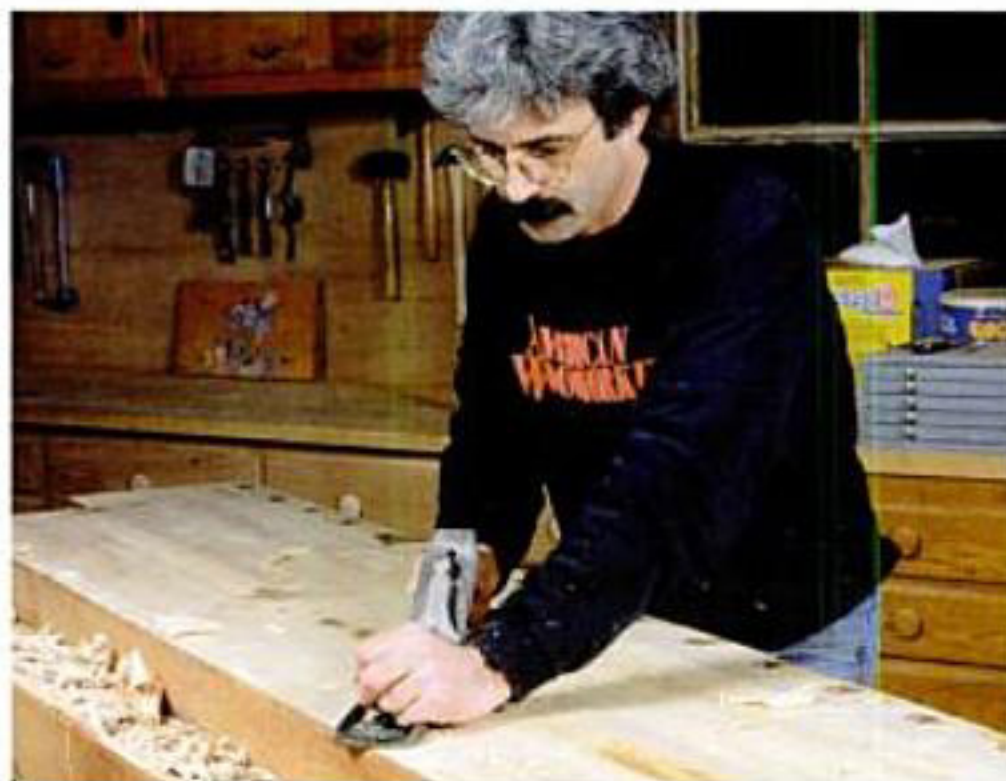
Wax the sole of the plane with a thin coat of paste wax to reduce friction between the sole and the benchtop. Set the plane iron for a fairly aggressive cut. How aggressive will depend on how much material you have to remove. (I miked my shavings at about 0.005 in.) Plane the high spots first, working at an angle of about 45° across the grain, in the general direction that produces the fewest tear-outs. Then repeat the process from the other side of the bench, crisscrossing your initial plane cuts. (See photo, above.) This extends the flat area in all directions. When you've finished, again check the width and length of the bench for flatness, and go back over any remaining high spots.

To clean up the cross-grain plane marks, set your plane iron for a finer cut (about 0.001 in. to 0.002 in.) and plane in the direction that produces the least tear-out. You'll produce the best surface if your plane has a sharp iron, a flat sole, a cap iron set about



PHOTOS BY ELLIS VALENTINE

After planing top at 45° across the grain (opposite page), repeat the process with the plane perpendicular to the first cuts (right). To check for twist, sight across winding sticks placed at opposite ends of the bench (above). Then plane parallel to the grain to remove cross-grain plane marks.



1/32 in. back from the edge, and a very small opening between the iron and the sole. Work the full length of the bench, checking your progress occasionally with the long straightedge and the winding sticks.

When all the high spots are gone and you're satisfied the benchtop is flat, chamfer the edges slightly with a block plane or sandpaper and sand the entire surface with 180-grit sandpaper.

Step 4: Finishing

Benchtops need a reasonably protective finish to stand up to solvents, glues, stains and abrasion. I prefer a thin coat or two of shellac to seal the surface followed by three or four thin coats of wiping varnish. (See "Oil Finishes," AW #28.) I use Waterlox "Transparent" or "Marine Sealer" (available at many hardware and paint stores, or from Rudy's, 4086 E. 71st St., Cleveland, Ohio 44150, 800-248-7839).

When the varnish has dried thoroughly, apply a coat of paste wax to help keep glue from sticking.

Afterthoughts

Bench flattening is mainly an exercise in planing large flat surfaces. It's an important exercise because the skills involved are essential hand-tool techniques. If you haven't worked with planes this ambitiously before, here's a golden opportunity to practice. And if you're an old pro, I'll bet your bench could use a little tune-up. ▲



ELLIS VALENTINE
is associate editor of *AMERICAN WOODWORKER*.



A Woodworking Guild Can Inspire You With New Skills, Ideas and Opportunities. Here's How to Start One.

BY JIM CUMMINS

A dozen years ago in Milwaukee, a few people decided to form a woodworking guild. Their efforts drew 65 charter members to the first meeting of the Wisconsin Woodworkers Guild, at which founding president Frank Obremski personally underwrote a \$50 prize for whoever recruited the most new faces during the next year.

Obremski's cash was well invested. Today this thriving group has more than 200 members and a yearly budget of \$8,000. It hosts scores of workshops and activities, puts out an informative newsletter and runs an annual toy drive for needy children. Guild officials still feel they've only scratched the surface—most of the active members live within a half-hour drive of the meetings.

This guild deserves special mention not because its success is unique, but because it demonstrates the rewards woodworkers can find when they band together. And it isn't just a matter of camaraderie and good fellowship.

A guild can repay any individual's membership fees many times over by preventing woodworking mistakes and teaching new techniques. A guild can open up markets, provide recognition, and offer members a sense of belonging

to a worthwhile community. In short, a guild can be anything its members make it.

If there's a woodworking group in your area, consider joining up. If you can't find a local guild, even with the aid of AW's Guild Central ([see box, page 32](#)), this article will try to show you and your neighbors how to get one going.

Benefits of Belonging

Guilds are ideal for exploring what Michael Dresdner, a regular contributor to *AMERICAN WOODWORKER*, calls "cross-over" technology—tools and techniques, such as gunsmithing and metal working, from other crafts that would be terrific for woodworking if only we knew about them.

Along the same lines, guilds can often gain access to wholesale establishments that don't sell to individuals. Or negotiate better prices with manufacturers who do retail. The Washington, D.C., Woodworkers Guild recently arranged 55 percent discounts on name brand carbide router bits and 40 percent off major woodworking books. And when I was president of our local Guild of Craftsmen some years ago, I secured discounts for members at more than a dozen local shops.

There's no limit to the benefits. You can set your sights high, as the Guild of Oregon Woodworkers has done. It's using the strength of its numbers to negotiate a group insurance plan. Or you can work on a smaller scale: Any guild can buy glue by the gallon, screws in 5-lb. boxes, and brushes by the gross. The newsletter can let members know what bargains will be available at the next meeting.

Making Meetings Meaningful

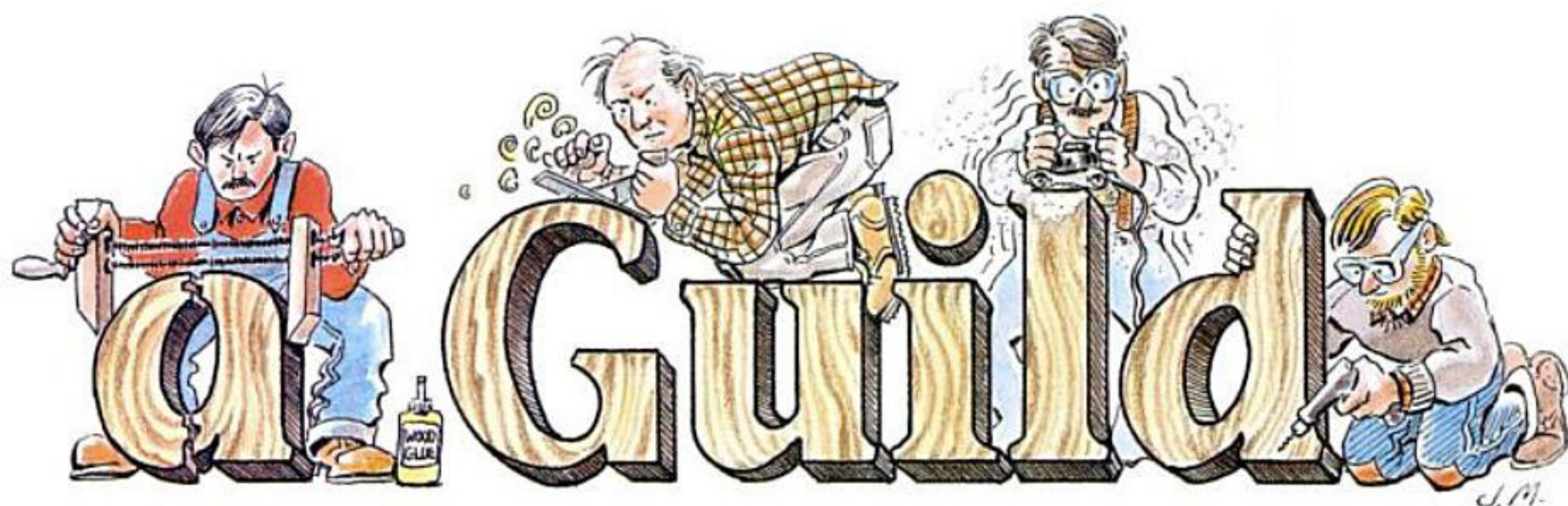
Membership meetings are the heartbeat of a guild.

If they're interesting and entertaining the guild will thrive. If they're not, you'll quickly be out of business. You don't have to reinvent the wheel to succeed. Just look at what activities work well for other guilds and copy them. AW keeps in contact with many of country's woodworking groups. Here are some of the things they offer:

Talks by members—These can cover a wide range of subjects: Demonstrations on sharpening, vacuum-bag clamping, marquetry, scroll sawing, CAD systems, and shop electricals or heating strategies. The North



"OK, folks it's time for Bob's review of that new instant glue."



Texas Woodworker's Association recently held a presentation on flocking, the practice of lining a drawer by spraying on shredded wool fibers.

Other groups have offered Q&A sessions, raffles of exotic wood scraps and similar goodies, and auctions or tool swaps. One group held a slide show of a trip to a Shaker village. Several had demonstrations by Makita, Ryobi or other manufacturers. And of course there's always coffee and cake, and maybe an annual banquet.

Contests—You can stage contests (with or without prizes) on topics like best work photo, sharpest plane, smoothest finish. One guild holds a toy competition; some hold contests or exhibits featuring specific projects such as constructing a table or a chair.

The monthly meeting also can have a planned special focus, such as jigs and fixtures, or little boxes. Or a hands-on meeting might let members weld-up bandsaw blades from bulk stock.

Here's one idea that's been working successfully for the Wisconsin Woodworkers Guild: a sort of mini-meeting. On an appointed day, members provide logs for another member's portable sawmill. You get first pick of a board from your log; the rest of the wood is auctioned among members to raise funds for the guild. Participants not only get experience in outdoor woodcraft, logging and sawing, but a lot of wood goes into circulation.

Trips—There's no reason a guild (or subgroup) can't regularly plan to visit a museum, woodworking gallery, historical village, famous woodworker's shop, chisel factory, furniture

conservation shop, etc. These trips can be as ambitious as you want—one Midwestern guild even took a trip to China. Similarly, subgroups can preview events and workshops that can be extended to the whole membership later.

Many guild meetings are local social events, with numerous guests and a strong showing of spouses. In fact, some guild members may never actually do any woodworking, but simply like the idea of it. While such a loose approach can offend a few purists

NATIONAL GUILDS

In addition to the local guilds we've focused on here, there are several national and even worldwide groups devoted to special woodworking interests. Typically, these guilds have annual shows or conventions in various parts of the country, and publish magazines.

There are guilds for almost every craft: makers of spinning wheels and weaving looms, stick makers, carvers, picture framers, you name it. We'll add these to our data base as we hear of them. For now, here are a few longstanding examples.

American Association of Woodturners

667 Harriet Ave.
Shoreview, MN 55126
(612) 484-9094
Membership: \$25

American Society of Furniture Artists

Box 270188
Houston, TX 77277
(713) 660-8855
Membership: \$40 general,
\$25 student

Early American Industries Association

Box 2128
Empire State Plaza Station
Albany, NY 12220
(518) 439-2215
Membership: \$34

Guild of American Luthiers

8222 South Park Ave.
Tacoma, WA 98408
(206) 472-8439
Membership: \$36

International Wood Collectors Society

5900 Chestnut Ridge Rd.
Riner, VA 24149
(703) 382-1974
Membership: \$20

Marquetry Society of America

Box 224
Lindenhurst, NY 11757
Membership: \$18

National Wood Carvers Association

7424 Miami Ave.
Cincinnati, OH 45243
(513) 561-0627
Membership: \$8

(who want to hone in grimly on the ultimate dovetail), generally it makes for a livelier evening.

Promoting the Guild

If you want your guild to continue to attract members, you have to tell people it exists. Thankfully, there are inexpensive ways to do this.

Many local newspapers and cable TV stations run a free calendar of events that guilds can tap into.

Editors usually welcome publicity releases about any events of interest to the general community.

You don't have to be Joe Pulitzer to write a release: Find an event in your paper, substitute your guild's name and activity, and you'll quickly see the formula.

Key words and concepts will attract the editor's—and the public's—attention. A plaintive call for members probably won't see print, whereas a "Toys For Tots" membership drive is a sure thing. Fun events will draw interest too. One California group holds annual belt sander races and half the town seems to come.

Don't put all your publicity in one basket. Posters, flyers, a mailing list and especially word-of-mouth all help. For

shows, stage an "opening" with refreshments; done on a regular basis, openings soon become part of the local social calendar.

Guild buttons, bumper stickers and T-shirts can all carry your message in a clever way, and suppliers are as handy as the nearest copy of a metropolitan Yellow Pages.

Staging Events

If your fledgling guild thinks it's ready to stage a show but doesn't know how to do it, there may be experienced help close at hand. You can probably discover some local group that hosts exhibits, fund-raisers

or similar activities. It may be your firehouse, church, PTA, chamber of commerce, arts association, library or whatever.

These people can offer advice and

might even sponsor your guild's craft or furniture show, especially if it augments an idea they already have scheduled—a planned Decorators' Weekend at the local conference center, for example, or a booth at the county fair.

Forming alliances can also help on a smaller scale. The Rochester Woodworker's Society developed a connection with a local museum's gift

shop, which is now an outlet for guild members' crafts.

Keeping In Touch

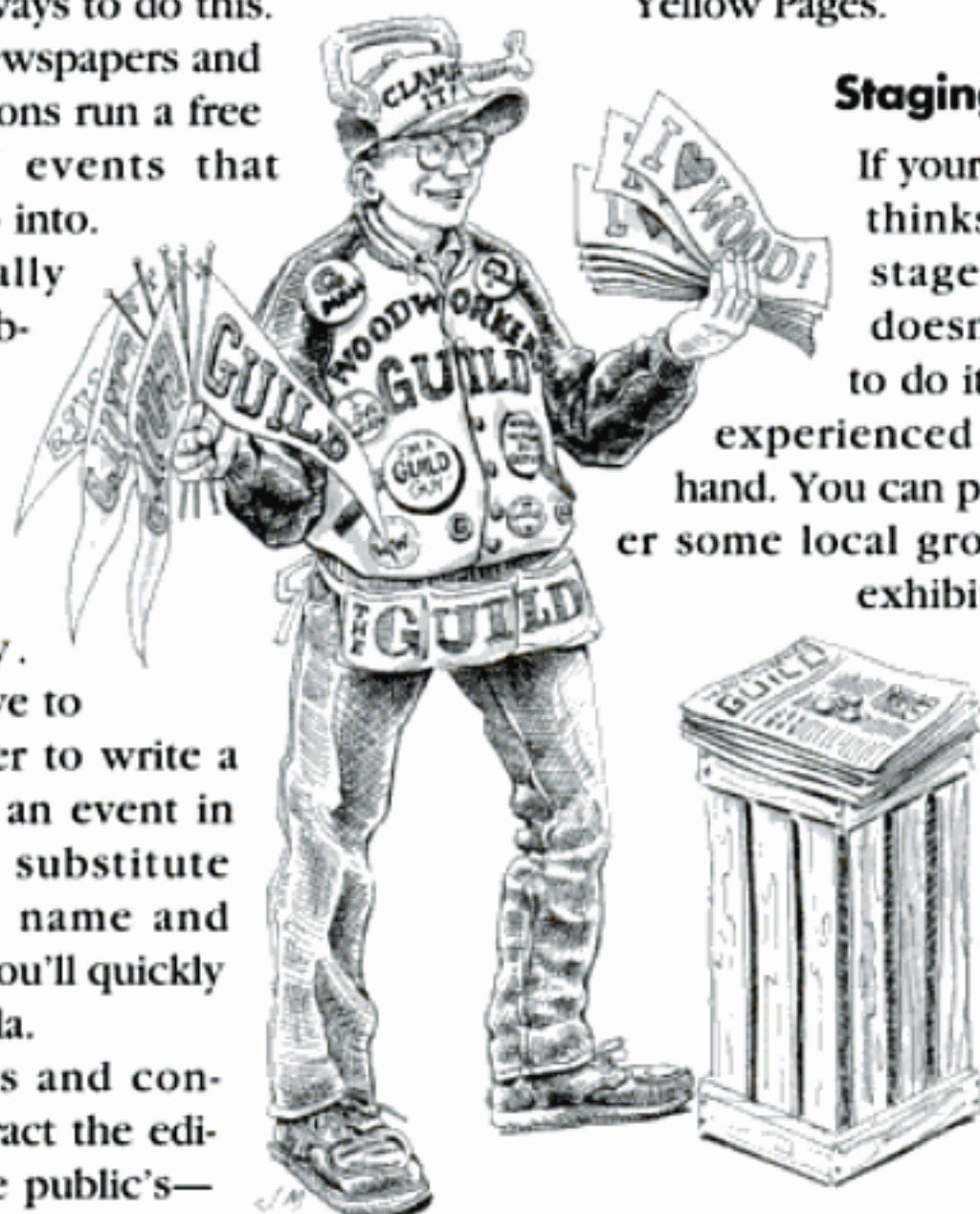
To maintain interest in your guild, you need regular contact with members. You have to make sure everybody knows about upcoming events. You have to mail dues notices. You need to hold elections and ask for volunteers. All these jobs, and more, can be done in a newsletter. But a newsletter needn't be just a list of dates and facts. Spice it up with free ads for buying, selling or trading wood, tools and related supplies. Or offer a Q&A column that members themselves answer.

Other proven features in newsletters are reports on recent seminars, surveys of magazine articles, reviews of books and videos, first-hand tool evaluations, photos of members' projects, warnings about disreputable dealers. In short, anything that would start a discussion over a cup of coffee will probably interest fellow newsletter readers.

In addition, each issue should contain officers' names, a short statement of the guild's purpose, and membership information.

Running off extra copies doesn't cost much, so send your guild newsletter to newspapers, schools, the chamber of commerce, local libraries, arts organizations, cable TV and radio stations—anywhere you can think of that will either generate publicity or attract more items for you to write about.

Most importantly, pay for or arrange exchange subscriptions with other woodworking guilds—there's no better way to get ideas and share experiences.



CALLING GUILD CENTRAL

Whether you're trying to find an existing guild or let others know you've just started one, AMERICAN WOODWORKER's Guild Data Base can help. It lists more than 200 guilds and woodworking clubs around the nation. To learn about the guilds in your state, write AMERICAN WOODWORKER Guild Central at 33 E. Minor St., Emmaus, PA 18098, or fax

a request to us at (215) 967-8956. You can contact us at the same address or telephone number if you're seeking new members.

Need a Speaker?

In addition to the Guild Data Base, AW has now produced a Speaker Data Base that lists the names, addresses and areas of expertise of dozens of top woodworking professionals who can speak

to your guild. To obtain a copy of this list, contact us at the address or fax number listed at left. Also, if you're a speaker or a manufacturer or company who'd like to be listed in our data base, contact us.

We can't, of course, endorse anyone or act as an agent. Those arrangements, and any fees, will have to be worked out on an individual basis between the guild and lecturer.

Formal Workshops

A sure way to attract members' interest is to offer a formal workshop. But setting up your first one so it runs smoothly and satisfies both the speaker and the audience can be difficult. If you want pointers, attend some other group's well-run workshop. Take notes on what makes things run smoothly and talk to other participants about what works and doesn't.

If you're at a loss for speakers initially, invite a non-member, such as a local woodworking teacher, to talk about a special interest. Your woodworking supply center can probably put you in touch with manufacturers who have free demonstration programs for joinery systems, spraying equipment, Euro hardware, or up-and-coming specialties. One of the best finishing demos I ever attended was sponsored by the Star Finishing Products company. The demonstrator's field was making instant repairs on furniture scratched and dented in moving vans, a full-time livelihood.

Potential speakers are everywhere: If your state or county has a Cooperative Extension, you might get someone to talk about harvesting wood. Your town's sanitation official could give advice about handling and disposing of hazardous waste. A school photo club adviser or camera shop owner might demonstrate how to photograph woodworking projects.

All of these speakers will charge little or nothing, though they're sure to appreciate it if you cover incidental expenses such as refreshments and travel, or offer them a certificate of honorary membership or a video of their "performance." But remember, as the level of a speaker's fame goes up, so do the fees and perks. It may cost you as much as \$2,000 to bring in a nationally known woodworking expert. (See box on previous page for more on potential speakers.)

Beyond one-time workshops, you may be able to arrange a continuing education course for your guild. Many colleges and high schools offer adult education courses, usually running an evening or two per week for a semester. If your guild can round up a

dozen paying students, the school will find an expert to cover almost any subject. You could even suggest the expert yourself; the school will know how to make the approach and how to negotiate fees.

Laying Down the Laws

Unless your new guild draws an inordinate number of lawyers, you're unlikely to find many people who will jump at the chance of drafting the



"Marvin, the newsletter says there's a guy down the block who sells bungs."

group's bylaws. Still, these rules will play an important part in determining your fledgling guild's direction, so it's important you consider them well. Foremost, don't cast its bylaws too rigidly, otherwise the rules may prevent members from pursuing broader interests and goals as the group continues to grow.

Your bylaws should address such things as whether the guild will actively pursue group activities—shows, workshops, tours. Whether juried work will be a condition of membership. What to charge for dues and whether to set aside some of the money for a library. How often the guild will meet, and what will happen at the meetings.

You may eventually decide it's in your best interest to incorporate, but even if you never do, your guild might as well conform to standard organizational rules and record keep-

ing. This will define the group in terms that bankers, lawyers, accountants and the Internal Revenue Service can understand. *Robert's Rules of Order* (available at most bookstores and libraries) is the basic reference. While it's best known as a detailed guide to running a meeting, this classic also contains useful sections on how to write bylaws and meeting agendas, and what a group's officers (president, treasurer, etc.) do. Another good source of information is "How to Form Your Own Non-Profit Corporation," by Anthony Mancuso (Nolo Press, 950 Parker St., Berkeley, CA 94710, 800-992-6656).

Growth

You might want your own guild to stay small and low key enough that the members can all play Monopoly at the end of the meetings. Even so, many of the advantages mentioned still apply. At the least, you can order enough tools and materials together to meet the supplier's minimum, or buy a few hundred feet of walnut to split up for your tie-tack project.

It's more likely that your group will grow with the vitality new members in all woodworking fields will bring to it. Where it goes from there is anybody's guess.

Picture this: You have a fat bank account, communal machinery, and run your own gallery downtown. For the annual "Guild Day" everyone in the county dresses like a woodworker. The Goodyear blimp films the guild parade for national television. The Budweiser horses come. Willard Scott wears a wig made of planer shavings . . .

Far-fetched? Of course. But if you build your way gradually, if you ever get there, you'll know exactly what to do. ▲



JIM CUMMINS
has been an officer in several guilds and art organizations over the past 30 years.

TURNED

BY RALPH WILKES

Like most woodworkers, I like to challenge myself when I build something from wood. That makes the project more interesting and it improves my skills. In designing this dressing table mirror I set two goals: to turn all the parts on the lathe, and to limit waste by making three of the four main components from a single disk of wood.

This piece consists of four major parts: a mirror frame, a support frame that cradles the mirror frame and allows it to pivot, a spindle, and a base. (See drawing.) It's simple to make so I'll just take you through the major steps.

Making the Frames and Base

Begin by thickening your stock to 1 in., then bandsaw a circle slightly more than 10

MITCH MANDER

MIRROR

A Simple Project That Reflects Your Turning Talents

in. in dia. I used cherry for this mirror but any hardwood or precious stow-away tucked in the corner of your shop will work fine. You could even consider gluing up a blank from contrasting woods.

Now mount the disk on a faceplate and true up the edge with a round-nose gouge so the disk is exactly 10 in. in dia. Round the corners slightly. From this disk you'll turn the support frame, the mirror frame and the base—in that order. (See drawing.)

To define the frames and the base, use a parting tool to cut two $\frac{3}{8}$ -in.-deep grooves: cut one $\frac{3}{8}$ in. from the outside edge, and the other $\frac{5}{8}$ in. from the first cut. I made my parting tool from a $\frac{3}{2}$ -in.-thick file, grinding off the serrations and sharpening it the same as I would a regular parting tool. It's important not to make the first cut too wide, since the kerf will form the gap between the frames on the finished mirror.

Transfer the cut lines on the face of the disk to the back with a rule or tape measure and make similar parting cuts from the back. Don't sever the rings yet; you want to leave about $\frac{1}{8}$ in. of wood inside the grooves so you'll be able to finish the frames while they're still on the lathe. If your tool rest won't reach the back of the turning, you can make a temporary rest from two pieces of wood joined at right angles and secure it to the lathe bed with clamps.

Next, add a shallow V-cut on the edge of

the support frame and another on the face, centering both cuts. Make the cuts with the tip of your skew chisel. This detailing adds flair to the otherwise plain surfaces and the cut on the edge of the frame helps you align holes later. While you're at it, use your skew chisel to round the inner edge of the support frame a little, just enough to remove the sharpness. Then finish-sand the front, edge and back of the support frame. At this stage, I also finish the frame's exposed surfaces by rubbing on a mixture of boiled linseed oil and shellac.

Now you can part the support frame from the rest of the turning. I find the easiest way to do this is to cut into the groove on the face of the disk until all the remaining wood is thin enough to let the beam from a flashlight pass through. Then I stop the lathe and gently snap off the ring. (See drawing.)

With the support frame off the lathe, sand its inner edge with a drum sander on the drill press. Apply finish to the inside and set it aside; you'll saw the frame to final shape later.

Now, with a gouge, go back to the lathe and smooth the outer edge of the mirror frame. Make a centered V-cut on the edge as you did on the support frame. Cut the profile on the face of the mirror as shown in the section view in the drawing, then move to the back and use a parting tool to cut the rabbet for the mirrored glass and the back. Next, sand and finish the mirror frame, part it off the lathe and clean up the unfinished edge.

The piece that remains on the lathe will become the base.

Turn this to the profile shown in the drawing, and sand and finish on the lathe. Now mark the center of the base while it's still on the lathe, then



Author holds template against spinning workpiece and marks key diameters with a pencil.



With the lathe spinning, author uses a hacksaw to part the pivot pins.

remove the base and drill a $\frac{5}{8}$ -in. hole to accept the tenon on the spindle.

Turning the Spindle

Turn the spindle between centers, using a piece of 1 $\frac{3}{4}$ -in. square stock. I cut the stock about 1 in. longer than the finished dimension to give my chisel some room at the headstock.

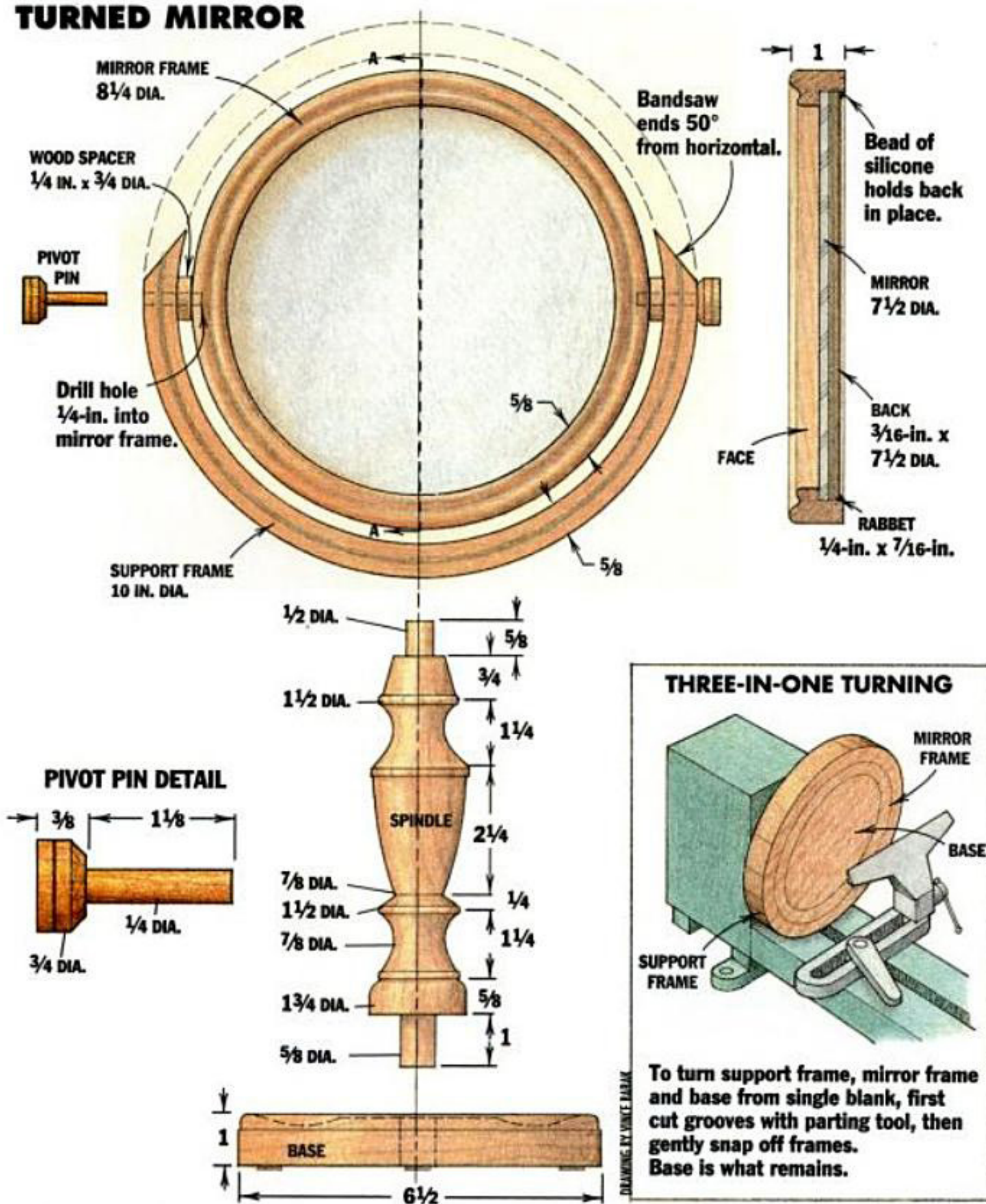
After roughing the stock into a cylinder, make a full-sized template of the spindle, then hold it against the workpiece and mark the profile with a pencil while the workpiece spins. (See photo, above.)

Using your pencil lines as a guide, you can turn the spindle with a gouge and a skew chisel. (For more on working with a skew, see AW #11.) Gauge the turning with calipers as you go. When they slip over the stock, you're there.

Once the spindle work is done, go back to the frames and mark the pivot pin holes and the mortise for the



TURNED MIRROR



spindle tenon. (See drawing.) You want to locate these holes precisely; otherwise the mirror will hang crooked. To do it right, first on a sheet of paper, lay out lines that cross at 90°. Then, using a compass, start at the point of intersection and draw circles the same size as each frame. When you lay a frame on the paper with its grain running horizontally, the hole locations will be in line with the cross you drew.

When drilling the holes, I placed a narrow chunk of scrapwood under each ring. This gave me some support and controlled tear-out. Remember you're making stopped holes in the mirror frame, so be careful to drill only 1/4 in. deep here.

You can now bandsaw the upper

portion of the support frame as shown in the drawing, leaving about 1 in. of stock above the pivot pin holes. Then sand and finish the sawn edges.

With both frames complete, turn the two pivot pins and the two spacers that go between the mirror frame and support frame. (See drawing.) The friction of the pivot pins in the support frame holes keeps the mirror frame stationary at any angle, so size the pins carefully. I made the spacers by mounting some scrap in a three-jaw chuck and turning it to a cylinder, then I drilled a 1/4-in. hole through the center with the piece on the lathe. I then parted off the pins and spacers by using a hacksaw with the workpiece spinning. (See photo, previous page.) Clean up

any tool marks and apply finish. Make sure you don't get any finish on the tips of the pins since you'll be gluing them into the mirror frame.

To make the back that holds the mirror in place, thickness-plane some cherry to around 3/16 in. thick, then draw a circle with a compass and bandsaw the stock to just less than 7 1/2 in. dia. I had my local glass shop cut the mirror glass, specifying 1/8-in. (double-strength) mirror glass, and giving them the back as a pattern to work from.

Putting it all Together

With all the parts made, do a dry assembly, checking for a good fit. Then apply a drop of glue in each of the mirror frame holes and tap home the pivot pins, connecting the two frames together. After that, glue the support frame and the base to the spindle. When the glue is dry, sand and finish the top of the tenon where it pokes through the inside of the support frame. To hold the back in place, I positioned the mirror and back in the rabbet, then ran a thin bead of clear silicone

around the edge of the back. This provides a clean look, and, should the mirror ever need replacing, it's easy to peel off the bead to get at the glass.

For a final touch, you can add self-stick felt pads under the base to guard against scratches. That's it. You're done. Now stand back and enjoy the view. ▲



RALPH WILKES
is an amateur woodworker and retired business manager of Keuka College in New York.



Pennsylvania Dutch HANGING CUPBOARD

Based on an 18th-Century Original, This Cabinet Sports Distinctive Hand-Forged "Rat-Tail" Hinges

BY DAVID SLOAN

This hanging wall cupboard is typical of those made by the German farmers who settled southeastern Pennsylvania in the 1700s—the Pennsylvania "Dutch," as they came to be known. It sports hand-forged "rat-tail" hinges and the scrollwork that's characteristic of rural Pennsylvania-German furniture.

Hanging cupboards of this type were popular in Pennsylvania-German farmhouses from the 1740s through the mid-1800s. With money scarce and the nearest town a day's ride away, store-bought luxuries were precious and rare. Those few on hand—needles, spices, sugar, perhaps a Bible and a looking glass—were locked up for safe keeping.

This particular cabinet is based on an 18th-century Lancaster County piece but it's not an exact reproduction. The original cupboard (now in a private collection) has a narrow reverse-ogee molding around the bottom of the cabinet—a detail I chose to omit. However, if you're curious, a measured drawing of the original cupboard appears in *The*

Pennsylvania Dutch and Their Furniture by John G. Shea (1980, Van Nostrand Reinhold Co., 135 W. 50th St., New York, NY 10020).

Notes on Construction

I made the cupboard from black walnut. The old ones were just as likely to be made of pine or poplar, painted red or blue, and decorated with fanciful birds, flowers and human figures.

In keeping with the original, I made a lipped frame-and-panel door. A flush (inset) frame-and-panel door would also be appropriate (see AW #31). I raised the door panel on the tablesaw (see AW #8, page 33) and cleaned up the saw marks with a scraper and sandpaper wrapped around a wooden block. I joined the stiles and rails with blind mortise-and-tenon joints (see Fig. 2) and cut the panel groove with a dado head on the tablesaw.

The decorative molding on the inside edge of the door frame is a nice visual touch, but it complicates the joinery a

FIG. 1: SCRATCH STOCK

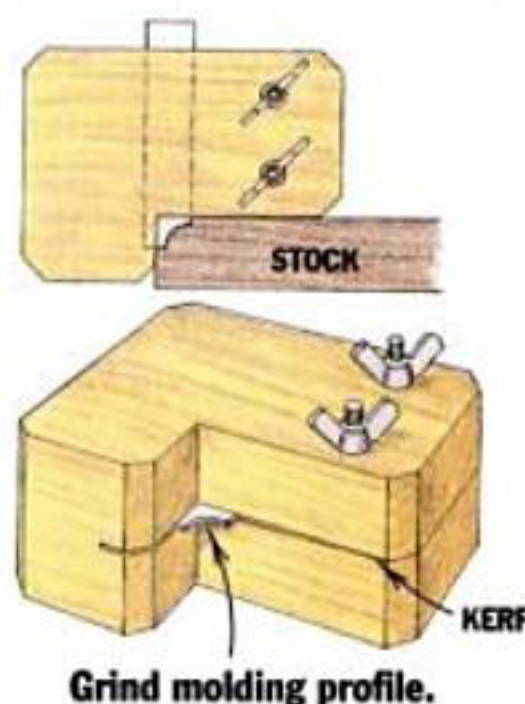
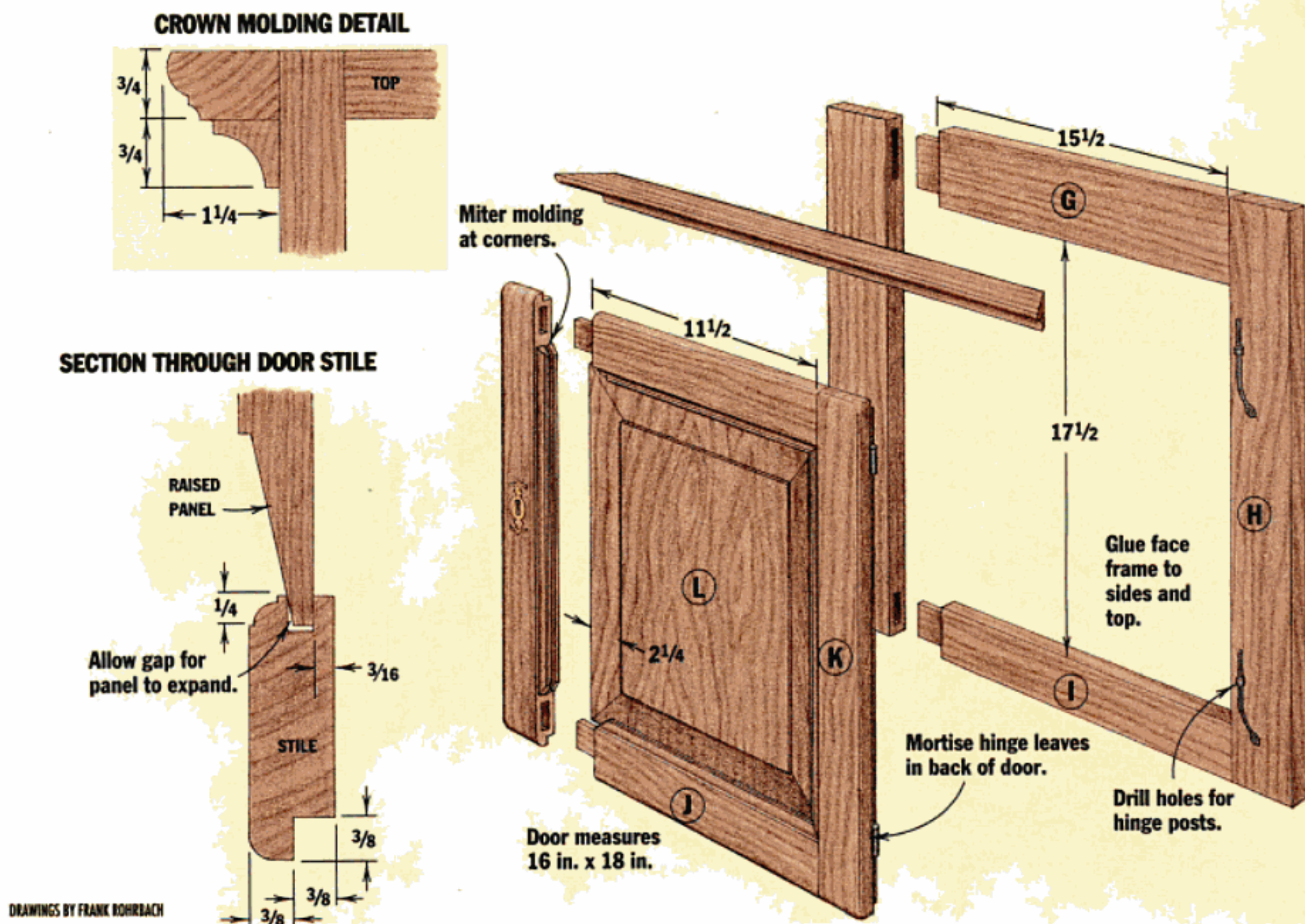


FIG. 2: PENNSYLVANIA WALL CABINET



DRAWINGS BY FRANK ROHRBACH

little because the molding must be mitered where the stiles and rails intersect. (See Fig. 2.) I didn't have the proper beading cutter for my router or shaper so I scraped the molding with a scratch stock; a home-made tool with a cutter ground from a broken hacksaw blade. I scratched the molding along the full length of the stiles and rails, then mitered the molding. If you want to keep things simple, you can eliminate the door molding entirely or glue an applied molding to the stiles and rails.

After gluing up the door I cut the 3/8-in. lip with a dado head on the table-saw and routed the front edge of the door with a 3/8-in. round-over bit.

Fig. 2 shows how the rest of the cabinet goes together. The only tricky part is getting smooth, flowing curves in the scrollwork. I made the cuts with a 1/4-in. blade on the bandsaw and trued up the curves with files and

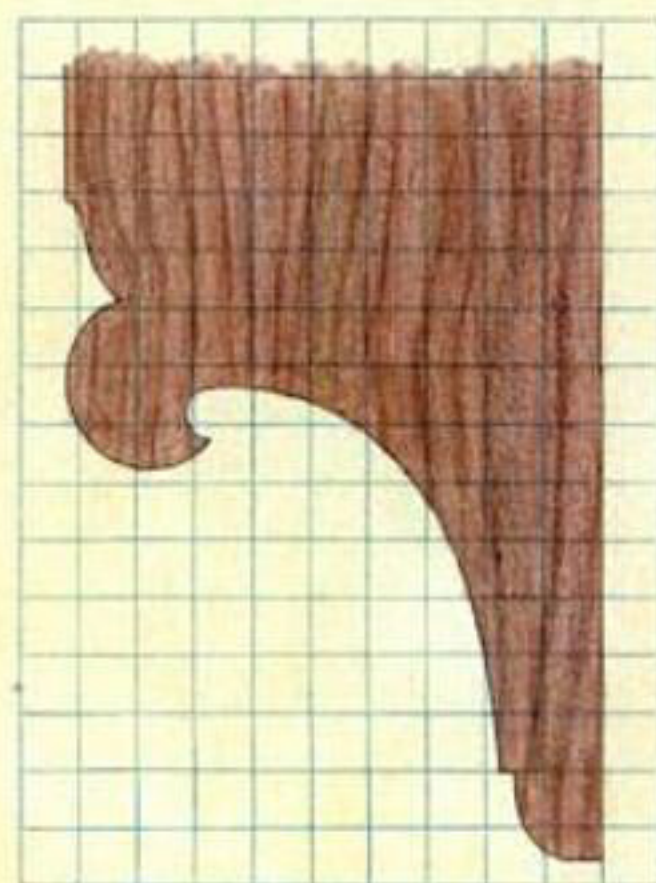
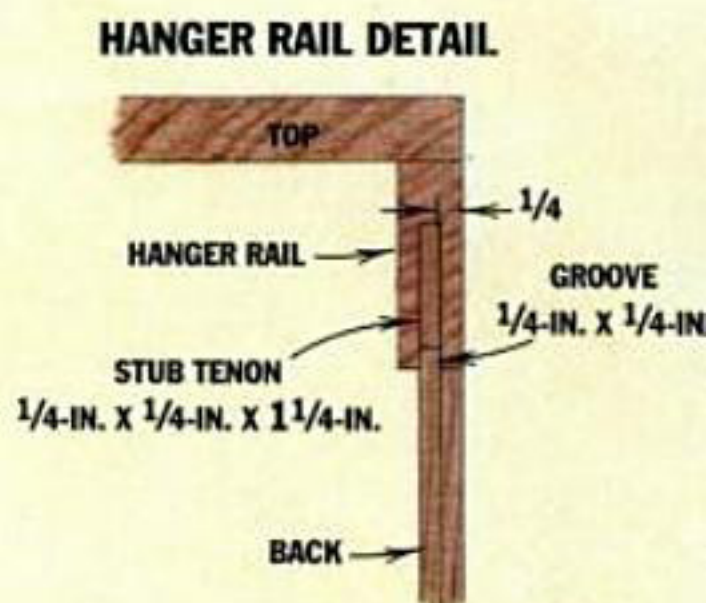
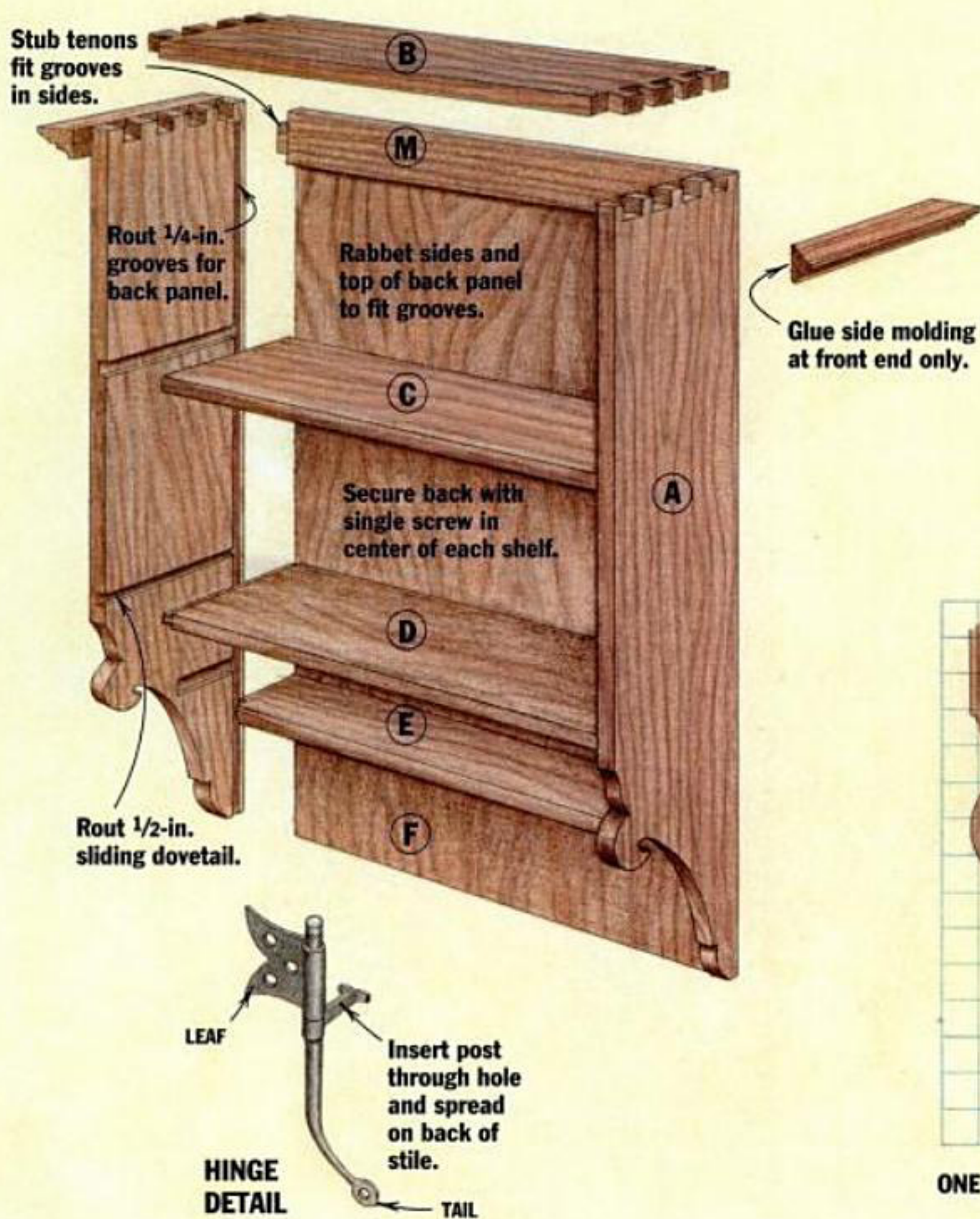
BILL OF MATERIALS

A: Sides	3/4 x 9 1/4 x 36
B: Top	3/4 x 9 1/4 x 23
C: Middle Shelf	3/4 x 8 3/4 x 22
D: Bottom	3/4 x 8 3/4 x 22 1/4
E: Bottom Shelf	3/4 x 5 x 22
F: Back	1/2 x 22 x 33
G: Top Face	
Frame Rail	3/4 x 3 3/4 x 18 1/2
(includes tenons)	
H: Face Frame	
Stiles	3/4 x 3 3/4 x 23 1/2
I: Bottom Face	
Frame Rail	3/4 x 2 1/4 x 18 1/2
(includes tenons)	
J: Door Rails	3/4 x 2 1/2 x 14
(includes tenons)	
K: Door Stiles	3/4 x 2 1/4 x 18
L: Door Panel	3/4 x 12 x 13
M: Hanger Rail	3/4 x 2 1/2 x 22
(includes stub tenon)	

sandpaper wrapped around dowels and wooden blocks.

For the back of the cabinet I made a glued-up panel rabbeted to fit into grooves in the sides and the hanger rail at the top. (See Fig. 2.) The panel floats in the grooves and is secured to the backs of the shelves with one screw in the center of each. This allows the panel to expand and contract on either side of center. The hanger rail itself has stub tenons that fit into the grooves in the sides.

As an alternative to a glued-up panel, you could rabbet the back boards to form lap joints. Lay the boards up without glue and screw or nail each board to the backs of the shelves. This way, each board is free to move individually. The backboards of many original cupboards were made this way. If you go this route, I suggest that you plane chamfers on the rabbets to decorate the seam between joints.



If you want to get fancy, you can jazz up the straight edge at the bottom of the back panel with a decorative profile in keeping with the scrollwork on the sides. One editor here at *AW* remarked that the straight edge looked too severe. Can't please 'em all.

I made the crown molding with one of my antique wooden molding planes (see *AW* #12 and #14). It's not the speediest way to tackle a molding but I get a kick out of using old tools. Power tool junkies can resort to their shaper or router table to make this molding.

The rat-tail hinges warrant some explanation. Each hinge has three parts: a leaf, a tail and a support post. On a lipped door like this one, the leaf is mortised into the back of the door.

SOURCES

The following hardware was used to build the hanging cupboard. Items can be ordered by mail from Ball and Ball, 463 W. Lincoln Hwy., Exton, PA 19341, (215) 363-7330.

► Hand-forged iron rat-tail hinges, 4 1/4 in. high "C" offset mounting (#H41-C07).

Note: For a flush door, order flush mounting rat-tail hinges (#H41-C06).

► Brass door lock, 4 1/4 in. high, 3/8 in. offset (#TCB-016).

the loop of the post and is secured with a screw at the bottom. The leaf just slips over the tail and gravity holds the door in place.

I mortised the lock into the back of the door and drilled a hole for the key. The brass escutcheon plate covers the key hole. The bar of the lock fits into a narrow mortise cut in the left stile of the face frame. I chopped this narrow mortise by hand with a narrow chisel.

To hang the cabinet, I located the wall studs and drilled through the hanger rail into the studs. Then I fastened the cabinet to the wall with two lag screws and washers. To take off the shiny zinc plating I "antiqued" the heads of the lag screws and washers by

CHAN'S KNIVES

BY SIMON WATTS

*A Master
Woodworker*

T.....



On a cold March morning in 1968 Yeung Chan slipped through the barbed wire into Hong Kong territory and escaped from Chairman Mao's cultural revolution. He was poor in possessions, bringing nothing with him from China but the compass that had guided him out. But he had a wealth of knowledge about



Using the same simple techniques and materials, the author can make a variety of knives. From left to right are: a chisel knife with a rosewood handle; an early version of a chisel knife with a plywood body; short-bladed carving knives in rosewood and maple; an artist's marking knife with a slim, rosewood handle; and a maple chisel knife.

ter than the last. Then, he used his knives to make a small plane and a chisel—both with hacksaw blade cutting edges. These tools, and another hacksaw blade that he used as a crude saw, were his woodworking kit.

Since those early years Chan has expanded beyond knifemaking to become a successful furniture designer and builder in California. But he continues to make knives. His favorite model (shown at far left, opposite page, and in the sidebar) has a rosewood handle, yet it still looks much like a plywood-handled predecessor he made 30 years ago. It's actually a multipurpose tool that serves as a chisel, a scraper, and a

less hazardous than a regular knife because its blade is shaped so you'll never draw it toward you. And the long handle gives maximum control.

As with his original, the blade in this knife is made from a hacksaw blade, but Chan now uses the slightly thicker blades from a power hacksaw that he can pick up used from machine shops. This steel is excellent for knife blades because it's hard enough to hold an edge and tough enough to resist chipping, yet it can still be ground and honed in a home workshop.

Chan stresses the importance of using steel that has been hardened across its whole width. Many hack-

when you grind off the teeth the remaining steel is too soft to hold an edge. Chan can tell the right kind of steel by the "ring" it makes when he strikes it. But he advises beginners to check the steel they want to use by clamping it in a vise and trying to snap it in half. If fully hardened it should break cleanly from edge to edge.

The knives shown here are only a few of many possible shapes and sizes. With the method explained in the sidebar on the following page, you can adapt this simple, versatile tool so it's a thing of beauty perfectly fitted to your hand and its use. (Continued)

SIMON WATTS

MAKING A CHISEL-KNIFE

BY YEUNG CHAN

My technique for making knives is simple. The handle and keeper come from a single piece of wood, which I cut in half and rout to accept the blade. Epoxy holds it all together.

To make this rosewood chisel knife, first lay out the blade shape on a piece of tool steel. (A power hacksaw blade works well.) Then shape the steel blank and rough out the cutting edge on a bench grinder. If you favor your right hand, grind the bevel as shown; if left-handed, grind a mirror image.

Cut the handle blank from $\frac{3}{4}$ -in.-thick stock and bandsaw the blank in half. Then, flatten the sawn surfaces so the two pieces fit together perfectly.

When routing the recesses for the blade, use a $\frac{1}{4}$ -in. straight bit set so the depth of cut is half the thickness of the blade. You can provide support for the router by clamping the parts flush in the wooden jaws of your vise, or in the jaws of a large wooden hand screw clamp. Clean up the routed corners with a chisel. Dry fit the blade and halves together, making sure the blade is held firmly and the joint closes completely.

Separate the keeper on the tablesaw, using a backing block to minimize tear-out.

Assembling the Knife

You'll get a better bond with the epoxy if you first clean

the blade with emery paper and acetone to remove any rust, dirt or grease. Glue up the handle first, making sure you coat both handle recesses and blade with epoxy.

To glue the keeper, first coat the exposed part of the blade as well as the adjacent, end grain surface of the handle with paste wax so the epoxy won't stick to it. Then apply epoxy sparingly to the keeper halves. Make sure none gets in the recesses. Clamp the parts together lightly and push them firmly over the blade so the keeper bears snugly against the handle while the epoxy cures.

Finishing

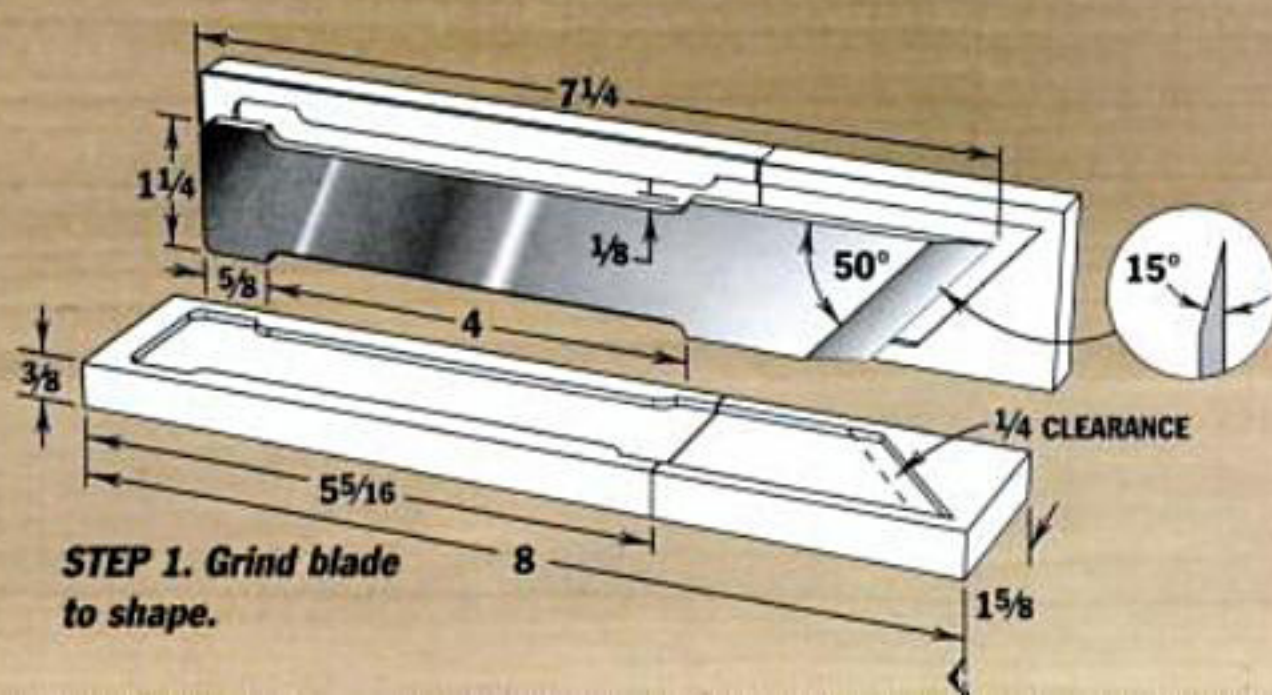
When the glue is dry, clean up all edges on the tablesaw with the keeper in place. Epoxy an $\frac{1}{8}$ -in.-thick piece of the same hardwood to each end to cover the end grain. Then, trim these ends on the tablesaw or disc sander until only about $\frac{1}{16}$ in. to $\frac{1}{8}$ in. remains.

Round over the long edges of the handle and keeper with a block plane and sandpaper. Finish the wood with tung oil.

You can sharpen the blade just as you would a chisel. ▲

YEUNG CHAN

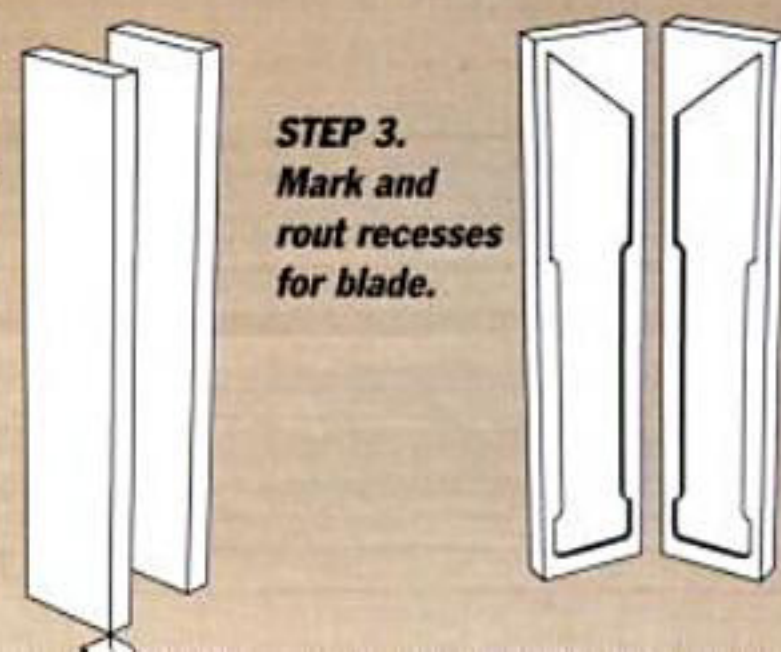
designs and makes custom furniture in Northern California.



STEP 1. Grind blade to shape.

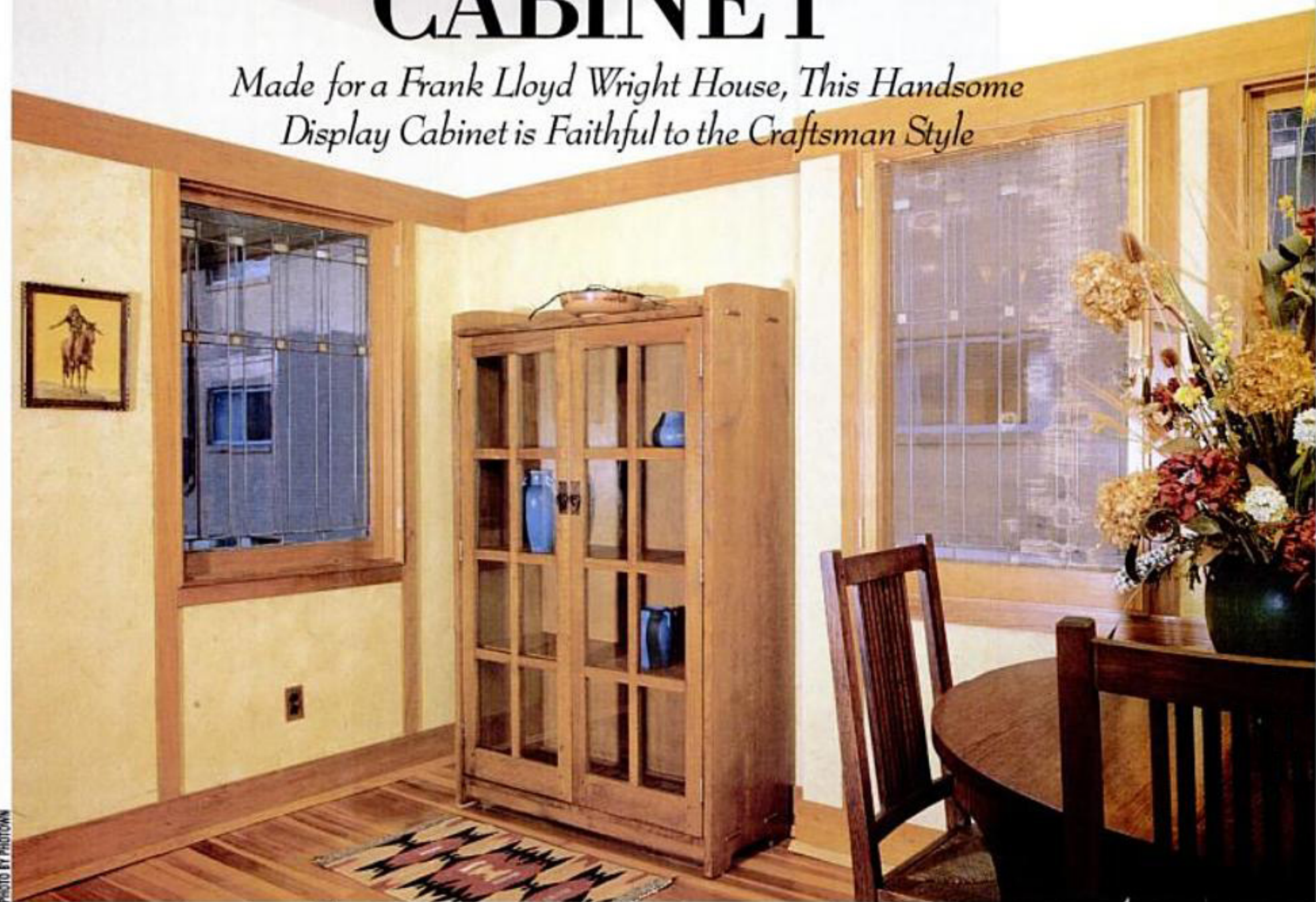
STEP 2. Dimension handle and bandsaw down the middle. Clean up and flatten sawn surfaces.

STEP 3. Mark and rout recesses for blade.



ARTS AND CRAFTS CABINET

Made for a Frank Lloyd Wright House, This Handsome Display Cabinet is Faithful to the Craftsman Style



The clean, rectilinear lines of this Stickley-influenced display cabinet are typical of the Craftsman style.

BY J. GREGORY KINSMAN

I've always been an ardent fan of Frank Lloyd Wright so I jumped at the opportunity to acquire and restore a home he designed—the Gardener's Cottage. The home was built in 1905 on the Darwin D. Martin estate in Buffalo, New York. My dilemma was that Mr. Wright hadn't designed furniture for the cottage, and I couldn't afford to buy a houseful of turn-of-the-century antiques. So, I decided to build the furniture myself, turning for inspiration to the rectilinear lines and flawless proportions of the Arts and Crafts furniture produced during that same period.

This display cabinet is patterned

after a bookcase by Gustav Stickley, whom many consider the father of the American Arts and Crafts movement. Stickley's Craftsman Workshops produced hundreds of furniture designs between 1901 and 1916. The cabinet's primitive structure and smooth oak surfaces, interrupted only by the shelf tenons protruding through the sides, are typical of Stickley's work and echo his belief in solid construction and functional design.

In keeping with the Craftsman style, I made the display cabinet of quarter-sawn white oak. (The back panel and the adjustable shelves are plain sawn white oak plywood.) The reproduction

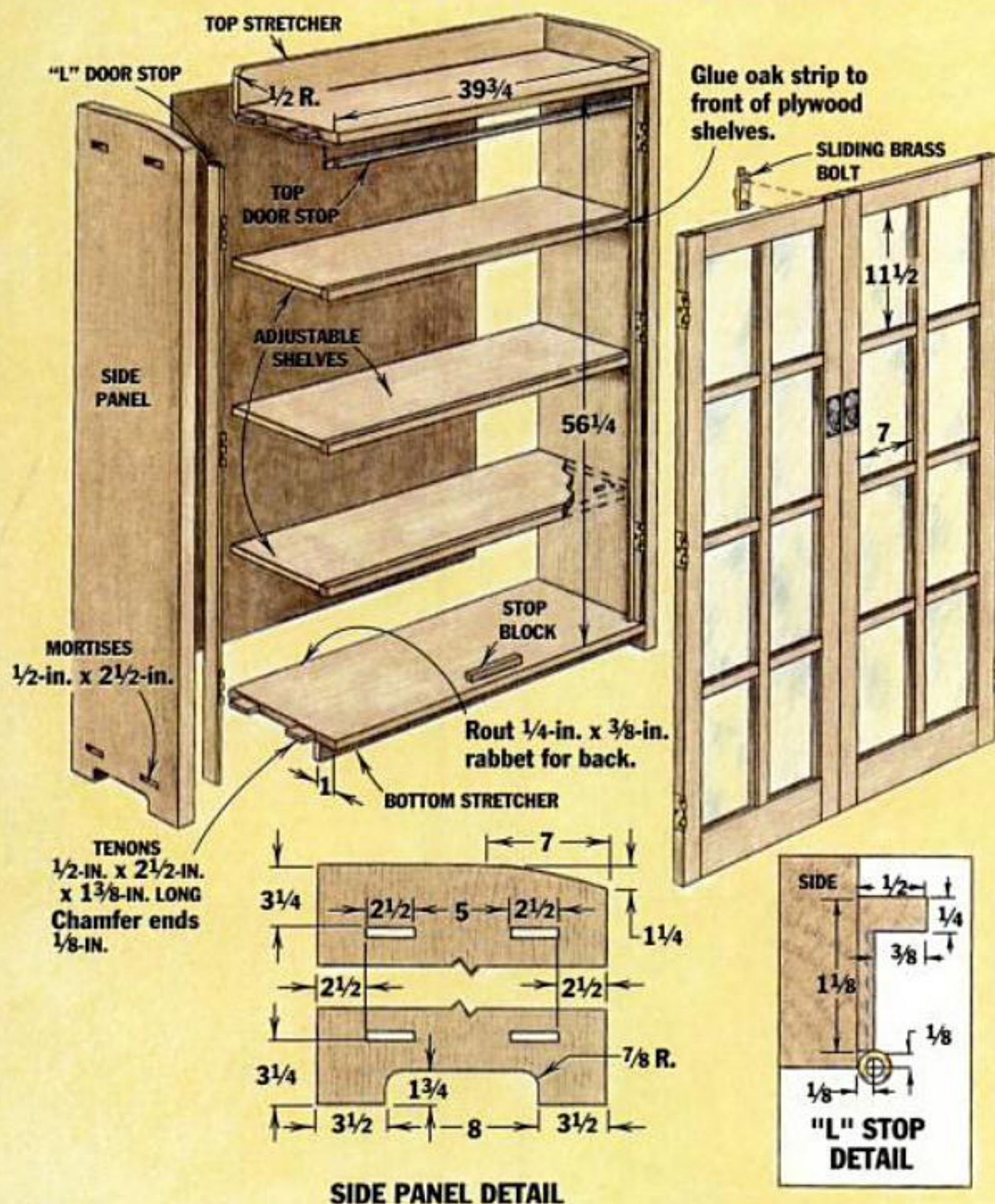
hardware, antique glass and Stickley-style finish all contribute to the cabinet's air of authenticity.

Making the Cabinet

Make the sides, top and bottom of the cabinet first. (See Fig. 1.) I started by planing 6/4 lumber to the finished thickness shown in the Bill of Materials. Then I matched the grain and the medullary ray patterns for the most pleasing appearance before edge-gluing the boards to width.

When the glue has dried, joint one edge of each panel, then rip and cross-cut the panels to the dimensions shown in the Bill of Materials. The

FIG. 1: ARTS AND CRAFTS CABINET



SIDE PANEL DETAIL

BILL OF MATERIALS

PARTS	QTY	DIMENSIONS
Sides	2	1 1/2 x 15 x 64
Top Shelf	1	1 x 14 1/2 x 42 1/2
Bottom Shelf	1	1 x 15 x 42 1/2
Top Stretcher	1	7/8 x 4 1/2 x 39 3/4
Bottom Stretcher	1	7/8 x 2 x 39 3/4
"L" Door Stop	2	1/2 x 1 1/4 x 56 1/4
Top Door Stop	1	3/8 x 7/16 x 39 3/4
Bottom Stop Block	1	3/8 x 7/16 x 6
Back	1	1/4 x 40 1/2 x 57
Adjustable Shelves	3	3/4 x 12 1/2 x 39 3/4
Shelf Edges	3	1 x 1 x 39 3/4
Door Stiles	4	7/8 x 2 1/4 x 56 1/4
Door Rails—Top	2	7/8 x 2 1/2 x 17 1/4
Door Rails—Bottom	2	7/8 x 4 x 17 1/4
Muntins—Horizontal	6	7/8 x 1 1/4 x 17 1/4
Muntins—Vertical	2	7/8 x 1 1/4 x 51 1/4
Glass Stops	32	1/4 x 1/2 x 12 1/4
Glass Stops	32	1/4 x 1/2 x 7 1/4
Antique Glass	16	1/8 x 7 1/4 x 12 1/2
Hinges	6	2 1/2-in. loose-pin butts
.....		
Door Pulls*	2	Sliding Brass Bolt*
Cabinet Lock*	1	Shelf Rests
		12

lengths given for the top and bottom shelves include enough material for the tenons.

Now lay out the feet and the top curves on the side panels. I made exact-sized plywood templates of each of these shapes (see Fig. 1) and traced them on the side panels. After cutting close to my layout lines with a saber saw, I clamped my templates under the side panels and used a flush-trimming router bit to cut the final shapes.

Next, lay out the mortises in the side panels and rout them with a plunge router and 1/2-in. straight bit, guiding the router with a board clamped to the top face of the side panel. (See photo, opposite page.) Then square the corners with a 1/2-in. chisel.

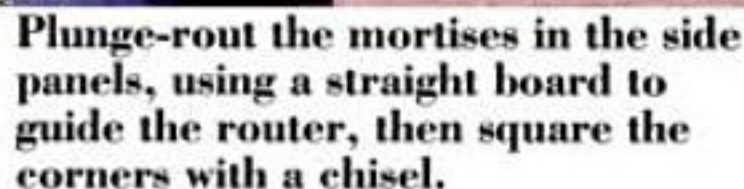
To create the tenons on the top and bottom shelves, you first rout 1/2-in. by 1 3/8-in. tongues on the ends of the shelves then cut away the excess, leaving only the finished tenons.

I used the same 1/2-in. straight bit to rout the tongues, working from both sides of the shelves, and again using a straight board as a fence. Then I laid out the tenons on the tongues, checking the spacing against the mortise locations on the side panels. To get a clean shoulder between the tenons, cut away most of the waste with a scroll saw, then finish up with a flush-trimming bit, letting the lower shoulder guide the bearing. (See photo, page 47.) Chisel out the corners where the tenons meet the shelf shoulders, and finally, chamfer the ends of the tenons about 1/8 in. This detail is typical of Stickley's furniture and reduces the visual harshness of square-edged tenons protruding from a side panel.

Now make the top and bottom stretchers, and glue them to the top and bottom shelves as shown in Fig. 1.

Glue up the cabinet by first spreading glue lightly in the mortises and on the cheeks of the tenons. Assemble the parts and clamp them together with bar clamps, using straight wooden beams (2x4s will do) as clamping blocks to hold the sides flat against the shoulders of the shelves. Measure the diagonals of the cabinet to check for squareness. To remove excess glue around the exposed ends of the tenons, use a

I made the three adjustable interior shelves of $\frac{3}{4}$ -in. oak plywood and



applied front edge strips of quarter-sawn oak to add stiffness and create the illusion of a 1-in.-thick shelf. (See Fig. 1.) Then I drilled holes in the side panels for shelf rests, locating them so the edges of the shelves would be hidden behind the door muntins when the doors were closed.

When selecting oak for door parts, try to find pieces that complement each other visually, with similar grain

Cut the tenons on the rails and muntins (see Fig. 2) with a 1/2-in.-wide dado blade on a tablesaw, pushing the stock with the miter gauge. Use the rip fence and a gauge block to deter-

RE-CREATING A STICKLEY FINISH

BY ELLIS VALENTINE

Much of the beauty of Gustav Stickley's furniture derived from his careful wood selection and his insistence on finishes that didn't obscure the natural look and feel of the wood. He devised this finishing process to achieve the low-key, almost sensual look and feel he wanted.

If hair-splitting authenticity is your cup of tea you can follow this recipe. But historians speculate that if Stickley were alive today, he'd probably be using modern finishing materials, provided they were practical and produced the same results.

Step 1: Fuming With Ammonia

Fuming with ammonia is a time-honored, if somewhat hazardous, way to color raw wood without dyes or pig-

(WARNING: *Ammonia and its fumes are extremely irritating and harmful to skin, eyes and mucous membranes, and may be fatal if inhaled. It's vital to wear goggles, a vapor respirator, and gloves, and to work in a well-ventilated area. Keep ammonia and other finishing supplies out of the reach of children.*)

Prepare your project for fuming by first removing all hardware. (Steel or iron in contact with the oak will turn it black in those areas, and brass will corrode.) Place the unfinished piece in an airtight container or closet, or in a makeshift tent of polyethylene. Make sure the plastic does not touch the workpiece or it will prevent the fumes from penetrating in those areas.

To fume the wood, place a few

the mix with denatured alcohol to dilute the color. Banana oil is an excellent solvent for aniline dyes and retards the stain's drying time, making it easier to control than straight alcohol stain, with fewer lap marks.

Step 3: Lacquering

Next, Stickley finished his furniture with two coats of a special lacquer, sanding lightly after each coat. To make this lacquer, he mixed 2 parts "German lacquer" to 1 part bleached white shellac (1-lb. cut), often adding very small amounts of aniline dye as a toner. Stickley's German lacquer was made of nitrocellulose resins dissolved in amyl acetate. It dries very hard and more slowly than modern lacquers. The addition of shellac gives the lac-



White oak (left) is ideal for ammonia fuming because of its high tannic acid content. After 12 hours of fuming, it has turned a deep gray-brown (middle). Shellac and paste wax bring out the warmth and richness of the fumed wood (right).

ments. The principle is simple: Ammonia fumes react with the tannic acid in wood and darken it. Some woods, such as white oak, walnut and mahogany, fume better than others because they have higher concentrations of tannic acid. The gray-brown color of the fumed wood turns a rich brown when you apply a finish. Stickley preferred fuming because it doesn't exaggerate the wood's contrasting grain the way pigment stains do.

Concentrated, or "anhydrous," ammonia (26 percent solution) works best for fuming. It is available from chemical- and drafting-supply houses. Ordinary household ammonia (5 percent solution) will work, but more slowly.

saucers of ammonia on the floor of the enclosure and seal the openings. You'll see some darkening in as little as 15 minutes, and it will continue for about eight to 12 hours. (See photo.) When you're satisfied with the color, remove your project from the tent. Allow the remaining ammonia to evaporate outdoors.

Step 2: Dyeing

After fuming, Stickley "touched up" the color on sapwood and areas not affected by the fumes, with dilute dye stains. To make his stains he dissolved powdered alcohol-soluble aniline dyes in a solvent called "banana oil" (amyl acetate, see Sources), then he thinned

quer more body and improves the finish's adhesion and flexibility. To date, I've been unable to locate a manufacturer of Stickley's lacquer, but modern "bronzing" lacquers (see Sources) are very similar in clarity, build and handling characteristics.

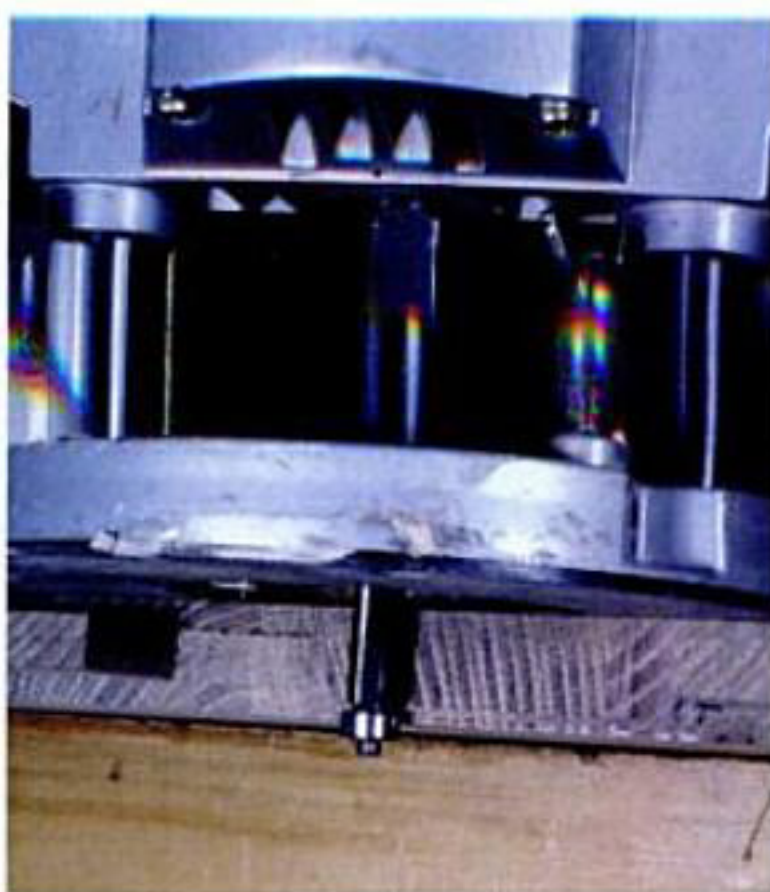
Step 4: Waxing

Stickley recommended a coat of floor wax for his final finishing step. Wax doesn't offer tremendous protection, but it imparts a hard luster and a silky feel, without obscuring the texture of the wood. ▲

(Special thanks to Robert Welsh for sharing his expertise in Arts and Crafts finishing.)



Cut the tenons on the muntins with a dado head, using a gauge block against the rip fence to determine the shoulder locations.



After sawing away the waste, trim the shoulder between the tenons with a router and flush-trimming bit, using the lower shoulder as a guide.

SOURCES

The hardware and finishing supplies for the Arts and Crafts cabinet came from the following sources:

- ▶ **Sliding brass bolts and ball-tip loose-pin hinges:** The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374-9514, (612) 428-3200.
- ▶ **Mortise cabinet locks** (Item #13J52): Woodcraft, 210 Wood County Industrial Park, Box 1686, Parkersburg, WV 26102-1686, (800) 225-1153.
- ▶ **Reproduction door pulls:** Buffalo Studios, 1925 E. Deere Ave., Santa Ana, CA 92705, (714) 250-3333.
- ▶ **"Banana oil" (amyl acetate) and bronzing lacquer** (Item #4091): Industrial Finishing Products Inc., 465 Logan St., Brooklyn, NY 11208, (718) 647-6663. (\$50 minimum purchase)

mine the shoulder locations. (See photo, top left.) Clean up any ridges left by the dado blade with a rabbet plane or sharp chisel.

Next, lay out the lap joints where the horizontal and vertical muntins intersect as shown in Fig. 2. You can measure to determine these locations, but a more direct method is to use the

same 1/2-in. dado blade. This time, line up your cuts by eye instead of using the rip fence to locate them. When everything is cut to size, dry-assemble the parts to check the fit.

Glue up the doors next, assembling the lap joints first. Then glue the vertical muntins into the top and bottom rails. Finally, glue and clamp the stiles to these rail/muntin assemblies, and check to see that the doors are square and flat. While the glue is drying, drill and peg the corner joints, using 3/8-in. oak pegs cut from a block of end grain stock with a plug cutter. I used two pegs on each bottom rail joint and one for each upper joint.

Allow the glue to dry overnight, then remove the clamps and trim the doors to fit in the cabinet opening. I allowed 1/8 in. of space between the doors and at the top and bottom, and 1/16 in. at the L-stops on the cabinet sides.

Lay out and chisel the hinge mortises in the doors and the L-stops, then hang the doors. I used three 2 1/2-in. loose-pin brass butt hinges (see Sources) on each door.

After hanging the doors, find the exact mounting locations for the top and bottom door stops. To do this, close the doors and clamp a straight piece of scrap across their faces to hold them in alignment. Trace the position of the back edges of the doors on the top and bottom shelves. Then open the doors and glue the

cabinet lock into the right-hand door and screwed the strike plate into a shallow mortise chiseled into the edge of the left-hand door. I chose this particu-

lar lock (see Sources) because the keyhole lines up with the keyhole opening in my door pulls when they are centered on the stiles.

The door pulls I used (see Sources) are exact copies of original Stickley pulls, crafted of solid copper with an antique patina. You can save some money by substituting simple brass pulls or knobs, or omit pulls entirely and use the key to pull the door open.

I used antique, or "rolled," glass in the doors, because the wavy texture makes the cabinet look authentic. My glass came from a shop that specializes in salvaged glass, but most stained glass dealers carry it as well.

To hold the glass in place, I made stops from the 1/4-in. by 3/8-in. strips I cut out when rabbeting the door parts. It's a good idea to pre-drill tiny pilot holes in the stops to prevent them from splitting when you tack them in place.

After rounding the cabinet's sharp edges with sandpaper and sanding all surfaces to 220 grit, I finished the piece according to Stickley's own recipe (see sidebar), with the following exceptions: First, since I didn't have any "banana oil," I used a very dilute mixture of alcohol-soluble aniline dyes to touch up the color of the oak after fuming. Aniline dyes are available from many mail-order suppliers. Second, I substituted two thin coats of shellac for Stickley's "lacquer." (See sidebar, Step 3.) This gave me the visual and tactual effect of the Stickley finish using readily available materials. You can achieve similar results, with perhaps more protection for the wood, using prepared aniline dye stains and thin coats of a modern wiping varnish. ▲



LAMINATED RECURVE BOW

BY CHARLIE NORELLI

I inched forward through the woods, bow and arrow at the ready, watching through the leaves for the sign of movement. Then it came, just to my right. In an instant, the arrow was away, and with a “thump” landed hard.

In this case, the target was only a plastifoam deer that’s mounted on a pulley in my back yard, but hitting it cleanly was enough to tell me that my new bow—about the 20th I’ve made—was quiet, accurate and powerful.

I first tried bowmaking while I was in medical school as a way to relieve the strain of studying, and over the years I’ve found it’s a fun hobby and a great challenge. Even a beginner can build a bow that will work fairly well if he takes his time and adopts a proven design. But the more involved you get with bowmaking, the more you’re able to experiment in the search for the perfect bow.

About 10 years ago, I started making take-down laminated recurve bows like this one. “Take-down” because they break down into three parts, and “recurve” because each limb tip



*Made From
Fiberglass and
Wood, This Project
Has Some Punch*

forms a secondary curve. (See Fig. 1.) This is a good bow for the novice to make. You only need basic power and hand tools. Though I use some special rigs for laminating and drilling, these things aren't necessary if you just want to make a bow to test your skills.

In the following pages I'll cover the basics of building this bow. The fine points can fill a book, and you'd be smart to read one before you try bow-making. (See the box on page 51.)

Making the Bow Form

Laminated recurves are made from a sandwich of wood, fiberglass and epoxy. The top and bottom limbs are formed separately in a plywood bow form, using an inflated fire hose to clamp the laminates in place. (See Fig. 1.) The handle, or riser section, is simply laminated wood that is shaped to fit the profile of the user's hand.

To make this bow, I first built a plywood form with the limb profile band-sawed into it. I fine-tuned the profiles with a drum sander, then glued plastic laminate into the bottom half of the form to cover any slight irregularities.

Getting a perfect profile here is important. If the surface dips and rises you won't be able to apply even pressure across the laminates and that increases the risk of flaws in the bow.

I'm not as concerned about imper-

fections in the upper part of the form because the pressurized fire hose will fill any gaps. (Fire hose, plugs and clamps are available from Fedora's Archery Shop, 115 Wintersville Rd., Richland, PA 17087, 717-933-8862.) If you'd rather not invest in special equipment for your first bow, you can use regular pipe clamps, or wrap the form with strips from a rubber inner



The basic ingredients of a laminated bow are hard wood and thin, uni-directional fiberglass strips.

tube. But with these methods, the laminates are more likely to slip and it's harder to apply pressure evenly.

Choosing Materials

The modern composite bow limb consists of an inner core of two to three thin wood laminates sandwiched between two fiberglass strips. Adding fiberglass improves the bow's strength and "spring," making it more powerful than a simple wood laminate bow.

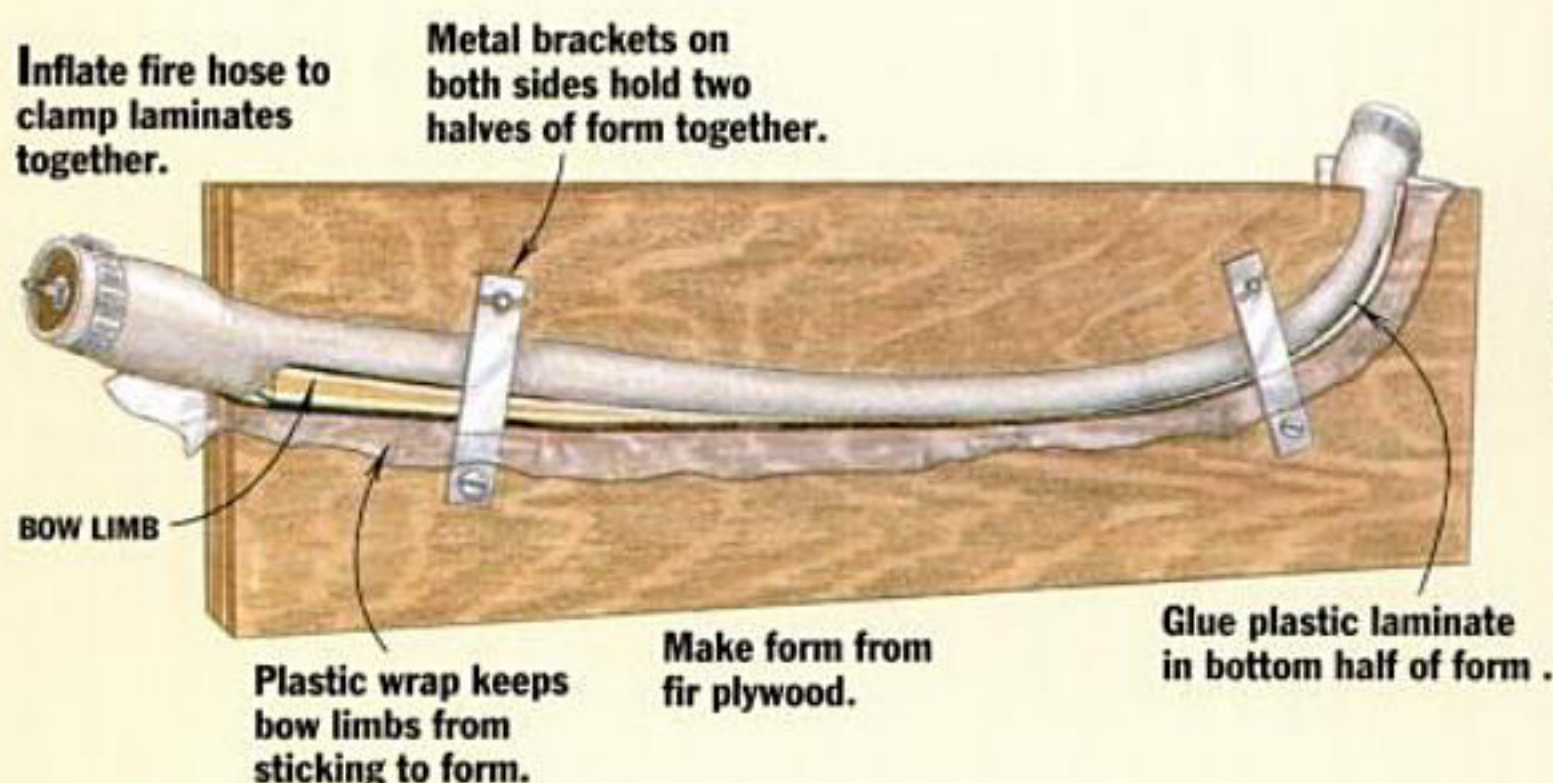
On this bow, I used two strips of black locust for the core because it's tough, yet flexible. Many bowmakers today also like Eastern hard rock maple.

As for fiberglass, I use Gordon's Bo-Tuff (available from Fedora's Archery Shop, 717-933-8862, or The Old Master Crafters Inc., 130 LeBaron St., Waukegan, IL 60085, 708-623-2660). Bo-Tuff is a uni-directional fiberglass specially designed for bow limbs.

Wood for the riser (see Fig. 2) should be strong, a good shock absorber and pleasing to the eye. I made this one by laminating curly ash. Other woods widely used in risers include figured maple, osage orange, bubinga and cocobolo. You could make a riser from a single piece of wood, but I like to use two so I can cover the bolt insert I install through a counter-bored hole in the back of the riser. (See Fig. 2.)

The thickness and the number of the wood and fiberglass laminates you use in the limbs determines the bow's draw weight, which is the amount of force it takes to draw the bow string 28 in. from rest. Most people start with wood laminates that are 0.08 in. to 0.12 in. thick and fiberglass laminates that run between 0.04 in. and 0.05 in. On this design I used two 0.10-in. laminates of wood and two 0.045-in. laminates of fiberglass to produce a bow

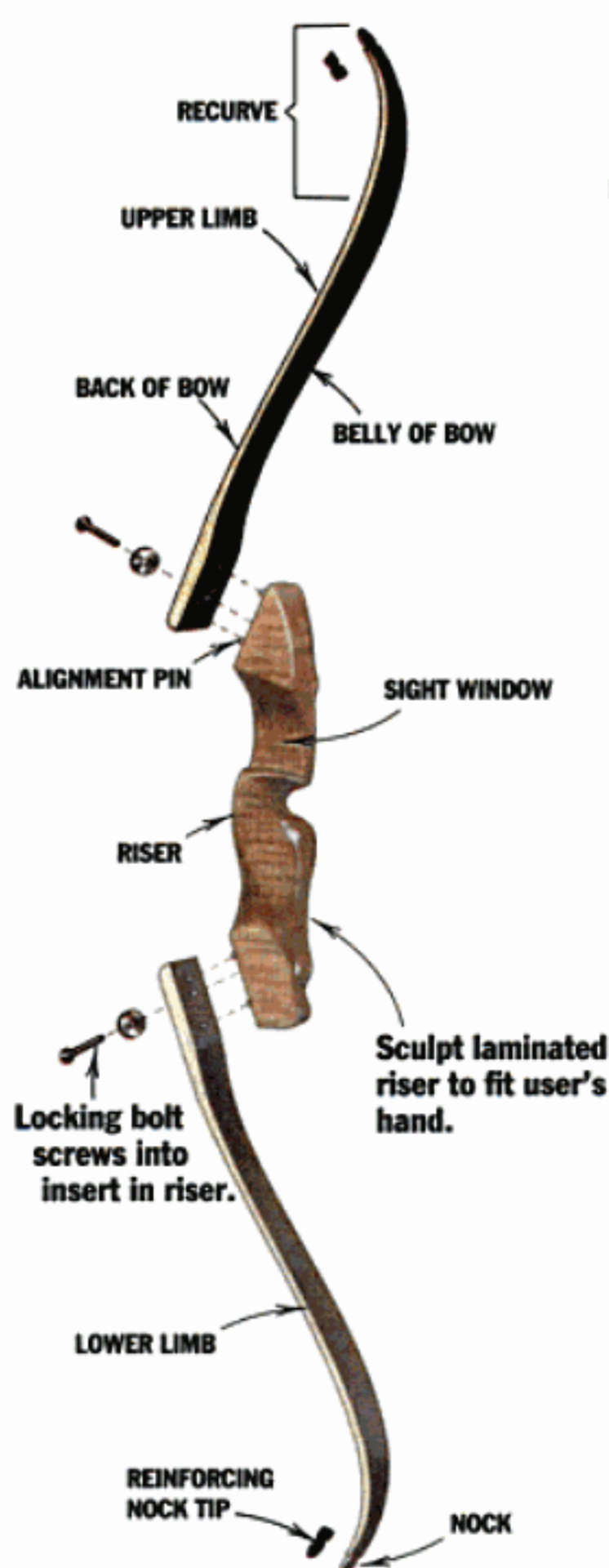
FIG. 1: LAMINATION FORM



With a bow limb in the form, author first inflates fire hose to clamp laminates in place (above right), then places the bow form in a shop-made heat box (right) to ensure that the epoxy cures evenly.



FIG. 2: LAMINATED RECURVE BOW



with a 55-lb. draw weight. (See sidebar for more on bow design.)

After choosing the laminates, I used a drum sander mounted in my drill press to create the proper taper on the fadeouts. Then I dry assembled the parts in the form and inflated the fire hose to 80 lbs. psi to make sure the hose tightly compressed all potential gluing surfaces.

Gluing Up the Limbs

I find an epoxy called Smooth-On (available from Bingham Projects Inc. 5739 N. Monte Verde Dr., Mountain Green, UT 84050, 801-876-2639) is best for gluing up my bows. This glue is very thick, almost like Vaseline, and relatively easy to use since the proportions of resin and hardener aren't as critical as with some other epoxies.

I applied thin, even coats to the limb parts, then carefully set the laminates in the form so they wouldn't slip out of alignment. Then I bolted togeth-

er the halves of the form and again pumped the fire hose to 80 psi. (See photo, previous page.)

Smooth-On epoxy must heat-cure to maximize bonding strength. When I first started making these bows, I heated the form in a simple plywood box with four 100-watt light fixtures inside. (See photo, previous page.) But now I'm using a special heat tape (available from Fedora's Archery Shop, 717-933-8862). This shortens curing time to 45 minutes (vs. six to eight hours), and ensures that the core laminates are heated evenly.

(Later, when gluing on the reinforcing nock tips (see Fig. 2), I used a temperature of 90° to 100° F and applied it to the tips alone.)

Once the epoxy cured I sanded the edges of the limbs square, applied masking tape to the belly of each limb and drew approximate center lines. These helped me align the limbs with the center of the riser so I could drill the alignment pin and bolt holes. I used a self-centering doweling jig to make these holes, but you could do the job with a shop-made jig.

Then I was ready to trim the limbs to their final shape. First, I bolted them to the riser, put the bow in my vise, belly up, and checked the alignment along the three parts. (See photo, opposite page.) Then I used a plastic template to lay out the profile of the limbs. These limbs lined up perfectly with the riser, but if they hadn't I could have compensated a bit by shifting the plastic template slightly so its center line aligned

DESIGNING A BOW

Designs for modern composite bows can vary widely, but years of trial and error have shown it's best to stay within a rather restricted design "zone" when building a bow.

The primary factors affecting your design are the length of arrow you intend to use, referred to as draw length, and the desired draw weight of the bow, which is measured in pounds, with the string pulled 28 in. from rest position.

For people up to 6 ft. tall, a good average hunting bow will have a draw length of 28 in. and a draw weight of 45 lbs. to 50 lbs. You're almost always better off building your first bow on the lighter side because a bow with a lower draw weight is easier to control and shoot accurately.

The overall length of the bow is another important design consideration. Too short a bow will tend to create

finger pinch, due to the acute angle of the string, while too long a bow generally will produce less arrow velocity and be less maneuverable in the field. Hunting recurve bows vary from 56 in. to 61 in. in length when measured tip to tip along the bow's profile. Target bows are usually longer (66 to 70 in.). For hunting and field shooting with normal draw length, a 62-in. recurve has proven to be an excellent choice.

Before designing your own bow, it's best to consult with a reputable bowyer and measure several bows, using a micrometer, tape measure and protractor. If you'd rather work off a proven design, you can buy blueprints (available from The Old Master Crafters Inc., 130 LeBaron St., Waukegan, IL 60085, 708-623-2660; or Bingham Projects Inc., 801-876-2639).—C.N.

with the one on the riser.

After laying out the profile, I sanded the limbs to shape on a belt sander.

Fine-Tuning the Bow's "Balance"

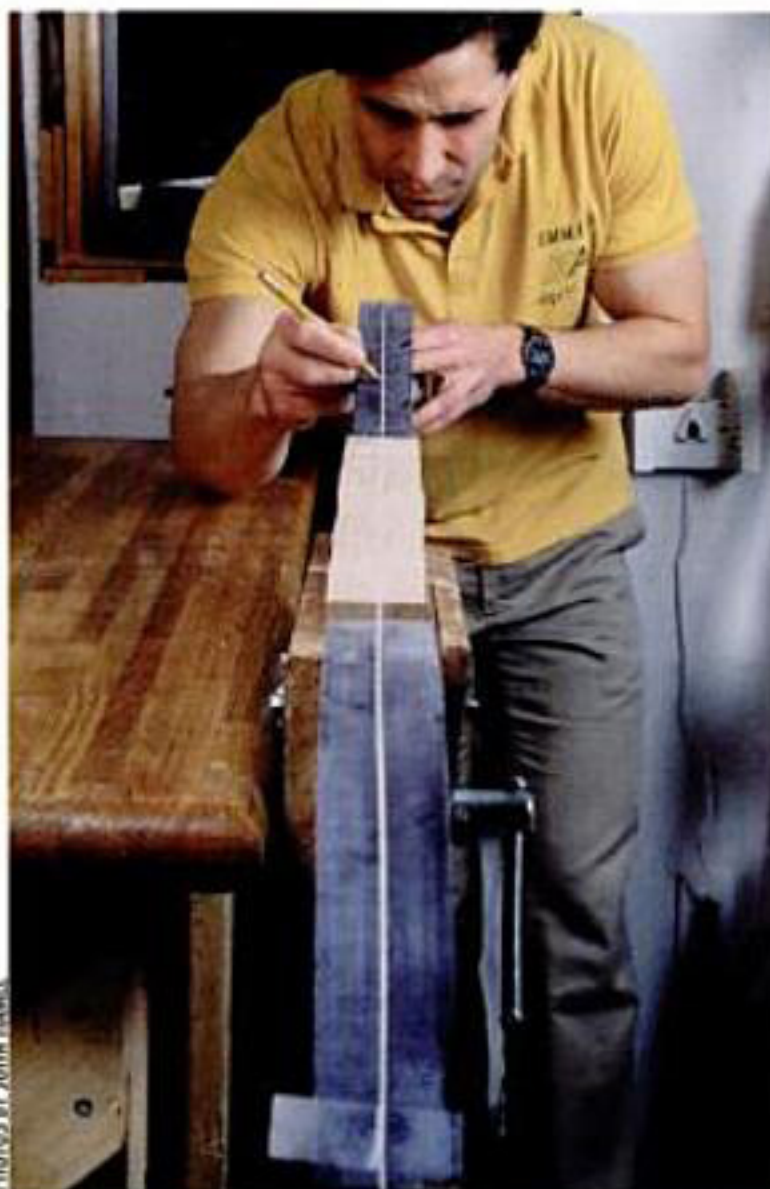
When you sight down a bow string from one tip, a finished bow should be in "balance," meaning the string splits both limbs and the riser in half. To check the balance, I cut the limbs to make a bow that would be 62 in. from tip to tip when measured along the profile of the bow. Then I filed shallow nocks with a thin, rat-tail file, attached a longer than normal string to the bow and sighted down the string.

Often at this stage of the construction process, one or both tips may pull to the side. This may be because of increased tension on the side to which it pulls or may be because of asymmetrical nock placement. Either evening the nocks or sanding some material from the side of the limb *toward* which the tip pulls will bring the limb back into alignment.

Next, I checked the symmetry of the limbs when viewed from the side. On a strung bow, the upper limb should have $\frac{1}{4}$ in. more bend than the lower one when measured perpendicular from the string to the ends of the riser. (See photo, above.) If there is a great difference between the bend in the two limbs you can trim the width of the limbs or sand the backs very slightly to adjust them. But don't take off too much or you'll weaken the limbs.

Sculpting the Riser Handle

Most competent woodworkers can intuitively work their way to this point. However, correctly sculpting the riser handle requires an understanding of shooting technique and hand placement. It's best to study and measure a few bows to get a feel for this, but basically you want to achieve three things: You want the grip to fit your hand naturally when you hold your arm outstretched at shoulder level. You want to shape the grip so that when you hold it outstretched, the web between your thumb and forefinger forms an angle of approximately 20° to 30° . Finally, you want to sculpt the entire riser so it will balance when you rest your forefinger in the thumb groove.



Author sights down the bow string to check the alignment of the limbs and riser.

FOR MORE INFO

For more on making recurve bows, see the following publications:

► *Traditional Bowyers of America*, by Dan Bertalan (1989, Envisage Unlimited, Box 777, East Lansing, MI 48826).

► TRADITIONAL BOWHUNTER magazine, Box 15583, Boise, ID 83715, (208) 362-4064.

For information on making traditional one-piece bows, see these books:

► *The Art of Making Primitive Bows and Arrows*, by D.C. and Valerie Waldorf (1985, Bransom Press, available from Dixie Gun Works, Box 130, Union City, TN 38261, 800-238-6785).

► *Making Indian Bows and Arrows... The Old Way*, by Douglas Wallentine (1989, Eagles View Press, available from Dixie Gun Works, 800-238-6785).

Once you have determined a proper profile, you can trace it onto the riser, rough it out on the bandsaw and then sand the form to its final contours. (See photo, top right.)

The last step before applying a finish is achieving acceptable draw weight. Though the thickness of the laminates and limb design are the major determinants, you can reduce the draw weight



To shape the riser handle, use a hand-saw and belt sander.



To check symmetry between the limbs, measure from the string to the ends of the riser. The upper limb should have $\frac{1}{4}$ in. more bend than the lower one.

a few pounds by belt sanding the width of each limb slightly (perhaps $\frac{1}{8}$ in. off each side). Again, don't take off too much or you'll jeopardize your bow's longevity and stability.

As far as finishing goes, I like to use simple spray polyurethane, while some other bowmakers use two-part catalyzed varnish (available from Duncan Direct, 205 S. Federal Highway, Stuart, FL 34994, 800-749-8263). Before you try some other finish, test it on some flexible scraps to make sure it is elastic enough to withstand the heavy flexing a bow undergoes.

Making this bow proved to be a lot of fun, and I think you'll enjoy trying one too. I've found that once you start building bows you won't stop at one. You always want to make one that's a little better. Best of all, as you finish each one, you not only have a beautiful piece to look at, you have something fun to play with. ▲



CHARLIE NORELLI

is a doctor of rehabilitation medicine in eastern Pennsylvania, where he makes and shoots bows.



The appeal of this cabinet by the author is heightened by the sensitive use of form, grain and color.

WOOD FIGURE

IN DESIGN

BY
MONROE ROBINSON

Grain, Color and Texture Can Either Enhance or Disrupt the Appearance of Your Work

Have you ever wondered why some pieces of furniture are more inviting to the senses than others? Often it's because the furniture maker chose wood whose grain and color complemented the shape and purpose of the piece.

If you look closely at a really fine chair you can see how the wood grain seems to have *wanted* to follow the curves of the chair. A good chairmaker knows instinctively how to select and cut wood to achieve this effect. For generations, the best craftsmen have used the grain, color and texture of wood to convey—even emphasize—their intentions.

The best-known advocate of using wood figure in design is James Krenov, my former instructor in the fine woodworking program at the College of the Redwoods in California. Krenov has been teaching, writing and lecturing about the subject of figure for years. [\(See sidebar, page 54.\)](#) As he explained to us, many people aren't aware of how wood's character can be used to enhance the design. They're more inclined to rely on exaggerated shapes to "make a statement," not realizing that subtle shapes and carefully chosen wood are more effective. Harmony makes a statement, too.

"Some people think this concern for harmony and balance is unrealistically emotional," Krenov lamented. "But emotion *is* important, as is the curiosity that springs from emotion, especially when it expresses an attitude toward the work. The best furniture has always reflected the caring—even loving—use of wood. With care and skill, plus some sensitivity and patience, you can make artistic things of the simplest wood."

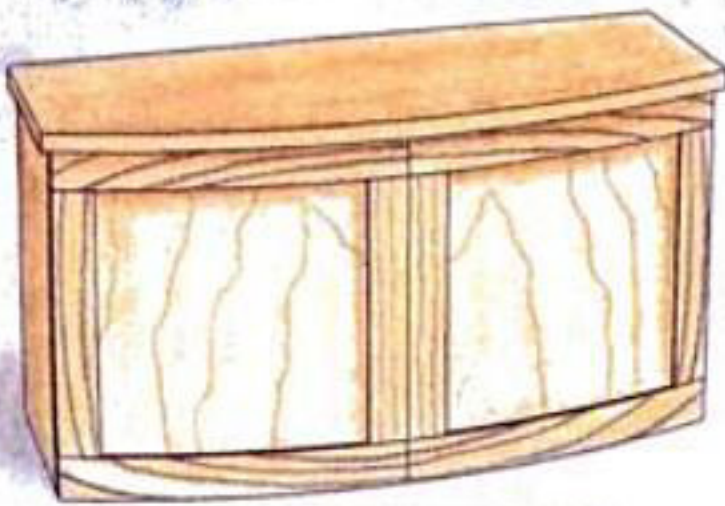
Grain

Craftsmen should realize that the *apparent* shape of a piece of furniture results not only from the actual shape itself, but from the visual effect of the grain as well. We can use subtle curves to convey our intention if our choice of

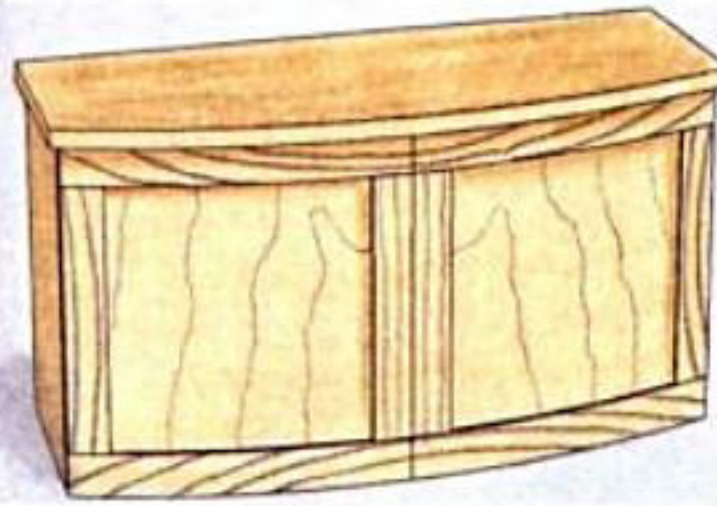
FIG. 1: HOW GRAIN AFFECTS DESIGN

CURVED STILES AND RAILS

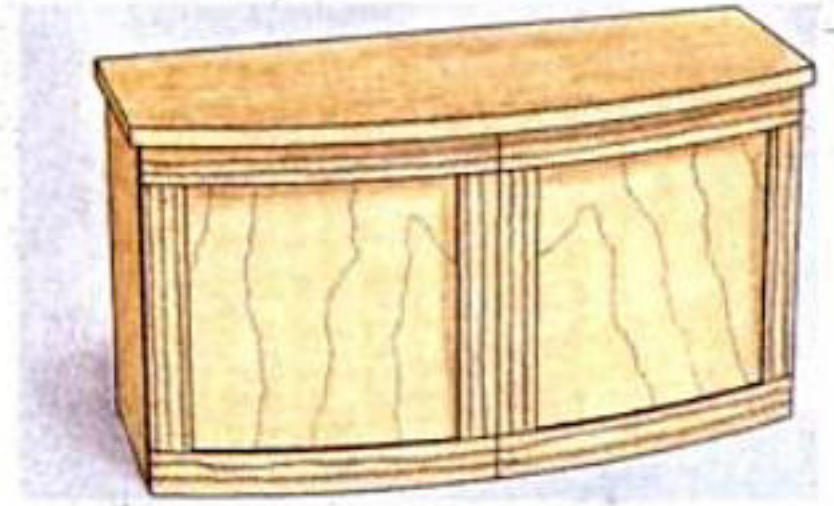
CONVEX CABINET



Grain of stiles and rails curves slightly inward, emphasizing convex shape.

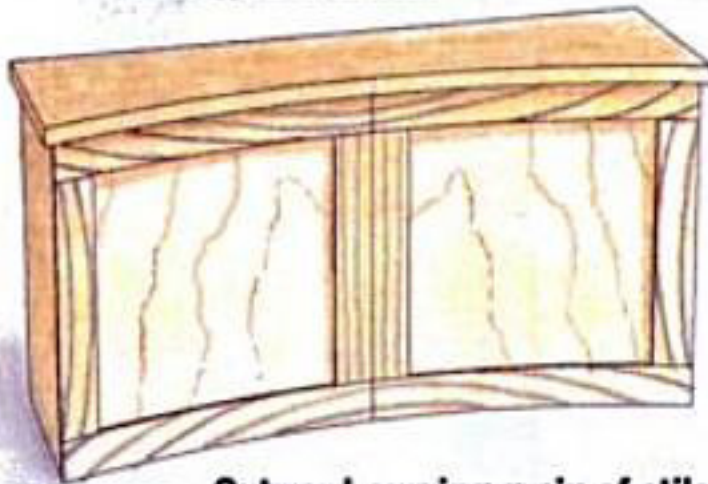


Outward-curving grain works against the shape.

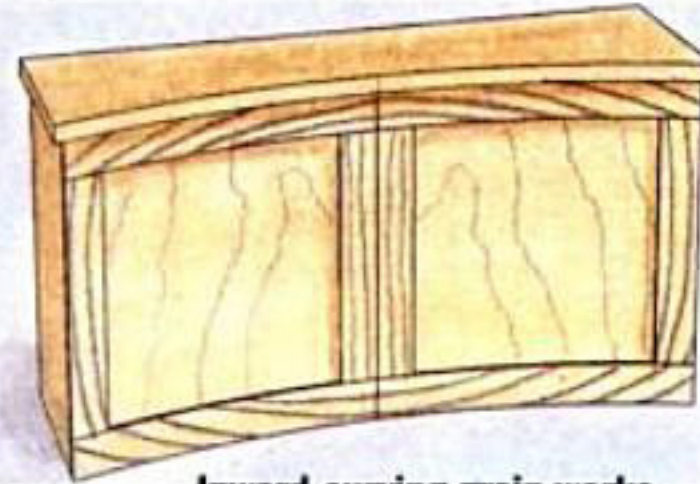


Straight grain is unexciting.

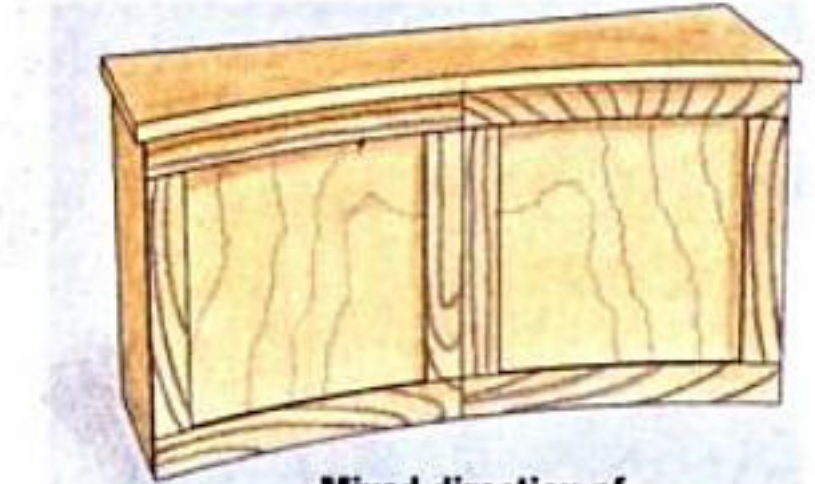
CONCAVE CABINET



Outward-curving grain of stiles and rails complements concave shape.



Inward-curving grain works against the concave shape.



Mixed direction of grain looks confusing.

STRAIGHT TAPERED LEGS



Outward-sloping grain gives legs a sturdy appearance.

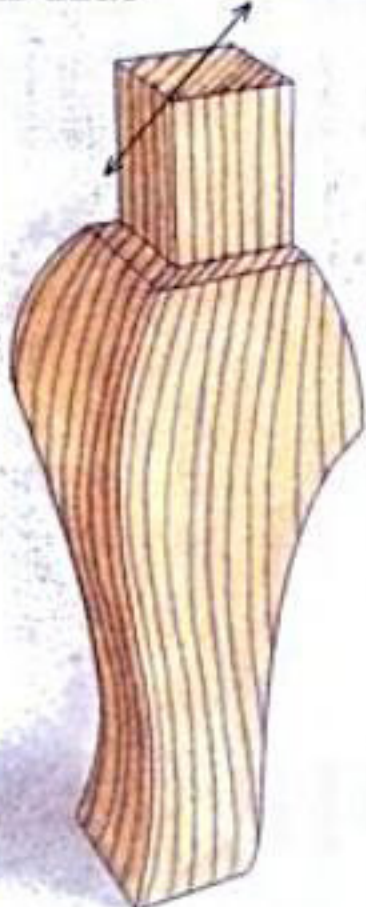


Inward-sloping grain makes the legs appear to be toed in.

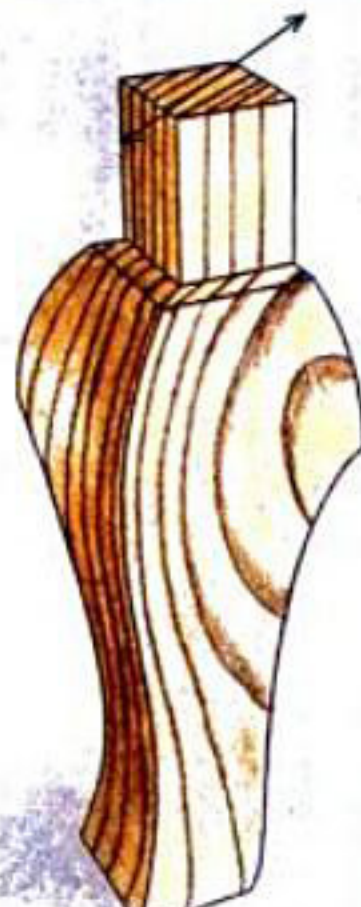


Straight grain looks static and unexciting.

CURVED LEGS



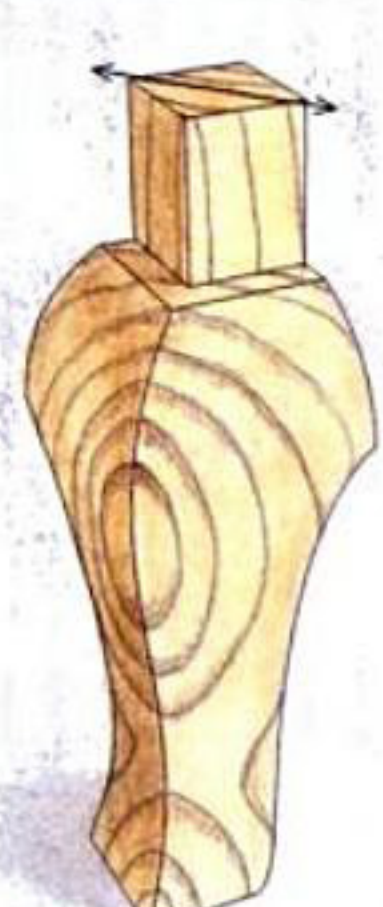
Annual rings running from inside corner to outside corner follow curved sides of leg for best visual effect.



As rings are rotated slightly, grain pattern becomes compressed on one side and exaggerated on the other.



Rings parallel to one face make it appear flatsawn and visually flatten the curve on the adjacent face.



Rings running from side to side clash completely with curved surfaces.

JAMES KRENOV

AND THE COLLEGE OF THE REDWOODS

BY ELLIS VALENTINE

In the brightly lit workshop, you can feel the intensity in the air. Twenty-two students are hard at work at their benches—some scrutinizing planks for color and grain, others patiently working out details on full-sized mock-ups of their current projects. At the center of the room stands James Krenov, the man whose books have influenced a generation of woodworkers, hand-sanding the edges of a nearly completed cabinet base. At age 72, he is still doing what he does best, creating yet another piece of sublime, hand-crafted furniture.

For the last 12 years Krenov has taught and worked alongside his students in the fine woodworking program he helped found at the College of the Redwoods in Fort Bragg, California. His goal: to pass along the rich legacy of hand-craftsmanship he accumulated through exposure to many cultures around the world.

As a child in northeastern Siberia and Alaska, he developed a feeling for natural materials by watching the native people make utilitarian objects of leather and wood. Later while building fine wooden boats in Seattle, he developed an eye for line, form and their relationship to function. While living in Sweden, Krenov was inspired by the spirit and elegant simplicity of Arts and Crafts furniture and studied for two years with Carl Malmsten, the renowned Swedish cabinetmaker.

Krenov's books, *A Cabinetmaker's Notebook*, *The Fine Art of Cabinetmaking*, *The Impractical Cabinetmaker*, and *James Krenov, Worker in Wood*, (Sterling Publishing Co. Inc., 387 Park Ave. S., New York, NY 10016) have brought him worldwide recognition and respect. His work is represented in The Philadelphia Museum of Art and in the national museums of Sweden, Norway and Japan. He has received many prestigious awards, including the Swedish Cultural Prize, The British Arts and Crafts Award, a Fulbright and, recently, the Centennial Silver Medal from the British Society of Designer Craftsmen.



ELLIS VALENTINE

A Unique Course

Despite his renown, Krenov works in relative obscurity at the College of the Redwoods. The woodworking shop, tucked away at the edge of town a mile from the campus, is a world unto itself, where everything is dedicated to the pursuit of woodworking. The students—18 men and four women—labor six days a week in the well-equipped shop. The lumber room, under the watchful eye of instructor David Welter, is stacked to the ceiling with fat planks of Swiss pear, doussie, figured maple and other unusual and exotic species, along with Douglas fir, Port Orford cedar and other domestics.

This woodworking program is different from many college-level woodworking courses in its emphasis on personal expression, patience and sensitive awareness of tools and materials. While there are occasional formal critiques by the staff, the atmosphere is one of sharing and mutual support in matters of design and technique.

The students' projects reflect Krenov's influence in the process by which they are designed and built. From preliminary sketches, students proceed to full-sized mock-ups made of scrapwood, cardboard and hot-melt glue. By manipulating the mock-ups,

Still hard at work at age 72, author/woodworker James Krenov roughs out a cabinet leg on the bandsaw (left) at the College of the Redwoods, where he also lectures twice weekly to students in the fine woodworking program.



DAVID WELTER

they arrive at the most pleasing proportions for the project—before actually cutting precious wood. As they make the piece, they strive with their eyes, hands and minds to infuse it with "intention" and clarity of vision, those nearly intangible qualities that characterize the finest craftsmanship.

Krenov acknowledges "a great reverence for the past," and for those genuinely humble craftsmen, like Edward Barnsley, the pre-eminent British furniture maker of this century, who "did so much with so little," making exquisite pieces without superfluous ornament. In an age of indifference to the past, he exhorts graduates to uphold the integrity of their craft—not to be tempted to mediocrity. Though furniture fashions will change, he says, people will always appreciate the intrinsic beauty of honest workmanship.

For more information, contact The College of the Redwoods, 1211 Del Mar Drive, Fort Bragg, CA 95437, (707) 964-7056. ▲

ELLIS VALENTINE
is associate editor of *AW*.

grain is in harmony with the overall shape. (See photo, next page.) As Krenov says, "Maybe you don't need a curved shape at all; the subtle curve of the grain may say what you want to express."

To see how grain can work with (or against) shape, consider the stiles and rails of a curved-front cabinet. (See Fig. 1.) Clearly, some grain patterns enhance the design while others disrupt it. Random use of grain detracts from the rhythm and poise of a piece.

Grain can also affect the visual "stance" of a piece. Straight tapered legs can appear to slope either inward or outward depending on their grain direction. (See Fig. 1.) Even on curved legs, grain orientation can contribute to the appearance of balance and intention. (See Fig. 1.)

If we are to use wood figure effectively, we must develop an understanding of how the grain runs through a plank and how to cut the plank to get the grain patterns we want.

The visible grain pattern is produced by the annual growth rings intersecting the surfaces of a board. By cutting the board at different angles to the annual rings, you can produce different grain patterns.

Grain patterns are usually pronounced in temperate woods (those grown in temperate climates), such as nut woods, fruit woods and even most soft woods. (See photo, below.) Tropical and subtropical woods, on the other hand, are harder to predict. Some, like teak and Honduran rosewood, have pronounced annual growth rings. But many others, including mahogany, doussie, and East Indian rosewood, have barely discernible rings, so grain orientation may not be as noticeable or important when designing with these woods.

Color

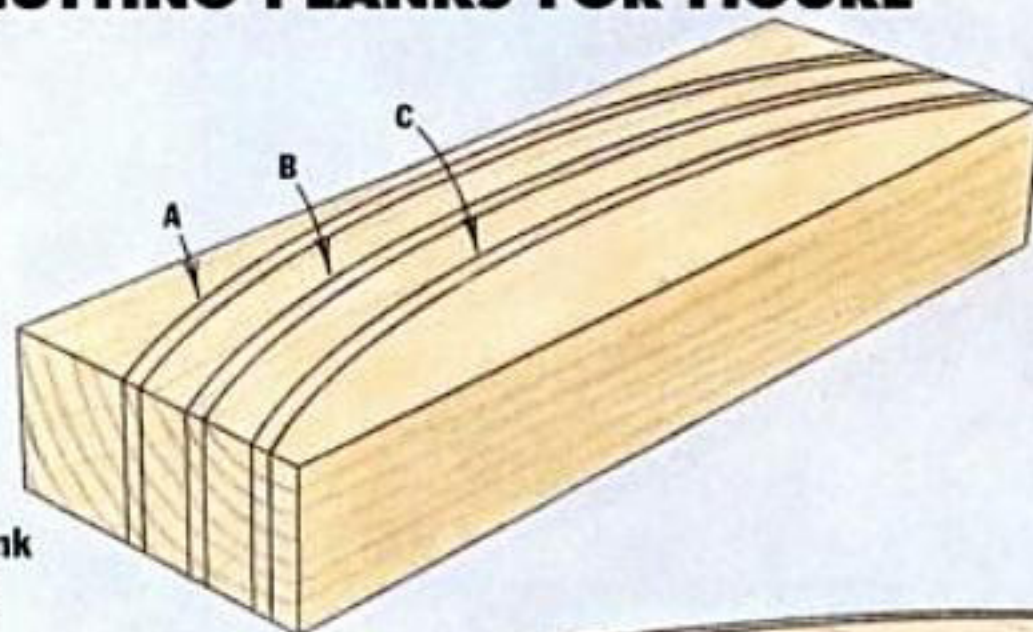
Wood color is another important design element. It affects the visual volume of a piece, or, as Krenov would say, its "weight and measure." (See photo, next page.) A piece made of dark wood will actually appear to be more lightweight than a piece with identical dimensions made of a lighter-colored wood.

Often a single plank will have lighter and darker areas. A skilled

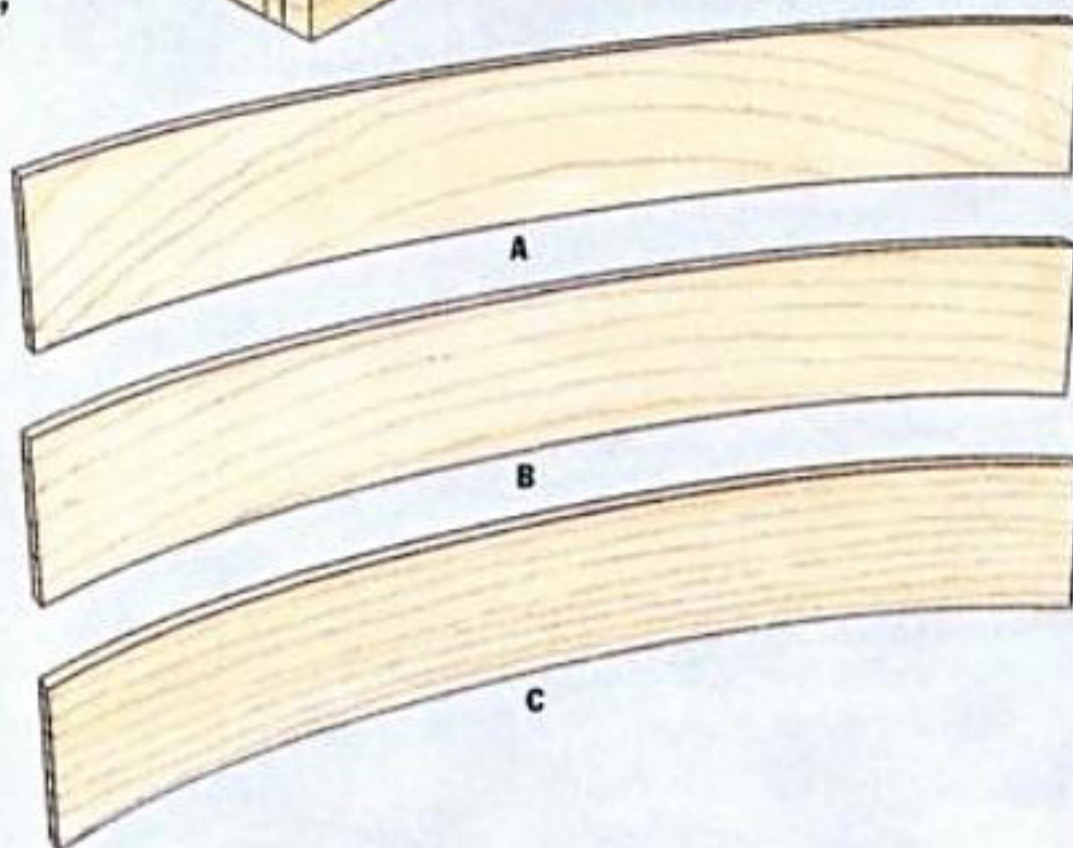
FIG. 2: CUTTING PLANKS FOR FIGURE

CURVED RAILS

The end grain of this plank is horizontal at the right, slopes up slightly in the middle, and slopes up steeply at the left.



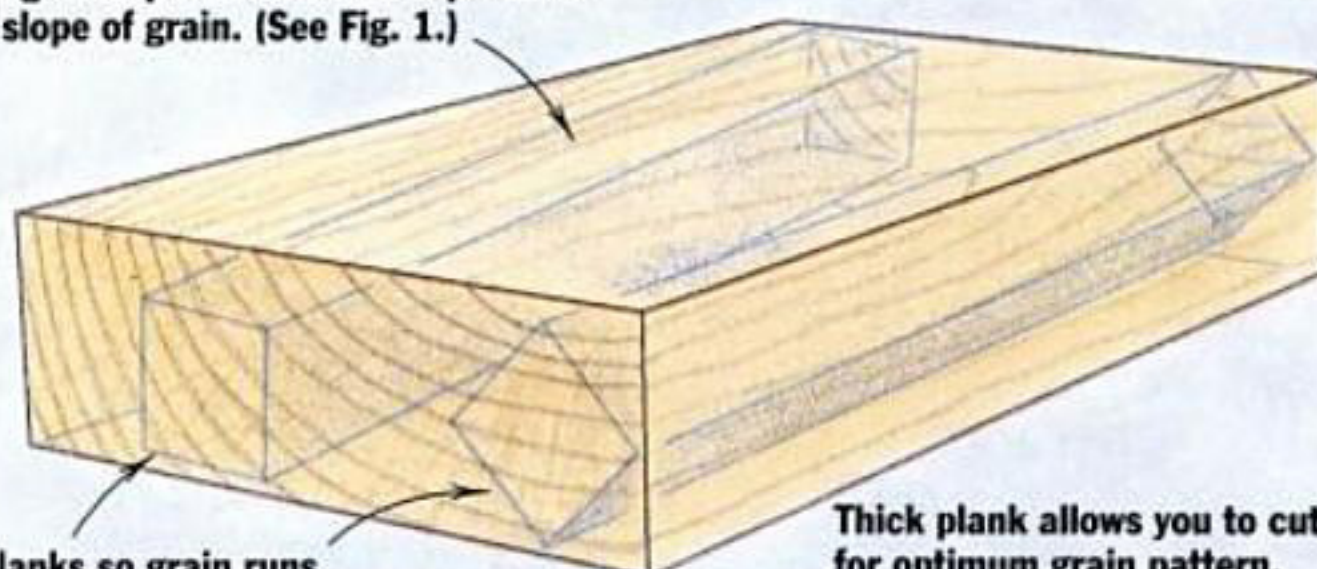
Curved rails cut from different parts of the plank will have different grain patterns.



LEG BLANKS

Cut at angles to plank surfaces to produce desired slope of grain. (See Fig. 1.)

Orient blanks so grain runs corner to corner. Cut blanks out with a bandsaw for safety.



Thick plank allows you to cut for optimum grain pattern.



It's important to consider both the prominence of growth rings and how they are oriented when choosing wood for a project.

woodworker can use these different-colored areas to create *visual shape*, much as an artist shades certain parts of a shape to create the illusion of curvature and depth. On convex cabinet fronts for instance, you can enhance depth and shape by using a lighter section of the plank in the midsection and darker parts on the sides. On concave surfaces the opposite is true. Or, if you're making a back panel for a cabinet, you may place lighter-colored areas toward the corners, which are usually in shadow.

Some planks have color patterns that deserve special attention in cutting. (See Fig. 3.)

When choosing wood for a project, you should be aware that its color is likely to be affected by the finish you apply to it and by exposure to light over time. Each wood is different. Some, including walnut, cherry and doussie, will darken with exposure to light. Others, like most rosewoods, fade or lighten. Bright colors, like the purple in purpleheart and the red of padauk, eventually turn a dull brown.

Finishes can affect the color of woods in dramatic ways, so you

should try to plan on these effects when designing a piece. Oil finishes usually darken wood more than shellac or lacquer. This darkening may be desirable on some woods like teak or doussie, but on walnut it tends to obscure the grain and color contrasts over a period of time. A shellac or lacquer finish will preserve the colors of walnut much better than an oil finish. Experimentation and experience are useful when selecting a finish for a particular wood.

Texture

Wood texture—the size and appearance of the grain—is another variable in furniture design. A moderately textured wood like walnut may be equally at home in both country and formal environments, while ebony's near-plastic lack of texture may not fit well in casual settings. Coarse oak conveys a feeling of informality, while fine-textured oak can be very much at home in more formal settings.

Texture can be an important factor when choosing complementary woods for a piece. Contrasts between textures, whether sharp or subtle, may

work effectively. On the other hand, if the base of a table has a much finer texture than the top, the result may feel out of balance. A coarse-textured base may work better.

These rules aren't carved in stone. Krenov reminds us that we have options when we design. Color, grain and texture are simply means of expressing our intention.

Special Woods

We've all seen furniture where a strongly patterned wood, like curly maple, has been used throughout. The results are loud and command our attention, but would we find them comfortable to live with every day?

You may want to consider other ways to use strongly figured woods when designing furniture. Perhaps surrounding a highly figured panel with straight-grained stiles and rails will illuminate its unique beauty even more. (See photo, below right.)

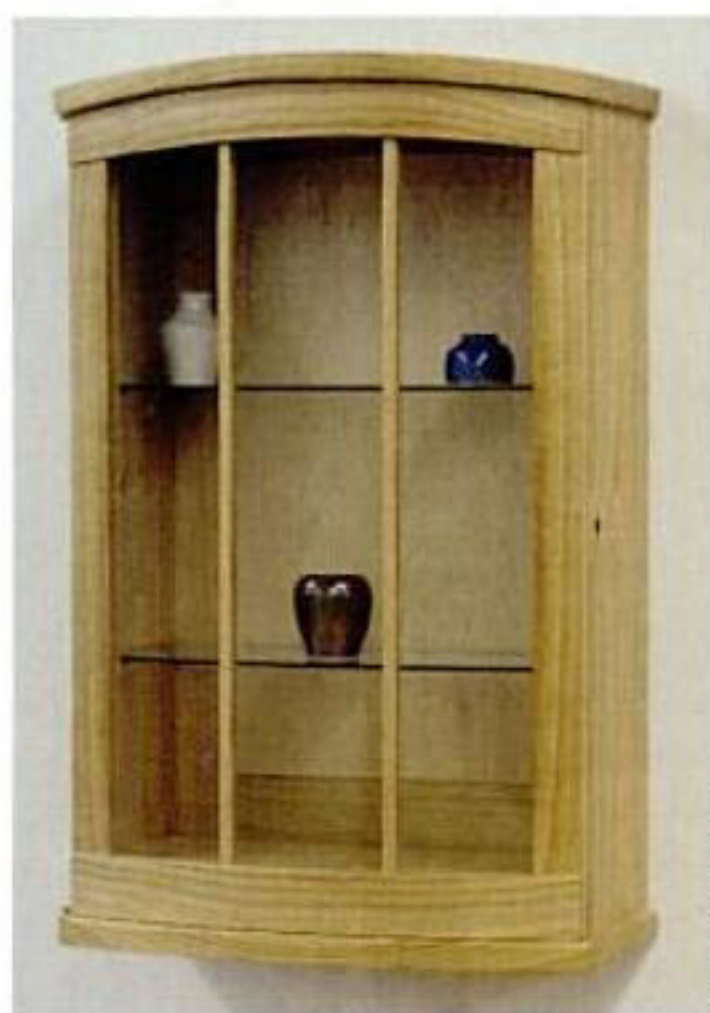
Cutting for Grain

To get the grain orientation you want, it's helpful to begin by sketching some possible grain patterns, noticing how each affects the overall appearance of the piece. When you've decided on a composition that pleases you, study your plank to determine how you will cut it to obtain this appearance. Depending on where you cut, you will obtain different grain effects.

The plank at the top of Fig. 2 is fairly typical. Viewed from the end, the annual rings are horizontal at the right, curve upward slightly in the middle, and curve at a steeper angle on the left. When you cut a curve through a plank like this, say, to produce a curved rail for a cabinet, the grain pattern on the cut face will vary drastically as the angle of the rings to the face changes. If you practice cutting curves from scrapwood you'll find that, with care, you can produce a piece with curved grain very predictably.

You can also control the grain direction on straight legs by cutting your plank at the correct angles to produce either straight or sloped grain. (See Fig. 2.) Again, practice is the best way to gain experience reading the grain.

Although it may seem more difficult to get the grain you want on legs that



PHOTOS BY DAVID WELTER

Subtle grain patterns enhance the simple shape of this cabinet by Dale White (above). James Krenov used the deeper color of hickory to lend visual balance to this cabinet-on-stand (right).



FIG. 3: SAWING VENEER

OPTION A: SAWING ACROSS THICKNESS OF PLANK

Veneer sawn across thickness produces a uniform running book-match suitable for panels or large surfaces.



Stains and streaks may be used as design elements.

OPTION B: SAWING ACROSS WIDTH OF PLANK

Veneer sawn across width is best suited for a single dramatic panel because the color pattern changes very quickly.



are curved on four sides (see Fig. 1), it is not much different from the procedure for straight legs. You have to interpret the grain on the outer surface of your plank.

In order to cut parts with exactly the grain you want, it's a good idea to buy thick planks. For example, if you need a 2½-in. square block for a curved leg, you might need a 3-in. or 4-in. plank in order to saw out a blank with the grain running diagonally on the end while running straight down the length of the block. (See Fig. 2.)

A bandsaw is the perfect machine for roughing out parts from thick planks since you must often cut at unusual, sometimes compound,

angles in search of the perfect grain. I strongly advise against even attempting such cuts on a tablesaw—cutting odd angles could be too dangerous.

Cutting parts from thick planks may require extra wood and take longer than merely planing and ripping the stock. But to me, the additional material and labor are a small tradeoff for the pleasure of seeing my intended grain patterns in the rough-sawn parts. This pleasure lasts through the entire construction of a project and reminds me I'm much more than an underpaid laborer.

Buying Lumber

The ability to interpret and cut planks sensitively is hard to describe

and best gained from experience. With practice, you'll begin to read more in the end grain of a board—or a log for that matter. Your curiosity will lead you out of your shop and to a lumber dealer or sawmill in search of choice planks.

When you visit the mill, look for thicker planks, not only for cutting leg blocks diagonally to the surface, but also because they produce a larger quantity of related wood for use in the same project. You'll also find that larger planks are more knot-free and straight grained.

Be sure to take a scrub plane with you to the lumberyard to check planks for grain and color. (Ask permission to use your plane.) When you've found a promising board, you can use the plane to remove rough saw marks and stains to get a better look. Even on surfaced planks, a plane will give you an idea of how the wood will work with hand tools. If the plank planes pleasantly, you'll find yourself anticipating the pleasure of working with it. But if your plane leaves a torn and chipped-out surface, or if it dulls quickly on curly or interlocked grain, you'll know the project will not be easy. Then you'll have to decide whether the end product will be worth the effort.

Krenov believes strongly in personal experience: "Your first experience with a wood is pretty general; you look at it and notice certain things, but by working with it you gather a lot of personal and important things. What you learn from books about its properties, origin, drying habits, gluing and warping is important, but it is at best a supplement to your own experience."

"Some planks or parts reflect these written properties, and some don't. By carefully considering the grain pattern, texture and color of each board and project, we're trying to get something extra into our work." ▲



MONROE ROBINSON
operates a bandsaw mill in Little River, California.

WOOD FACTS



PHOTOS BY ELLIS WALENTINE

Butternut (left) is lighter in color and softer than its close relative, American black walnut (right).

BUTTERNUT

BY DICK BOAK

SPECIES NAME

Juglans cinerea (Northeast Canada and U.S.)

Butternut is closely related to American black walnut (*Juglans nigra*).

TRADE NAMES

Because it resembles black walnut but is lighter in color, butternut is also commonly known as "white walnut."

APPEARANCE

Butternut is creamy gold to light honey brown in color, with slight similarities to French walnut, teak or shedua. The surface appears coarse because of the well-developed pore structure, but the texture is smooth. The well-defined contrasting grain lines are typically straight and wide without rippling or visible figure.

WORKABILITY

Butternut is soft enough to work by hand or you can use power tools, although, in either case, you'll need sharp blades and cutters to prevent woolliness and tear-out. Due to its softness and easy workability, it is a preferred wood for carving. Butternut sands easily, accepts finishes well and polishes to a high luster.

TECHNICAL PROPERTIES

Butternut, with a specific gravity of .45 and a density of 28 lbs. per cu. ft., is considerably lighter than black walnut, which has a specific gravity of .64 and

a density of 40 lbs. per cu. ft. Hence, butternut lacks the strength, hardness and durability of black walnut. The sapwood is quite soft and susceptible to insect attack and quick decay. Unlike many other woods, butternut's color doesn't readily bleach or darken with time and exposure to light.

USES

Sometimes used as a substitute for walnut, butternut is suitable for furniture, joinery and cabinetry, as well as for sliced veneer and decorative wall paneling. Because it is similar in color to teak, it is often used for boat interiors, although it doesn't have teak's rot-resistance.

SIZES

In general, butternut planks are 6 in. to 8 in. wide and 6 ft. to 8 ft. long. Thicknesses of 4/4, 5/4, 6/4 and 8/4 are common, although thicker carving stock from log sections also is often available. Logs typically yield a high percentage of lower grade (#1 and #2 common) lumber. Older butternut trees, occasionally growing 2 to 3 ft. in diameter, yield slabs ideal for free-form tabletops.

TOXICITY

Butternut is not toxic, although, as with any species, you should wear a dust mask during sanding and machining operations. Small boring

insects, sometimes temporarily dormant, may be present in the sapwood, so it's important to watch out for signs of insect activity once the wood is in a heated space.

SUSTAINABILITY

Although butternut is considered sustainable, it is not a common wood, and many of the remaining trees are not very healthy. But, since it isn't a major commercial species, the relatively small amount harvested doesn't have much impact on the supply. As with most species, the larger trees are prized and are the first to be cut. Dead trees must be harvested quickly or they will rot on the stump.

AVAILABILITY

Butternut is a specialty wood and is not readily available. The best sources of supply are small regional sawmills in the northeastern United States and eastern Canada, particularly in the Catskill Mountains in south central New York state.

COST

Because of sporadic supplies, butternut prices are unpredictable. The wholesale price (100 bd. ft. or more) for kiln-dried lumber may range from \$1.50 to \$3 per bd. ft., depending on grade and width. Retail prices are \$3 to \$5 per bd. ft. ▲

TOOLBOX

Toggle Clamp Stays Locked ▼

Lever-action toggle clamps are great for holding stock securely, but they can spring open if exposed to excessive vibration or if you accidentally bump the lock lever—especially when the clamp's set for light pressure. De-Sta-Co's new Toggle-Lock-Plus clamps solve this problem with a locking lever that keeps the clamp closed until you first pull a release. The feature is available on nine popular models. (Price: clamp shown: \$21.15)

De-Sta-Co, Dept. AWT, Box 2800, Troy, MI 48007, (313) 589-2008.

CIRCLE NO. 620 ON PRODUCT INFORMATION FORM



Easy Saw Alignment ▲

Precisely aligning a tablesaw or radial arm saw can be difficult when you only have the surface of the saw blade to use as a reference for your square. The Exact Cuts Alignment Tool more than triples your reference surface (to 10 in.) by replacing the blade with two precision aluminum bars. You bolt one bar to the saw's arbor, then bolt the second bar to the first to form a right angle. (See photo.) With this tool, you can check your tablesaw's blade-to-table, blade-to-miter slot, or blade-to-fence alignment. And on a radial arm saw you also can check the blade's heel and whether the saw's arm tracks parallel to the table. The kit includes an adjustable nylon square that helps you set initial alignment, as well as bevel and miter angles. (Price: \$54.95)

Exact Cuts Tool Co. Inc., Dept. AWT, Box 268, Florence, OR 97439, (800) 643-7411.

CIRCLE NO. 617 ON PRODUCT INFORMATION FORM

Splined-Miter Routing ▼

Making mitered corners in veneered plywoods used to mean dealing with a whole host of problems. You'd have to find a way to cut them accurately, and even if you did, the thin veneer corners would tend to split in use, and couldn't be shaped. Now there's a solution. Bryco's new Lock 45 router bit and tilting router bracket lets you cut spline miters and then assemble them with T-shaped wooden splines you make in the shop. The solid wood splines not only



stand up to abuse, they can be shaped. Also, because the router bracket will tilt to any angle, you can use mitered spline joints on everything from square frames to octagons and more. To use the system, just mount the aluminum router bracket to your router table, tilt it and run the workpiece past the Lock 45 bit. (Price: bit and bracket, \$79.95)

Bryco Inc., Dept. AWT, 240-7 Arden Dr., Champaign, IL 61821, (217) 356-2379.

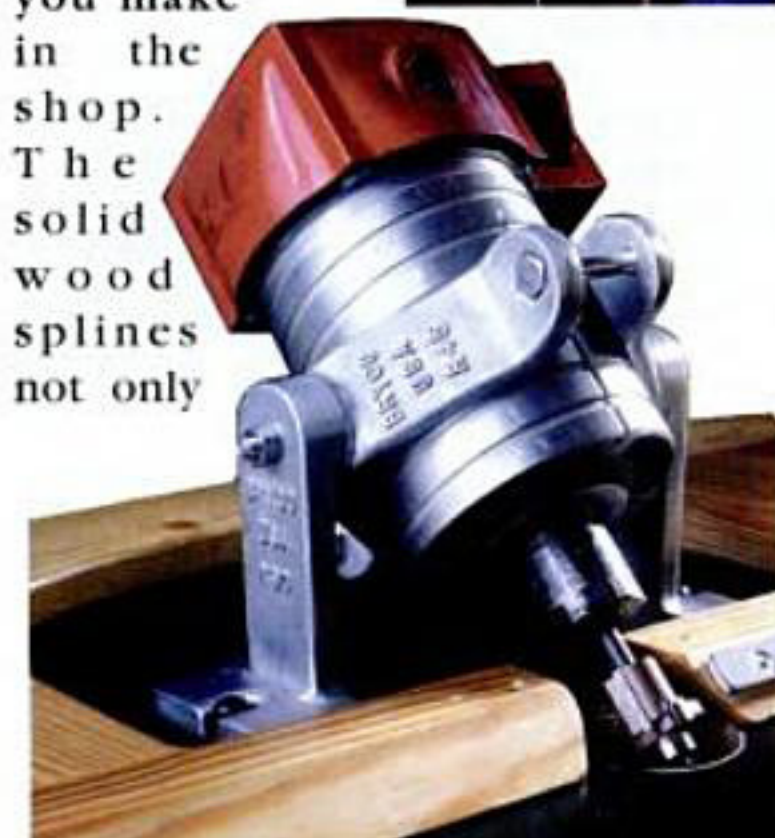
CIRCLE NO. 618 ON PRODUCT INFORMATION FORM

Soft Ride For Panels ▼

Panel Skate is a new mini shop dolly that makes it easy to move everything from large pieces of plywood to toolboxes and 1,000-lb. slabs of granite. It's bare bones simple: four wheels, two axles and a V-shaped aluminum body that weighs just 5 lbs. The short, 12-in.-long body makes it easy to maneuver, and the flexible rubber coating on the body protects delicate loads. (Price: \$69.95)

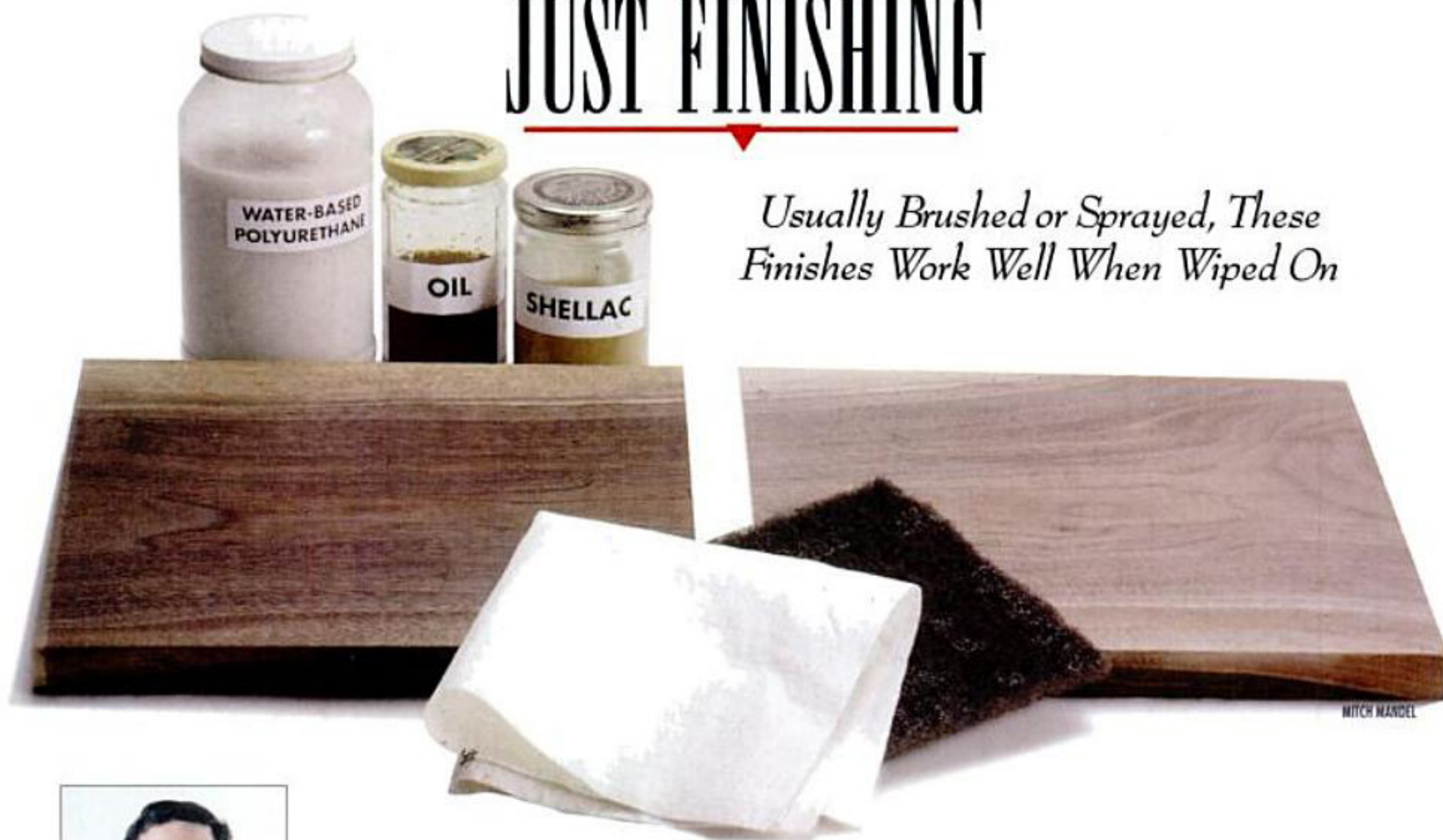
Shopcarts, Dept. AWT, 445 Harriet St., San Francisco, CA 94103, (415) 552-9522.

CIRCLE NO. 619 ON PRODUCT INFORMATION FORM



JUST FINISHING

Usually Brushed or Sprayed, These Finishes Work Well When Wiped On



BY MICHAEL DRESDNER

Three foolproof finishes? OK, I'll come clean; they are really just three variations on a single theme, the wipe-on/wipe-off finish.

Wipe-on finishes are not new, but they are the perfect place for the new finisher to start: You won't need to buy a spray gun, or even learn how to brush out a finish. Most wipe-on finishes form non-toxic films and contain few, if any, really hazardous materials. And best of all is the result you'll get. With a minimum of effort, you'll have a thin, clear satin finish that leaves the surface of your work looking "woody" rather than plastic-coated.

If wipe-on finishes have one drawback, it is that they don't provide the high level of protection that we've come to expect from thicker polyurethanes and "catalyzed" lacquers—or even brushed-on varnishes. Consequently, they are not ideal choices for dining room tabletops or kitchen cabinets. They will, however, serve

well on almost any low-wear item—from turnings and small boxes to cradles and grandfather clocks. For more protection (and build), you can wipe on more coats of finish. I recommend using thin latex gloves to keep solvents away from your skin when applying any wipe-on finish.

Preparing the Wood

Since wipe-on finishes are relatively thin, they don't cover surface scratches and defects like heavier coatings, so you need to pay more attention to preparing the wood prior to finishing. First, remove defects by sanding the wood's surface to 150 grit, then raise the grain by wetting the surface with water. Wipe off excess water, let the wood dry overnight, then sand lightly with 220-grit sandpaper. Now you're ready to finish.

Oil

The most popular wipe-on finish is oil, either straight or in a varnish

blend (see AW #28). Woodworkers like oil finishes because they look good and are easy to use. Many woodturners finish their work right on the lathe by wiping on oil and wax while the piece is still spinning. Although *your* piece is probably sitting still, the same principle applies.

Using a piece of ultrafine Scotch-Brite as an applicator (available from Woodcraft, Box 1686, Parkersburg, WV 26102, 800-225-1153), rub the surface liberally with pure tung oil, boiled linseed oil, an oil-varnish blend or my own favorite, a gelled oil finish, such as Bartley's Clear Varnish (available from The Bartley Collection, 29060 Airpark Dr., Easton, MD 21601, 800-787-2800). Oil-varnish blends are slightly less foolproof on open-pore woods like oak because they sometimes form bubbles or bleed out of the large pores. Wait about 10 minutes, then wipe off the excess with a clean cotton cloth and let the piece dry overnight. (Remember

3 FOOLPROOF FINISHES

JUST FINISHING

to hang the cloth and applicator out to dry if you can't incinerate them right away. Oily rags left in a clump are sure to start a fire, but once they are dry and stiff they can go out with the trash.) For a slightly richer finish, scuff the surface with 320-grit paper once it is dry, and wipe on another coat of oil.

Shellac

Although we usually think of shellac as a brushing finish or as the basis of French polish, it is an excellent wipe-on coating as well. Use a 3-lb. cut (3 lbs. of shellac flakes or buttons in a gallon of denatured alcohol)—the same cut as most ready-mixed shellac. Wipe the shellac liberally onto the wood with a clean cotton cloth, then wipe off any drips or puddles immediately with the same wet rag. If the shellac seems too thick or sticky to wipe easily, add some denatured alcohol. When the wood is coated, it should look wet

and feel slightly sticky. The shellac should not appear to be an obvious layer on the wood. It should look like it has been absorbed into the surface.

Water-Based Finishes

Although usually sprayed or brushed, water-based finishes may also be used as wipe-ons. In fact, most of the application problems associated with water-based materials disappear when you wipe them on. Whether you buy gloss or satin, the end result will appear to be satin, since you're leaving such a thin film.

Choose a water-based polyurethane and flood it onto the wood surface with a lint-free rag. Then using another clean rag, immediately wipe off all the material that doesn't penetrate, then let the piece dry overnight. There will be a small amount of grain raising with some woods, so you may have to *lightly*

scuff the surface with 320-grit (or finer) sandpaper once it is dry.

The Finishing Touch: Wax

Any finish you choose will benefit from the extra protection and soft sheen of a thin coat of paste wax. Allow your last coat of finish to dry at least a day before waxing. Then take some paste wax on a piece of steel wool or Scotch-Brite and rub it on with the grain of the wood. After 10 or 15 minutes, buff off the wax with a clean, soft cotton cloth. If you lose track of the time and let the wax sit too long, you'll find it very difficult to remove the excess. If that happens, simply wet the surface with fresh wax and buff it off. The solvent in the newly applied wax will redissolve the hardened wax without removing it completely. Remember that wax works best when it is thinnest. To renew the wax, simply reapply it once or twice a year. ▲

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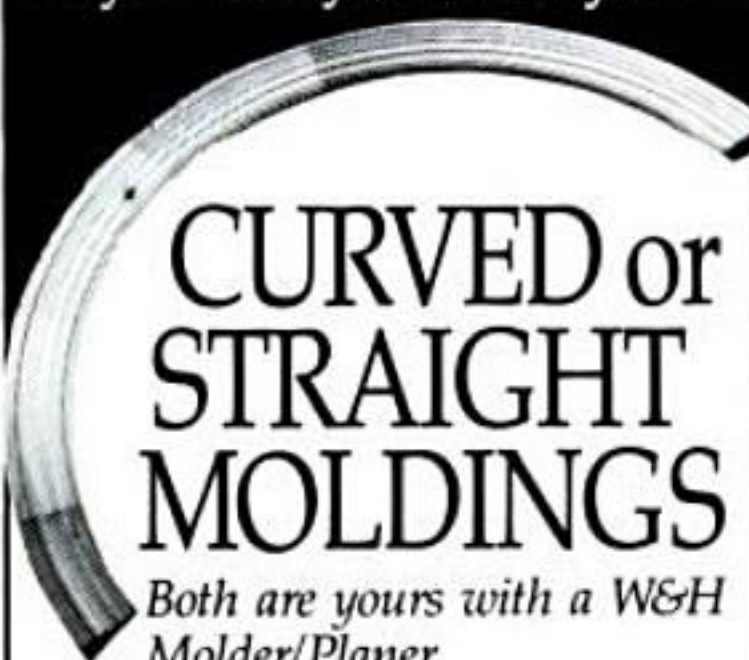
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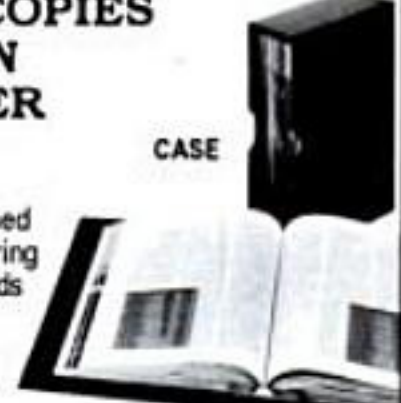
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GALLERY



"Bird Chest of Drawers" by Paul Chanedaysson, San Francisco, California. Mahogany, Japan colors. Dimensions: H: 50 in., W: 24 in., D: 19 in.

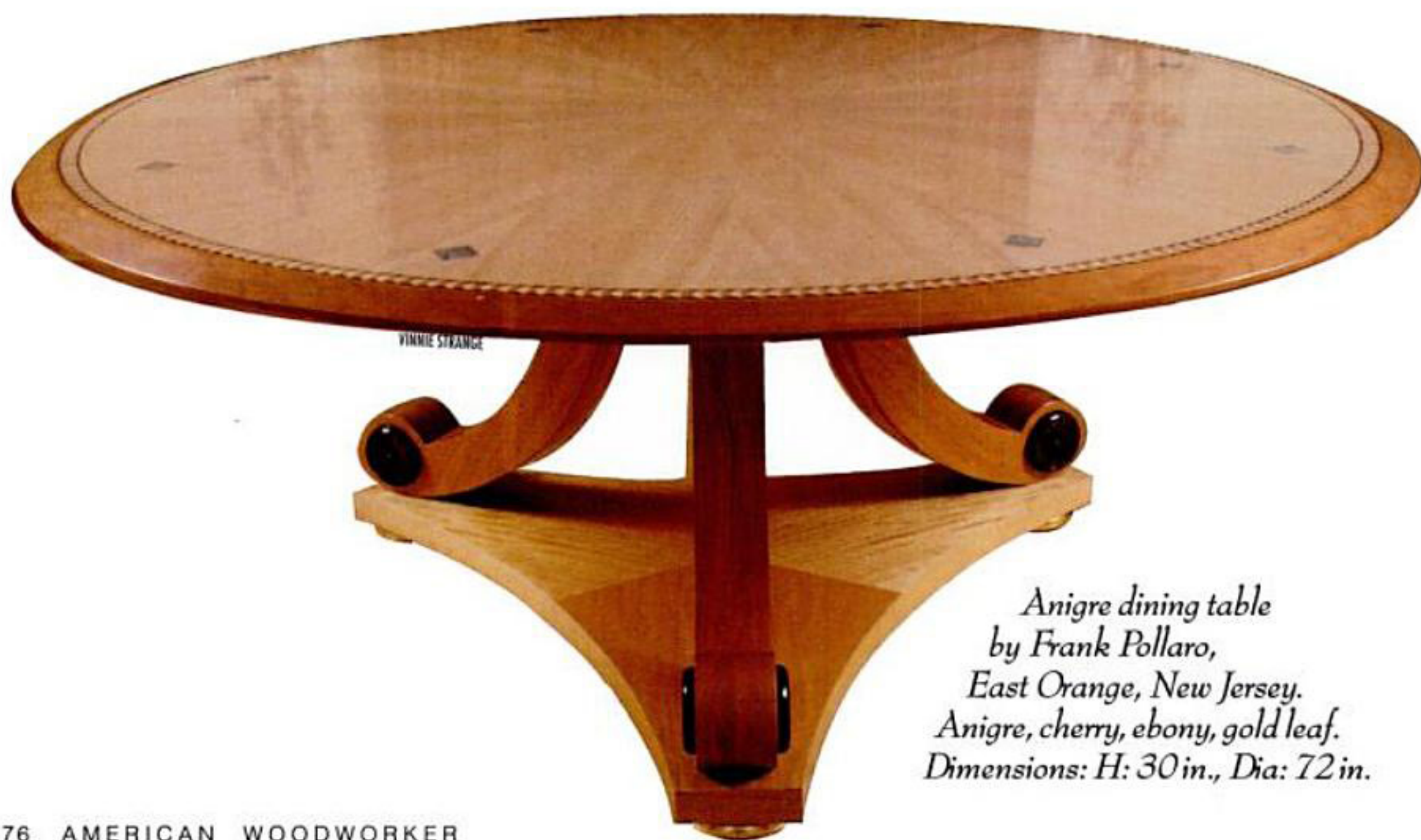
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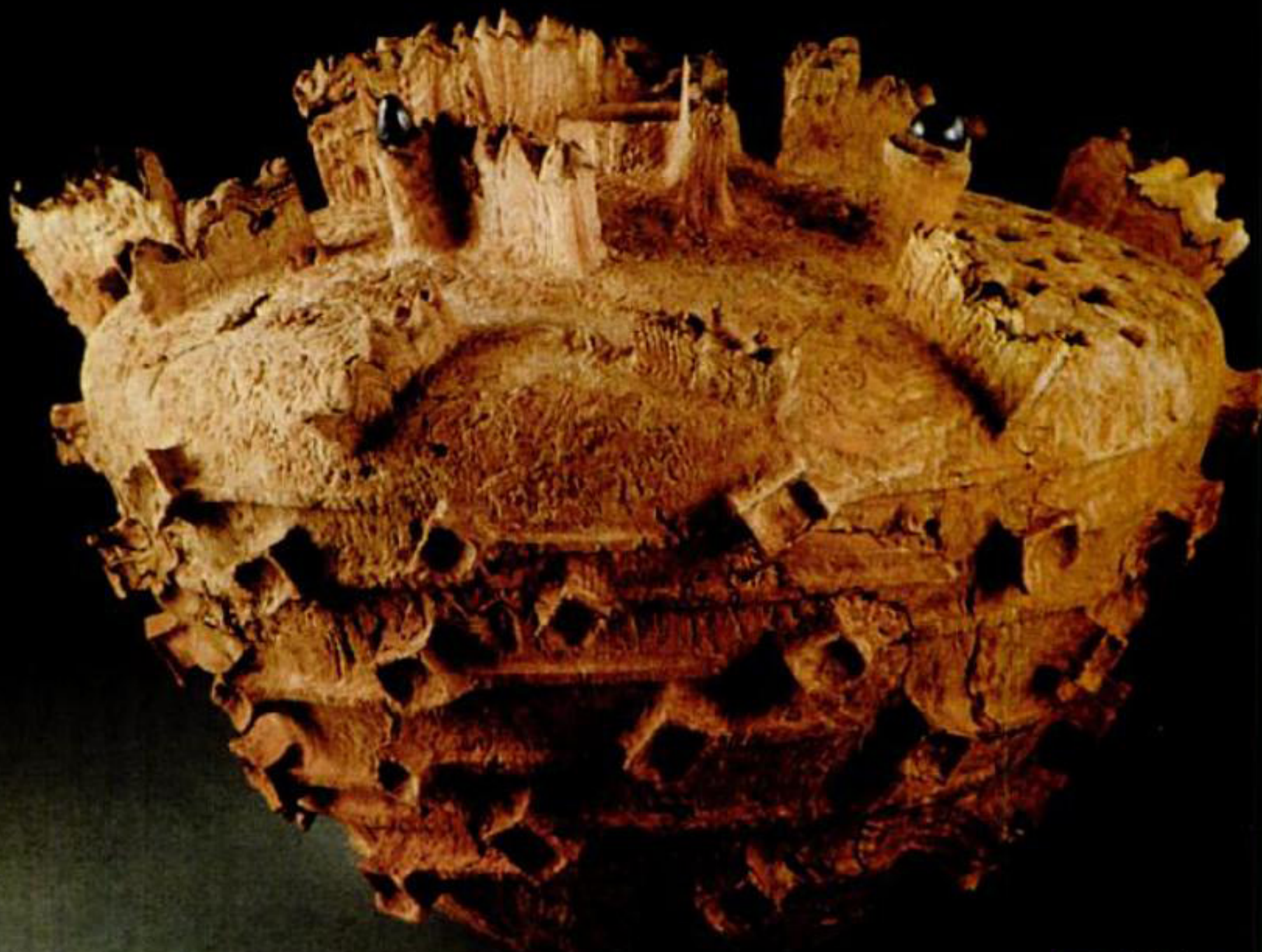


Perfume vials by Jon Sauer, Daly City, California. Left, black bamboo. Dimensions: H: 5 in., Dia: 1 1/2 in. Above, lignum vitae, ebony. Dimensions: H: 4 1/2 in., Dia: 1 1/2 in.

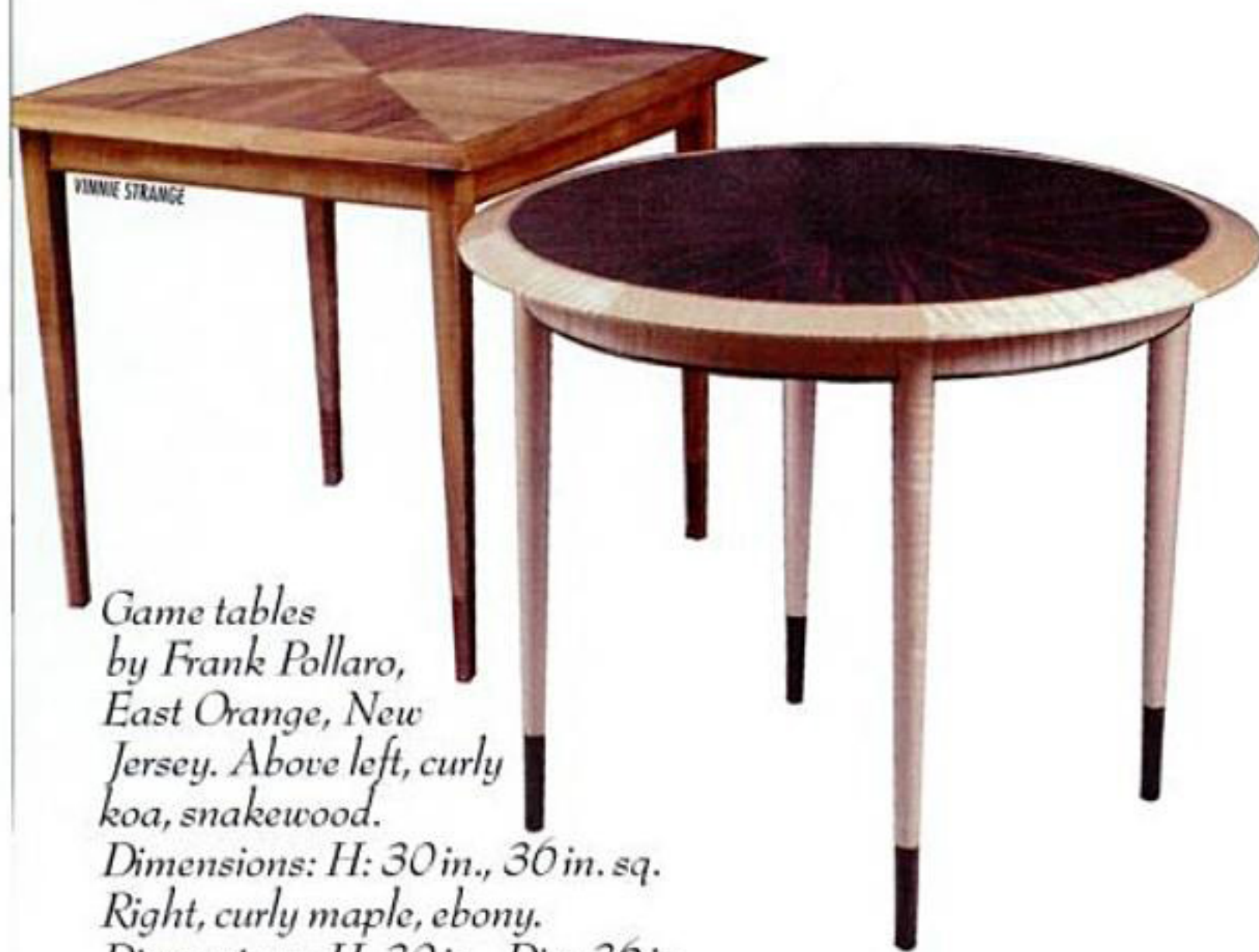


VIMMIE STRANGE

Anigre dining table by Frank Pollaro, East Orange, New Jersey. Anigre, cherry, ebony, gold leaf. Dimensions: H: 30 in., Dia: 72 in.



Turnings by Hugh E. McKay, Gold Beach, Oregon. "Halo 2" (right) maple burl, serpentine (stone). Dimensions: H: 11 in., Dia: 17 in. "Squared" (above) maple burl, serpentine. Dimensions: H: 13 in., Dia: 19 in.



Game tables by Frank Pollaro, East Orange, New Jersey. Above left, curly koa, snakewood. Dimensions: H: 30 in., 36 in. sq. Right, curly maple, ebony. Dimensions: H: 30 in., Dia: 36 in.

Want to see your work in "Gallery?" Send color slides or color transparencies to "Gallery," AMERICAN WOODWORKER, 33 E. Minor St., Emmaus, PA 18098. Please include: materials, dimensions, name of photographer, your name, address and phone number. If you want your photos returned, enclose a self-addressed stamped envelope.



The Chair From Hell!

You may think it only exists in bad woodworking dreams or in interior design shops run by guys named "Phillipe" and "Bruce," but according to that venerable compendium of truth and accuracy, the "Weekly World News," there really is a chair from hell.

Not merely a testament to bad design, this so called "Chair of Death"

FINAL PASS

has reputedly killed 63 people who have dared to test it, says WWN. The latest victim: a British furniture repairman who died in a car wreck within hours after resting his rump on the chair's barely worn seat.

The lethal lounge graces a dark corner of the Busby Stoop Inn in Yorkshire, England, where it's been doubling as the grim reaper since 1702. That's when original owner, Tom Busby, placed a curse on the chair as he was led away to hang for murder. In the nearly 300 years since, the chair of death has struck with equanimity, killing everyone from an RAF flier to a secretary to (uh-oh) a journalist.

Sounds nasty, but we'll try to find out for sure, that is if we can convince the mother-in-law to accompany us on a "special" vacation.

A Little Success

You could say Ted Dubay is a small-minded woodcarver. In fact, his visions of grandeur are no larger than a dime. And that's exactly what he thinks will get him into the record books.

Dubay, a carver of miniatures who lives in East Lyme, Connecticut, made this pair of functional wooden scissors that he believes will beat the record for the "world's smallest." Dubay's bass-



wood scissors measure just $\frac{3}{64}$ in. by $\frac{37}{64}$ in. by $\frac{1}{4}$ in.

He says carving his pair only took about two hours, but when "you're only talking $\frac{1}{64}$ th of an inch, the precision is incredible."

—Beth Strickland

Plastic Wood

A timber that won't split, rot or give in to the ravages of termites? Yes, it's out there, but there's a catch: it's a composite of wood and plastic.

Timbrex, manufactured by Mobil Chemical Co., is made of equal parts of scrap polyethylene plastic (grocery bags and stretch wrap) and waste wood (ground pallets and furniture sawdust). The extruded "timbers" aren't strong enough to handle heavy loading, but they're acceptable for decking, dock planking and some furniture uses. Walt Disney World and Busch Gardens are building benches with Timbrex seats, and Mobil has even commissioned a conference table made of the stuff.

Andrew Ferrari, Mobil's manager, marketing and sales, says at this point

Timbrex is mostly sold wholesale as dimensioned lumber in sizes ranging from 1x6 to 6x8, but the company is starting to move into the retail field, so you're likely to see it soon at



lumberyards. The artificial timber currently sells wholesale for \$900 to \$1,200 per 1,000 bd. ft., which Ferrari

admits makes it more costly than pressure-treated wood. However, the company argues that Timbrex's longer life makes it a good buy.

We tested a sample in the AW shop and found that it machines well. You can rout it, drill it, saw it, and it doesn't split. A test with yellow aliphatic resin glue showed it holds about as well as end-grain gluing. It will even take paint. For more information, call (800) 972-5255.

Index to Wood Mags

You've got three weeks to make a gift and you know you've seen just the thing in one of those woodworking magazines, but can't remember which one.

Don't fret. There's a new index that can help. *The Guide to Published Woodworking Plans and Techniques* by Art Gumbus lists more than 11,000 projects, tips, techniques, reviews, etc. from 25 woodworking magazines, including AW, of course.

The index comes in a three-ring binder, and will soon be offered with an optional (as yet unpriced) floppy disk for DOS computers. The bound guide costs \$20 and is available from KnotWhole Publishing, 5629 Main St., Putney Stratford, CT 06497.

COMING NEXT ISSUE

AW'S SPECIAL ROUTER ISSUE
Buyer's Guide to Plunge Routers
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