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Issue 53, March 1990

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Issue #53, March, 1990 Volume 9, Number 5

Popular Woodworking

Deborah Porter

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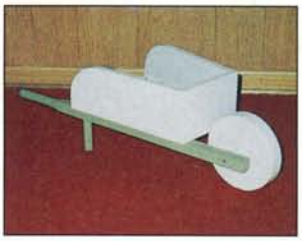
Howard V. French



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Jacob Schulzinger

61

On the Cover

This graceful cabinet accents any room, and is a great way to show off some lovely wood. Ken Sadler made his out of Western cedar and he details the procedures in his article "A Handsome Cabinet on a Stand," starting on page 66. Putting together the case requires an interesting combination of rabbets, notches, dadoes and dovetails. This one will challenge you.

Ken Sadler

Departments

Columns

Clear Cuts

As if we don't get enough of each other at work every day, sometimes Phil and I exchange labor on our remodelling projects on weekends. I help him move a couple of yards of wet concrete around; he helps me work on my deck.

This was the third day he'd given me on this deck and progress was moving slowly. I apologized for this as Phil was leaving, and he laughed and said, "That's all right. I guess you can't expect a guy who earns his living making project plans for a magazine to actually have a plan for his own deck!"

He was right, there really wasn't a plan–per se. There were twelve piers that had been in the ground for two years. There was a pile of clear heart redwood that had been more or less stickered out in the elements for two years. And there was this two–year–old sketch of some two–by members forming a joist arrangement that might somehow meet up with those piers...

I'd had to wait two years to build the deck until "the time was right" to get the spa that I wanted to build it around. I was going to finalize the design measuring from the spa itself. I knew I wanted two levels, and I'd vaguely visualized something about steps on either side of the spa.

Of course, during those two years I'd dipped into that pile of redwood two–by. So Phil and I were trying to realize this vision, or rather, he was waiting around a lot while I was contemplating all the possible ways to put this assortment of boards together.

Don't get me wrong: I build code or better every time. But I find I do like to improvise.

Even in the most precision–requiring trades there comes a point where it's really best to get away from paper. The most important thing about drawers, for example, is that they fit their opening. Anything beyond that is just whatever you do to make them stronger, or nicer–looking, or sized for your needs. But first you make them fit.

Sometimes paper and pencil are essential. If you're sculpting a realistic relief carving, for instance, they can help you figure out how to depict the depth of an actual scene in 3/4". William McMaster explains this on page 76, but he, too, would agree that paper and pencil aren't always the way.

For example, improvisation—solving sudden "surprises" in wood, tools and time—often leads to interesting design. Ken Sadler outlines some rules of good furniture design to follow (and even break) on page 35, but his small cabinet project (page 66) encourages improvisation in planning its interior.

As for my deck, I think it came out as nice as it did because I designed most of it while sitting in the tub, looking at the lumber.

David M. Camp

Popular Woodworking (ISSN 0884-8823) is published bimonthly by EGW Publishing Co., 1320 Galaxy Way, Concord, CA 94520. Second-class postage paid at Concord, California and additional mailing offices. POSTMASTER send address changes to *Popular Woodworking*, P. O. Box 58279, Boulder, CO 80322.

SUBSCRIPTIONS:
A year's subscription (6 issues) is $17.00; two years' worth (12 issues) is $30.00; outside of U.S.A. add $5.00/year. Send all subscriptions to:

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#418		3/4" Core Box	round nose	3/4"	5/8"	1/4"	$15.00
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#473		7/16" Straight	plunge cutting	7/16"	1"	1/4"	$ 7.00
#474		1/2" Straight	plunge cutting	1/2"	1"	1/4"	$ 7.00
#775		1/2" Straight	plunge cutting	1/2"	2"	1/2"	$14.00
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#804		1/2" Flush	Trimming	1/2"	13/16"	1/2"	$ 9.00
#545		**Tongue & Groove**	Straight	15/8"	1"	1/4"	$30.00
#845		Tongue & Groove	Straight	15/8"	1"	1/2"	$30.00
#546		Tongue & Groove	Wedge	13/16"	1"	1/4"	$30.00
#846		Tongue & Groove	Wedge	15/8"	1"	1/2"	$30.00
#450		1/8" **Beading**	1/8" R	3/4"	1/2"	1/4"	$11.00
#451		3/16" Beading	3/16" R	7/8"	1/2"	1/4"	$11.00
#233		1/4" Beading	1/4" R	1"	1/2"	1/4"	$13.00
#453		5/16" Beading	5/16" R	1 1/8"	1/2"	1/4"	$14.00
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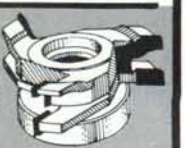

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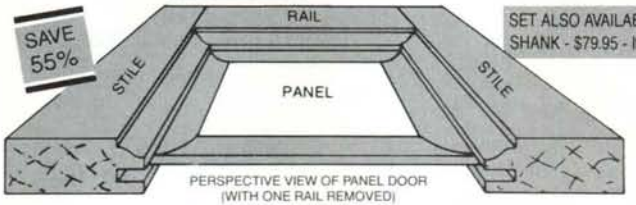

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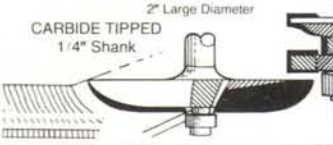

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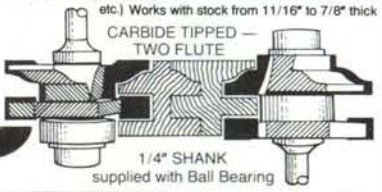

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Not Out of the Woods

Just read your "Clear Cuts" about forest preservation (PW #52, January 1990) and I thought you'd like to know about the Native Forest Council, P.O. Box 2171, Eugene, OR 97402. They're a non–profit organization dedicated to preserving our nation's native, virgin forests.

If you become a member you receive their newspaper, The Forest Voice, or call (503) 688-2000 for a free sample copy.

Keep up the good work.

Bob Hoffman, Editor–in–Chief
Workbench Magazine

Substitute Species

Your latest editorial was an excellent piece of work on the saving of our natural resources in fine domestic and exotic hardwoods. I read it over more than once, and I am glad there are lobbyists willing to fight for "our" cause.

I wonder how many readers have explored their own locale and tried some of the woods that grow in "their own backyards." Here in Arizona we have the tall Eucalyptus, which is a relative of the gumwood tree. Looking much like walnut in grain and color, it was often used as a substitute by my students. The citrus woods also have interesting colors and grains. We turned some goblets from branches of an apricot tree and placed them with other domestic and exotic woods for an identification contest, and no one could guess what it was. The grain is nice and the color is a deep reddish brown. Pearwood was often used in special decoration of many antique pieces.

Avocado trees have amazingly similar grain pattern and color as Honduras mahogany, though the wood is much softer. Manzanita (if you can find a piece big enough) is dark red in color, much like beefwood, or aromatic red cedar—a different color than padauk.

Honey mesquite, commonly known as desert ironwood, has a very distinctive grain pattern, is extremely hard, and is probably one of the darkest colored woods in my area. It is sometimes "outlawed" in shops because of its "dis–STINK–tive" outhouse odor and because of the dust that kicks up allergies. A dust mask is a must when turning this stuff.

Don Kinnaman, Phoenix, AZ

Puzzle Credit

The editors of *Popular Woodworking* would like to inform you, our readers, that the "Nativity Puzzle" published in the November 1989 issue is not an original design. Meredith Corporation of Des Moines, Iowa, has held copyright to this design since 1976, when it was first published in *Better Homes and Gardens®* magazine as a "Creche Puzzle" designed by David Ashe.

Candelabra Plans

Due to a production error, the full–size pattern for the curved candelabrum was left out of the Pull-Out™ Plans section of our last issue (#52). Interested readers can get a free copy of the pattern by writing to: Candelabra Pattern, 1320 Galaxy Way, Concord, CA 94520.

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PART NO.	D	PRICE
C1001	1/4	$6
C1002	5/16	$6
C1003	3/8	$6
C1004	1/2	$8
C1005	5/8	$10
C1006	3/4	$10
C1007	1	$12

1/2" SHANK

PART NO.	D	PRICE
C1008	1/4	$6
C1009	5/16	$6
C1010	3/8	$6
C1011	1/2	$8
C1012	1/2	$15
C1013	5/8	$10
C1014	5/8	$15
C1015	3/4	$10
C1016	3/4	$15
C1017	1	$12
C1018	1-1/4	$12
C1019	1-3/8	$15
C1021	1-5/8	$18

BEADING

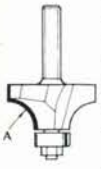
1/4" SHANK

PART NO.	A	PRICE
C1157	1/16 R	$11
C1158	1/8 R	$11
C1159	3/16 R	$11
C1160	1/4 R	$12
C1161	5/16 R	$13
C1162	3/8 R	$15
C1163	1/2 R	$16

1/2" SHANK

PART NO.	A	PRICE
C1171	1/2 R	$16
C1172	3/4 R	$20

ROUNDOVER



1/4" SHANK

PART NO.	A	PRICE
C1174	1/16 R	$11
C1175	1/8 R	$11
C1176	3/16 R	$11
C1177	1/4 R	$12
C1178	5/16 R	$13
C1179	3/8 R	$15
C1180	1/2 R	$16

1/2" SHANK

PART NO.	A	PRICE
C1187	1/2 R	$16
C1188	5/8 R	$20
C1189	3/4 R	$20
C1190	7/8 R	$34
C1191	1 R	$34
C1192	1-1/4 R	$40

DOVETAIL

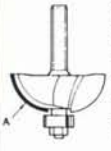
1/4" SHANK

PART NO.	D	PRICE
C1067	1/4	$7
C1068	3/8	$7
C1069	1/2	$7
C1070	9/16	$8
C1071	3/4	$9

1/2" SHANK

PART NO.	D	PRICE
C1074	1/2	$7
C1076	3/4	$9
C1077	1	$12

COVE



1/4" SHANK

PART NO.	A	PRICE
C1138	1/16 R	$12
C1139	1/8 R	$12
C1140	3/16 R	$12
C1141	1/4 R	$13
C1142	5/16 R	$14
C1143	3/8 R	$15
C1144	1/2 R	$16

1/2" SHANK

PART NO.	A	PRICE
C1149	1/2 R	$16
C1151	3/4 R	$28

ROMAN OGEE

1/4" SHANK

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"Tricks of the Trade" shares readers' tips for making woodworking tasks easier and safer. If you've come up with a trick that would help other woodworkers, send it to "Tricks of the Trade" C/O Popular Woodworking, *1320 Galaxy Way, Concord, CA 94520. Include any photos or sketches that help illustrate your idea (we'll redraw them). We pay $25 for each trick we publish. In this issue we've devoted the whole column to tips from Alice and Robert Tupper.*

Push Stick Return

We keep the push stick for our table saw handy by hanging it from a nylon cord running over two pulleys to a weighted can next to the wall. We used a can of pebbles sliding inside a carpet tube. With this setup, the push stick can't be dropped or laid out of reach; it's right there ready to be plucked out of the air.

Alice and Robert Tupper *are husband and wife woodworkers who build projects together, restore antiques, and are interested in old farm machinery. They live in Canton, South Dakota.*

Auxiliary Spray Container

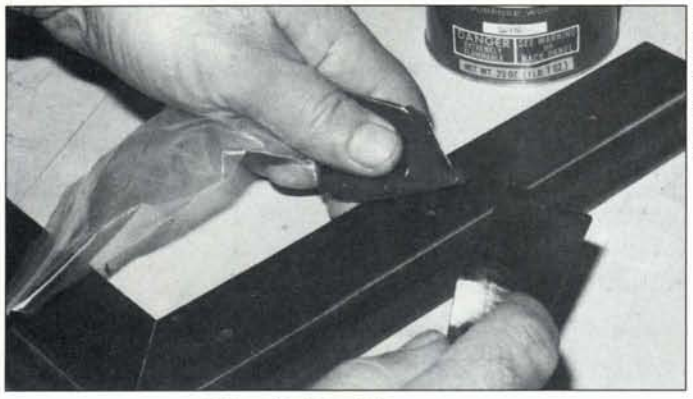
Small jobs with a spray gun waste more finish than is used. Try using a 35mm film can to hold a small amount. A 1/16" hole near the edge of the lid lets in air as the liquid is used. Another hole near the opposite edge of the lid takes the siphon tube with a friction fit. Very little finish sticks to the can to be wasted in cleaning or dumping.

Band Saw Scrap Box

Scrap pieces on the floor are not a problem around our band saw. An L–shaped box fits around the right side and back to catch the scrap cutoffs as they fall. A slanting shelf attached to the back of the machine fits up under the back of the saw table, as shown in the photo. The box is on casters so it's easy to roll out for dumping.

Tube Cutting Tip

Tubes, pipes and round turnings are always hard to cut at an angle, especially when you require a flat cut. Mark the desired length along the long side of the pipe and dip it in a pail of water at the desired angle. When the water line intersects the mark you have the cutting line. A carpenter's level can be laid across the pail (and shimmed if necessary) so that it is parallel to the water level. Then set a T–bevel at the desired angle and place it on the carpenter's level to guide you in accurately holding the pipe.



photos by the authors

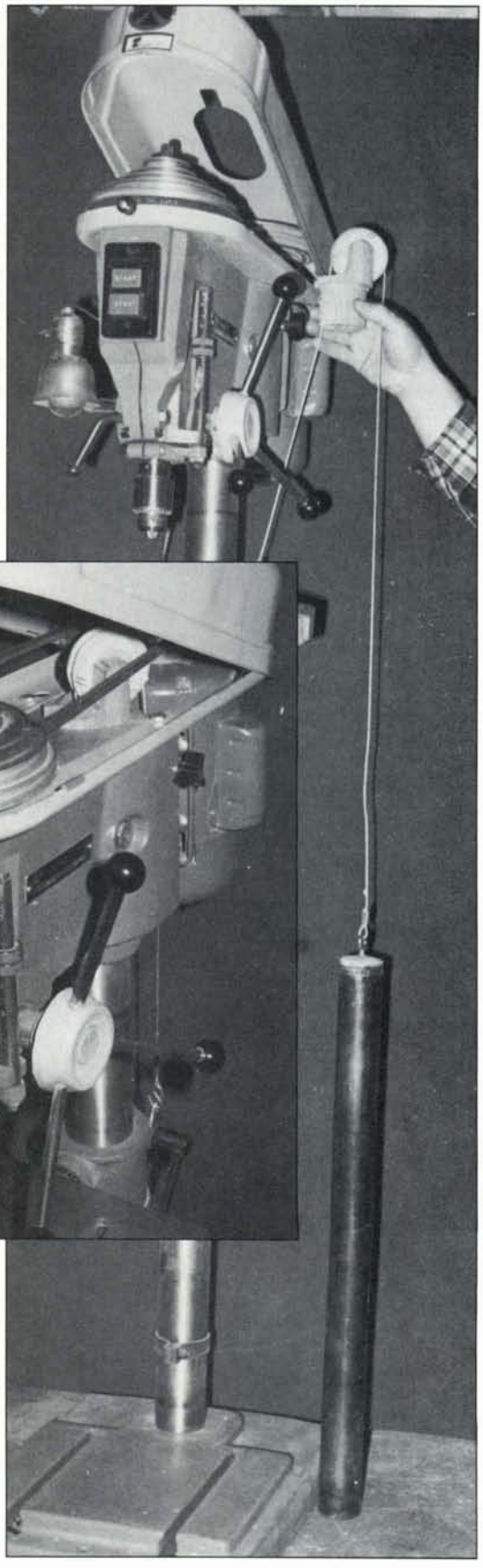
Wood Filler Dispenser

Use a plastic sandwich bag to hold a convenient amount of wood filler. To dispense it as needed, cut a tiny hole in one corner and squeeze the filler out. The can does not have to be opened as often, saving time and preventing the filler from drying out.

Drill Press Table Counterweight

The cast iron table of our drill press is too heavy to adjust up and down easily, so we solved the problem with a counterweight. First we made a wood plug that fits in the top of the column of the drill press stand and shaped it to take a homemade wooden pulley wheel. A 1/2" hole down through the plug that is in line with the edge of the pulley wheel allows a 1/8" steel cable to move freely. One end of the cable is threaded through the motor housing on the head to a 1-1/2" strip of flat iron that is fitted over the table locking bolt.

We made our counterweight from a 31" length of 2-1/4" auto exhaust pipe. Filled with melted lead wheel weights, it weighs about 50 lbs. An eye bolt and nut set into the molten lead takes the end of the cable. The length of the cable must be set to bring the table to 2" below the chuck when the end of the counterweight is on the floor. Slip the counterweight into the column with the drill press tilted on its side on the floor. Once you've adjusted the cable and set the drill upright, you'll discover how easy it is to move the table up and down. PW



Videoscene

by Alan Marks

Making a Solid–Body Electric Guitar with Dan Erlewine, ©1985 by Stewart–MacDonald, Box 900, Athens, Ohio 45701, (800) 848-2273, 120 minutes, $79.95.

I dive into unfamiliar waters here, never having built a guitar and knowing next to nothing about the process. But perhaps, in some inversely logical way, this qualifies me to evaluate this tape. I can, after all, tell factually whether or not a novice such as myself could undertake the task equipped only with the information contained in this tape.There are two ways for you to go about making a solid–body electric guitar. You can take the necessary measurements from any existing guitar. Erlewine demonstrates how to do this. If you can get your hands on one, you can easily make a drawing of it. The one chosen for the purposes of this tape is a "Strat," the common name for the Fender Stratocaster, a classic guitar from the sixties. If you want to make a Strat and don't happen to have one on hand to copy, use the drawing that comes with the tape.

It is a rare experience for me to review a tape in which the instructor demonstrates such a high level of proficiency and speaks with such authority. I have no doubt that the instructor is, as claimed, a nationally–known master repairman. The techniques and materials used by Erlewine could be used by a craftsman in any woodworking endeavor, and so I feel that even though I have no plans to build a guitar, I gained considerably from the instruction.

By no stretch of the imagination is this a professional video production. The shop's fluorescent lighting distorts the colors, and cancels out descriptive shadows. The camera frequently misfocuses. Background noise filters through and the fades from one scene to the next are irritatingly long. And yet the tape succeeds despite all these shortcomings, largely because of the thorough, forceful, and engaging personality of Erlewine. He often catches himself and returns to a previous step, saying something like "I missed telling you to clamp this piece in position until the Bondo dries so be sure to do that." But this viewer forgives him because he's trying to be so thorough and honest in his presentation.

In watching this video, you will learn a lot about drawing and layout and transferring measurements from a drawing to the workpiece. You will learn a lot about gluing, and in particular about a certain glue called Hot Stuff. You will learn about casting templates and reproducing curved surfaces using Bondo. You will learn some dandy techniques for routing with a drill press. You will learn sanding and shaping methods, and something about spraying lacquer.

One word of caution: the drawing that comes with the video does not fully detail the shape of the body. You might guess at it from watching the tape very carefully but the very best solution would be to have an

***Alan Marks** is a cabinetmaker in Carmel Valley, California, and a contributing editor to* PW.

original on hand for reference.

There is an impressive collection of electronic innards, pickups and potentiometers, controls, switches and such to mount in the body cavities. After watching the tape, I haven't the foggiest notion of how to wire them, so if you tackle the project, you too will probably need such wiring diagrams as may or may not come with the electronics. Erlewine does not include them, though a complete list of materials and hardware does come with his drawing. I guess the presumption is that you will get the hardware from the people who sell the tape, the Stewart–MacDonald folks.

This seems like a nice hobby project. If you don't play the instrument yourself, you could always gift it to some aspiring rock star relative.

Making a Carousel Horse with Norm Bryden, © 1988 by Bryco Products, Distributed by Woodworkers Supply Inc., 5604 Alameda N.E., Albuquerque N.M. 87113, (800) 645-9292, 94 minutes, $49.95.

I had a hard time following this one. Admittedly, my faculties were fatigued when I watched it the first time, but after viewing it twice, it appears that the responsibility for this does not rest on my shoulders but on Norm Bryden's.

As evidenced above, a homegrown videotape need not be a poor one if the presentation is thorough and engaging. Unfortunately, good craftsmen often make poor instructors. Teaching a craft to a novice requires the teacher to identify with someone who knows nothing. Not every craftsman can assume this perspective. Many would–be instructors presume they are communicating when they are not; such appears to be the case with this video. Anyone trying to produce and market his own low–budget instructional video would be well–advised to consult with a professional instructor or, better yet, with a director.

The Bryden tape is divided into sections, 1) Starting Your Project, 2) Carving the Head, 3) Making the Legs, 4) Cutting and Drilling, 5) Carving the Body, 6) Bodybuilding (assembling the horse), and 7), The Finishing Touch.

This tape shows how to make one of several possible styles of carousel horse. The horse shown here is taken from page 118 of a book by Charlotte Dinger called *Art of the Carousel* and is identified as a Dan Muller stander. Dan Muller carved the original in the early part of this century. The term "stander" refers to the horse's pose on the carousel.

You may buy the drawings separately for $24.50 or in a package consisting of both the video and the drawings for $59.95. In my opinion, the drawings do not adequately describe the construction of the horse. The video itself does a poor job of outlining the assembly and shaping of the blocks which make up the carcase. Taken together, the drawings and video left me with a lot of unanswered questions, but you would definitely be lost without both.

For example, in the second section, Carving the Head, Bryden begins work on a head which is already half–carved, with no explanation of how it came to look the way it does. He tries to show how to do a nostril here, an eye there, a belt buckle, but the shaping process used to create the head as an entity is left out. This is typical when he shows how to carve the other body parts.

Mostly he carves on horizontal pieces, and since the camera never shows us what is happening from above, you wind up listening to a description of what Bryden is doing without seeing it. The illumination comes from the wrong angle too, so what you can see of the cuts is often poorly delineated. All very frustrating.

Most of the time Bryden speaks to his work pieces, not the camera. He fails to engage the viewer's eye and he speaks in a phlegmatic, monotone voice. This made it very hard for me to concentrate.

Not many people possess the knowledge to teach this subject, so, unfortunately, you are not likely to see a better presentation. And because there is some good information in this tape, anyone wanting to learn how to create a carousel horse would be advised to get it. It will, however, take a lot of research, trial, error and experimentation on your own to fill in the missing blanks. PW

by Hugh Foster and Jacob Schulzinger

The Politics of the Home Shop

What if you want to supplement the income from your "day job" making things in your garage to sell at weekend craft fairs? Or suppose you're ready to retire from the rat race and pursue that woodworking hobby of yours on a semi–professional basis. Far from avoiding the hassles of the world by retreating into our shops, we find all manner of new hassles the day we become professionals.

Ted S., a teacher and a part–time woodworker and tool dealer, thought he had good relationships with his neighbors. His shop was pretty well insulated for noise, and never more than a few customers at a time came to his occasional Saturday morning demonstrations. Then he got a letter from the city advising him that selling tools from his home was a violation of the zoning codes. Was he "turned in" by a neighbor or by the downtown full–time tool dealer whose franchise Ted's superior service had usurped? The best advice he could get was that in most places in this country, it's simply not legal to run a business from your home.

When he's not pursuing freelance writing or teaching English, ***Hugh Foster*** *designs and builds custom furniture in Manitowoc, Wisconsin.* ***Jacob Schulzinger*** *is an industrial engineer in the aerospace industry. Woodworking is his part-time business and hobby.*

Houston, Texas, the fourth largest metropolis in the United States, differs from most cities in that it has no zoning laws. Instead, its various residential subdivisions have deed restrictions which are strictly enforced through the courts by the individual homeowners' associations. Most deed restrictions prohibit the running of any business from one's home, but many small businesses operate and get away with it, simply because the nature of their operations does not call attention to their activities.

A typical deed restriction for a 25–year–old subdivision in Houston reads, "All lots ... shall be used for single family residential dwelling purposes only ... There shall never be ... any other business or industrial use which might be or might become a detriment, annoyance or a nuisance to the neighborhood." What does this mean to the homeowner who wants to start a woodworking business in his garage? In an interview with Houston attorney Phyllis Finger, we were advised that "the intent of the deed restriction clearly indicates that the property may only be used for residential purposes and that the City Attorney, any owner of neighboring property, or the subdivision association may, at any time, decide you are in violation of your restrictions of you operate a woodworking shop for profit in your garage." If the nature of the business involves very little traffic to the home office, one would think the business would be exempt because clearly no nuisance to the neighborhood exists, but Ms. Finger again advises that "a business is defined as any particular employment, occupation, or profession followed as a means of livelihood, a calling, employment, trade or avocation."

We asked Ms. Finger what might happen to the homeowner who chose to violate his deed restrictions by running a business—no matter how innocuous or nuisance–free—from his home? She responded that "you may be subject to a fine of $200 per day, a court order enforceable by contempt (jail time), and an order that you pay the attorney's fees of the city, association, or neighbor that brings the suit, assuming they are successful."

We spoke with a number of woodworkers, plumbers, carpenters, and other tradesmen about how deed restriction, land covenants, or zoning affected their businesses. What we were usually told was that, in Houston, as long as they didn't flaunt their violation of the deed restrictions, they had no problems. When asked about this, attorney Finger replied, "Given the status of the law on deed restrictions, I would not advise any client to just assume that they would not be enforced ... Knowingly violating your deed restrictions is a risk that you must consider in calculating your possible business expenses."

Auto mechanics told us that they could not operate out of their homes by working on customers' cars there, but if they worked on those same cars in the owners' driveways, they had no

problem. Ms. Finger responded, "This type of business would fall into the same category as a carpenter who does repairs on your home. If the businessman has the proper licenses and is not in violation of the homeowners' deed restrictions, there should be no problem."

We can name dozens of woodworkers who make things in their home shops and sell them. When someone turns them in, they, too, will be in violaton. As we, the authors of this article, sit at our dining room tables pounding our keyboards, we are (we hope) generating income. Are we violating zoning laws or deed restrictions, and if so, isn't such a violation the American way? When asked about the case of the writer, Ms. Finger stated, "If he lived in Houston he would be in violation of the deed restrictions, but I sincerely doubt that the City Attorney would consider prosecuting a case of this type."

So now we have the real truth. The statutes were enacted to protect the average citizen from the abuses created by the minority. After all, the only real purpose of zoning laws and deed restrictions is to "force" us to be "good neighbors," and that seems fair enough. In one small midwestern city, if a friendly warning isn't enough to encourage one to be a good neighbor by obeying the zoning laws, then a court order demands it, and the fine is a minimum of $145 per day. Although it sounds as if the city makes a lot of money on these fines, that's not the intent. Rather, the purpose is to preserve the residential nature of the neighborhoods.

So what if you, the businessman, decide that you want to be strictly legal? What can you do if the zoning or covenants in your neighborhood are overly restrictive, or if the neighborhood has changed to the point where a small business of the type you plan will *not* adversely affect your neighbors? Attorney Finger informed us that "a commercial building permit is required when any person proposes to convert a single–family residence to a commercial one. A commercial building is defined as one other than a single–family residence. When a person applies for such a permit, he must file a certified copy of all documents containing restrictions on the property. If the city refuses to issue the permit on the violation of restrictions contained in the deed or other instrument, the person may have the case reviewed in court."

Fred H. tells us that his shop "is in an outbuilding; some would call it a garage, but to me a garage is where one puts his car—and my car has been in this building only three nights in the entire fifteen years we've lived in this house. My car is in a rented garage in the neighborhood; this June we lose the use of this garage, so I'd like to add on to my outbuilding—I'm sure they won't let me add a two–car garage to my alleged two–car garage. I've not even been legally allowed to heat it, severely limiting winter woodworking. I'd put up an attractive modern building with a safe wood heater in the woodworking portion—but a wood heater isn't allowed in my present building because it's possible to bring an auto into it. For them to consider this type of heat, I'd have to eliminate the overhead door. And isn't off–loading materials or out–loading projects a treat through 30" passage doors?

We do not advocate that you violate zoning laws or deed restrictions, but we can give you, as hobbyists, some reasonable suggestions on being a good neighbor. For example, in the summer Fred H. is often ready to go to work in his shop at 5 am, but always plans the day's work so that he won't have to run his planer until at least 8 am—and he won't run any power equipment much past 6 or 7 pm. In Fred's area most people leave the windows open during the summer months, and it wouldn't do to agitate the neighbors with noise. Another way of keeping on good terms is to take the best precautions you can when spray painting. Don't let the overspray land on unprotected cars or windows. Common sense would be enough—if common sense were more common!

Other cities beside Houston regulate private property use through deed restrictions or covenants. If you want to learn more about the limits placed on the use of your land, first obtain a copy of the restrictions from your local governing body and read it carefully. Do not read into these documents what you want to see. Then make a survey of the area to see if there are any obvious violations. The next logical step is to talk to the property owners involved in the deviations to learn what problems, if any, they have had, and what steps they may have taken to legalize their operations. Evaluate their situations, taking into account the nature of the businesses, the traffic they generate, the noise or nuisance created, and any factors that might have persuaded your local governing bodies to ignore their cases. Ask them how long they have been in business in that location, and whether they fall under a "grandfather clause" where their use of the land

predates the enactment of any property restrictions. At this point you have to decide how much a gambler you are. If you take the safe route, you'll check with the city attorney or zoning board, the president of your neighborhood's homeowners' association, or a private attorney to learn the actual state of affairs regarding this type of violation in your specific area.

Many people have successfully ignored zoning laws and deed restrictions, but if you take that gamble, you do so at some peril. The very act of going into business introduces you to the machinations of government departments since it begins with a trip to the courthouse to file an application for an assumed business name. This simple act marks your entrance into the legal side of the business world. You will probably have to file for a state sales tax certificate if you plan to sell retail; a federal tax identification number and unemployment insurance tax if you hire an employee; a sign permit just to put a sign over the door; a certificate of occupancy; a building permit for commercial space; and inspections by the fire marshall, health department and the public works department. Is it any wonder that the small businessman often tries to begin his business at home rather than rent commercial space?

Having employees can affect your home–based business simply by calling attention to potential zoning violations. As the traffic to your home increases, you could be asking for trouble by having even one person working with you in your shop. But if that employee acts as an independent contractor and works from his own shop to supply your needs, you have a different situation. In that case, he runs the risk of violating restrictions and offending his neighbors.

Full or part–time employees also add responsibility to your role as a professional woodworker from both legal and moral standpoints. A federal tax identification number will be used on documents you file with various government departments. As an employer you may be required to pay an unemployment insurance tax on a quarterly basis. Social security and personal

income taxes must be withheld and paid to the appropriate agencies on a timely basis. Should you desire to incorporate, you'll find that some states require payment of a franchise tax based on the company's capitalized value. Workers' compensation insurance, which protects you from lawsuits arising out of on–the–job injury or death of an employee, may also be in order—and should be considered (whether mandatory or not) because of the dangers inherent in using the many sharp tools of our trade.

Under the Occupational Safety and Health Act of 1970, all employers have the responsibility of providing a safe workplace free of recognized hazards. OSHA standards are voluminous, far–reaching, and demand not only a safe environment, but that your employees have and use personal protective equipment. Common sense will start you on your way, and at the top of your list of new responsibilities you'll find that the little things you may have ignored when you worked alone have become mandatory when employees are involved. Belt guards and grinding wheel shields are two obvious candidates for OSHA scrutiny, as well as a wide variety of hidden hazards you should be aware of—dust, chemicals in some adhesives and finishes, and exposure to noise.

So where are we? Right back at the beginning—with the law itself. If we remember that the goal of most laws is to insure that we be good neighbors, then the "golden rule" of all the major religions, "Do unto others ...," is as good a pre–law guide as we need. Morris D. tells of investing a fair sum in a woodworking venture with another fellow. He made the fellow co–owner of the patent on the invention they were manufacturing—now that fellow is stiffing him to the tune of set–up costs for the manufacture of the product that he invented, as well as his fair share of the current proceeds. Does a woodworker need a lawyer? You bet! Do you need a lawyer?

Learn what you can on your own without incurring the expense of an attorney. The easiest way is by reading the available books, including *Making It Legal: A Law Primer for Authors, Artists and Craftspeople* by Martha Blue (1988, 177 pp., $14.95, Northland Publishing Co., Box N, Flagstaff, AZ 86002). Copyrights and patents are covered, as are taxes, and establishing craft as a business rather than a hobby. Most of the book's examples apply to artists and writers, but it is one of the few sources that will tell you about rendering unto Caesar only that which is Caesar's. The book is a good start for your business library, but it can't cover the requirements set forth by all the state governments. For Texans, we can recommend *Your Texas Business* by Richard Alderman and Tom Oldham (1988, 210 pp., $17.95, Gulf Publishing Co., Box 2608, Houston, TX 77252-2608).

Lots of other books on the market will help you get started in the right direction. An experienced reference librarian might be able to give you tips even more specific than these: begin with books that treat the general topic of business, like Blue's. Then advance to those geared to your specific state and your specialty. The federal government offers pertinent titles through the U. S. Government Bookstores, through the mail from the Superintendent of Documents, or from the U. S. Small Business Administration. The SBA provided us with an excellent package of information at no charge that included these pamphlets: "Starting Your Own Business," "Outline of Tax, License and Permit Requirements for Starting A Business," "Directory of Business Development Publications," and a primer of what help might be available for you, the small businessman, from the SBA. In pouring over the Directory, I found no less than 57 separate pamphlets available, ranging in price from fifty cents to one dollar.

Your investment in both time and money should be protected, and we have, hopefully, given you some food for thought. Now you'll know whether you want to respond to the newspaper ad that says, "Wanted: hobbyist woodworker to build store fixtures." PW

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Book Reviews

by Hugh Foster

The Practice of Woodturning by Mike Darlow, ©1985 (Linden Publishing Co., 3845 North Blackstone, Fresno, CA 93726) 366 pp., hardcover, $29.50

This is the first Australian woodworking book of any kind that I've encountered. I hope that Linden has enough success with it to search the "down under" market for other titles to bring us. It's a model of clarity and completeness. While it does rehash material covered in American and British books on the subject, there is a unique slant. For example, the book shows a tool rest stand that's like nothing I've ever seen, and it's better than just about any that I have seen. After you see them, many of the book's lathe accessories will become necessities in your shop. Illustrations accompany all turning activities and feature a full range of safety gear. And Darlow not only shows us how to turn, he also explains why certain methods are to be preferred. This book is a real dandy.

Woodturning: Projects and Techniques by Bruce Boulter, ©1987 (Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016-8810) 139 pp., $14.95

This profusely illustrated book deals mainly with making laminated turnings of exotic woods. The projects include large and small bowls, lids, lace–making bobbins, and the like. The nearly five hundred photos help us to know what to look for when we stand back and study our work. The book is large and handsome, but it won't replace Pain, Nish and Roskiewicz on my shelf of turning books.

Award–Winning Designs for Woodturning by Alan and Gill Bridgewater, ©1987 (Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016-8810) 160 pp., paperback, $14.95

If the sixteen pages of color prints in this book aren't enough to motivate you to try some of the projects, you must be immune to suggestion. The 40 projects here use a wide variety of assembly and turning techniques, and were winners of the 1986 turning design contest held by the English magazine *Practical Woodworking*. There are some strange items here, even an awfully English soccer trophy glued up from 20 hexagons and 20 pentagons and many contrasting filler strips. Brickwork items, thin–turned items, and other extremely delicate projects fill the book, but even novice turners will find a few engaging projects here.

Small and Unusual Woodturning Projects by James A. Jacobson, ©1987 (Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016-8810) 160 pp., paperback, $12.95

All the projects shown here appear to be designed and built in a workmanlike fashion, some of them from very pretty wood. But a pretty turning blank doesn't necessarily make for a work of art, and the projects shown here lack that certain something that makes art of an otherwise fairly mundane item. Look before you buy. It's not that this is a bad book, for it isn't—it's just that the same dollars might buy you a better one. For instance:

Woodturning: A Designer's Notebook by Ray Key, ©1987 (Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016-8810) 144 pp., paperback

Published in England in 1985 as *Woodturning and Design*, this isn't the world's greatest turning book—for style and substance I much prefer Ron Roszkiewicz's *The Woodturner's Companion* (reviewed in *Popular Woodworking* #33, October 1986)—but Key's book is handsome, informative, and includes 302 fine photos and drawings. Very British in tone, manner and substance, the sections on tooling and coursework can be relevant to American turners, but the "Helpful tips on techniques," "Domestic wares," "Designs for the home," and "Individual objects," which together comprise about half the book, are worth your attention, for some fine designs are here. Key communicates the principles of turnery design as well. I prefer being shown how to design my own projects or even how to rip off someone else's design, rather than just being given a pattern to copy. This volume is pretty fine, almost as good as:

Turned–Bowl Design by Richard Raffin, ©1987 (Taunton Press, 63 South Main Street, Box 355, Newtown, CT 06470) 170 pp., paperback, $17.95

Turning Wood with Richard Raffan, this author's first book, looked like one of those books that wouldn't be surpassed for a generation, but in a way, this one does. Raffan explains why his bowls are beautiful and mine are too often just kludgy (my word!) Pictures fill the book, but its real beauty is in the text. Raffan implores his readers who want to sell their practice pieces to get honest prices for their work. Rather than sell them for the cost of the materials or less, we should sell the best for a good price and use the rest for heat. This is the only philosophy that permits us to practice enough without damaging the market. Far too many woodworkers have forgotten this premise, to the point where too many customers expect their projects to be virtually free. But that's not really what this book is all about. It's about geometry, form, aesthetic theory, craftsmanship, and Raffan's vision. He can't really tell us how to make his bowls, but as he tells us what he thinks about as he makes them, he helps us to make our own work better. This beautiful and inspiring book reminds me not of any other turning book, but of the Krenov trilogy, or that book I wish existed, *The Zen of Bowl Turning*. But since that ultimate title exists nowhere, Raffan's *Turned–Bowl Design* will have to do. And it does—most ably.

The Woodturner's Art by Ron Roszkiewicz and Phyllis Straw, ©1986 (Macmillan Publishing Co., 866 Third Avenue, New York, NY 10022) 286 pp., hardcover, $35.00

There are lots of turning books out there, and this one joins the authors' other book, *The Woodturner's Companion*, as among the very best. It has the most "modern" approach I've seen. All the drawings are artfully computer generated, and thus more "logical" than some hand–rendered illustrations. The hundreds of excellent illustrations aren't enough to make this book praiseworthy; its excellence lies in the clarity of its text. From the perspective of the novice turner, its 18 projects appear to range progressively from moderately difficult to nearly impossible. But it's easy to see from the text that the authors genuinely want and expect us to emulate the projects by the time we've finished the book. This could be the one that really teaches me the craft of turning, and it's certainly the volume for new woodturning authors to beat. PW

***Hugh Foster** is a part-time furniture designer/builder in Manitowoc, Wisconsin and the author of* The Biscuit Joiner Handbook *(Sterling Publishing Co., 387 Park Avenue South, New York, NY 10016).*

by Graham Blackburn

Sash Fillisters

The Uncommonest Fillister

Fillister planes were mentioned in my last column (*Popular Woodworking* #53, January 1990) as being the aristocrats of the rebate plane. They can indeed rival the fancy wooden plough plane in terms of magnificence and ingenuity, and are among the best examples of the pre–mechanized toolmaker's art. Of all the fillisters, the sash fillister is the least common and as a result the least understood, often not being recognized as a fillister at all, but instead being confused with the plough planes themselves. Although their original use in the making of window sash has now been made largely obsolete by all sorts of milling machinery, they are still useful tools in restoration or reproduction work, as well as in fine furniture shops where their unique attributes can make easier certain jobs that might prove tricky with router or shaper.

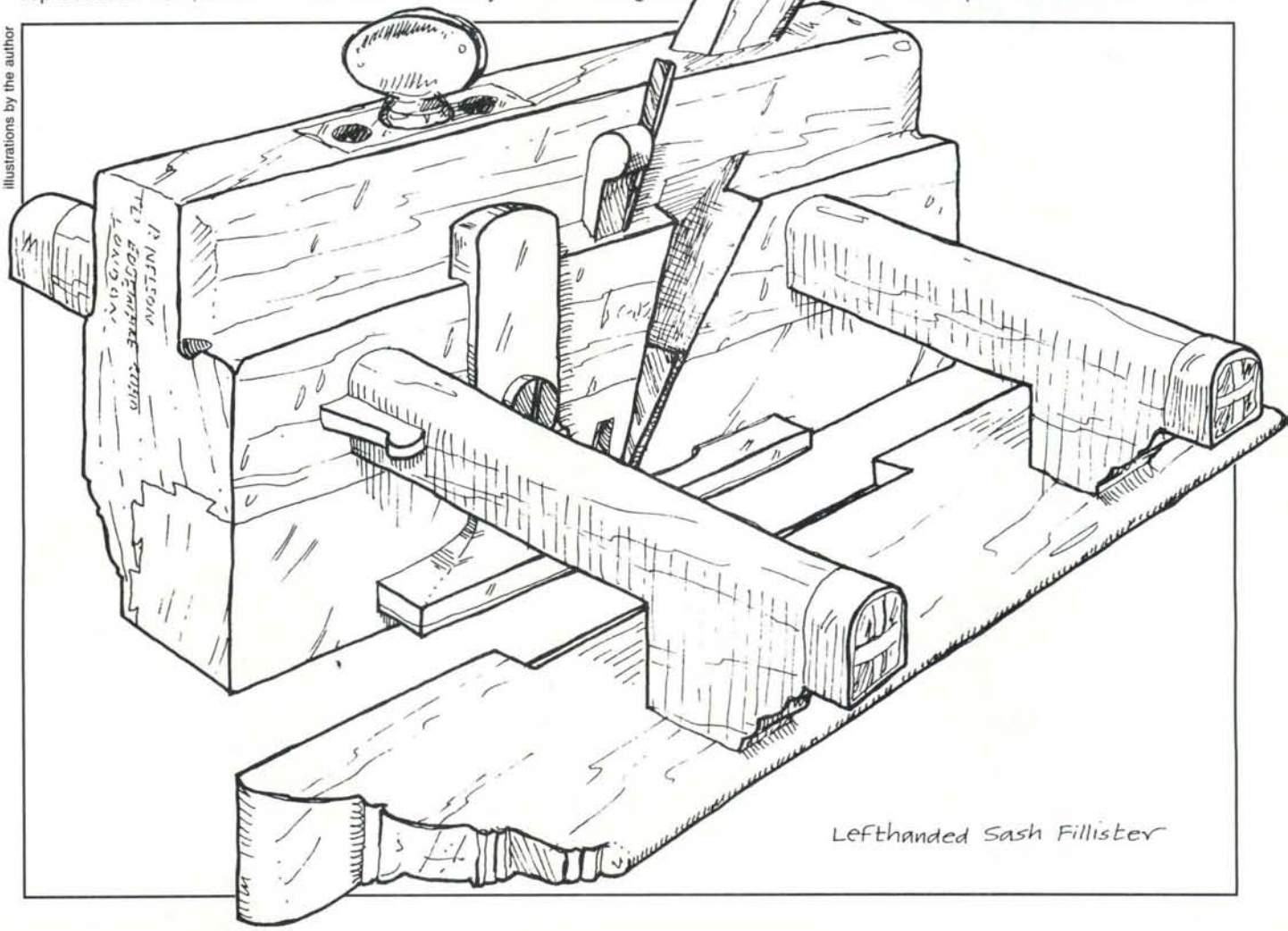
Sash Fillisters and Rebate Planes

A fillister is basically a rebate plane fitted with a fence and depth stop. Its purpose is practically the same, namely to cut a right–angled section out of the edge or corner of a board. Such a rebate (or "rabbet") is common to all kinds of woodworking. In carpentry it can be found in siding and flooring where adjacent boards are rebated in order to fit them together. In joinery and furnituremaking the rebate is the basis for all kinds of joints and construction. It's not surprising that there's a wide variety of tools designed for rebating. Today most rebates are made with router, shaper or table saw, but in the days before powered machinery, the plane was the usual tool.

The common rebate plane was made with a straight or skewed blade, and sometimes fitted with a spur, but since its primary use was for smoothing the bottoms of rebates already formed—which themselves then guide the tool's path—they are devoid of any form of fence or depth stop. Should any such guidance be needed, then fences must be fixed to the work or to the plane. Many old rebate planes bear the marks of fences nailed or screwed to the side or sole of the stock.

A rebate plane that was made with a

illustrations by the author



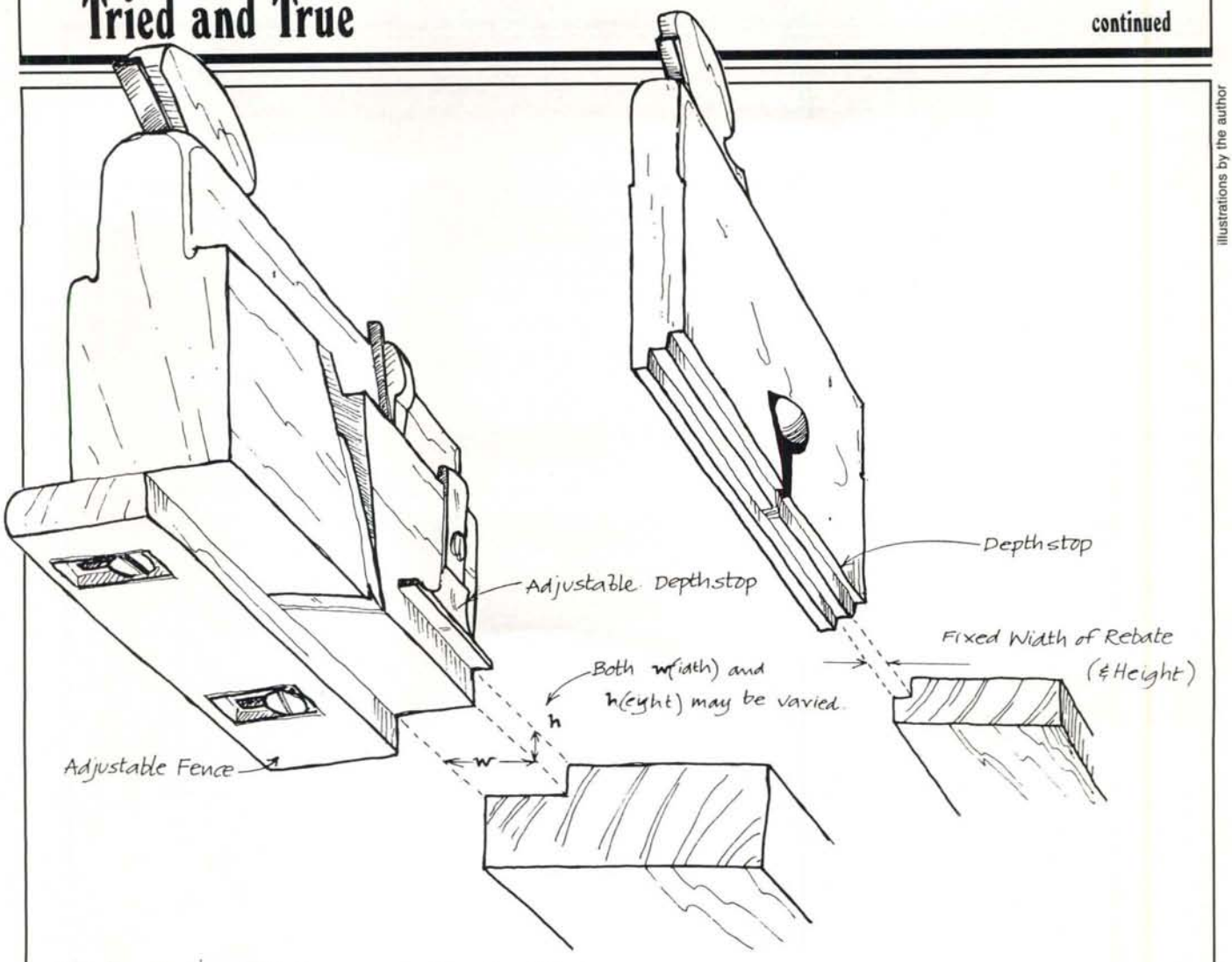


Fig. 1 Moving Fillister and Standing Fillister

illustrations by the author

fence and depth stop from the start is known as a fillister. Although there are several varieties, all belong to one of two main classes: standing or moving fillisters. The former class comprises planes with fixed fences and depth stops—formed simply by the shape of the sole (Figure 1 above). These tools could only be used for making rebates of fixed proportions. This might have been fine for work requiring the same size rebate over and over, but for a variety of jobs it was obviously not as convenient as a moving fillister (Figure 1), whose fence and depth stop could be adjusted.

The sash fillister is a member of the moving fillister branch of the rebate family; it cuts a rebate and is fitted with an adjustable fence and depth stop. But no matter how one sash fillister may differ from another—and there are some surprising varieties—all share this common distinction from regular moving fillisters: sash fillisters cut the rebate on the *far* side of the work whereas all other fillisters are designed to cut on the *near* side. For the right-handed woodworker standing in front of the bench working from right to left, this means that while rebate planes and fillisters in general work a rebate on the edge facing the worker, sash fillisters cut on the side or edge furthest away.

The Development of Sash Fillisters

The reason for the difference may seem hard to understand until you consider both the way windows were made in the eighteenth century and the development of the typical British joiner's workbench.

Sash windows—whose glass-holding frames slide up and down rather than being fixed, hinged or pivoted—became very common in eighteenth century Britain and the American colonies, but almost nowhere else. The joiners who made these windows needed a special tool to make the rebates in which the glass would sit in the frame. The ordinary rebate plane and the moving fillister can cut such a rebate quite easily—but on the edge of the work facing the worker. For such rebated work to become a sash bar in sash windows, it also needed a moulding on the side of the wood that would become the inside of the window. Thus, after the rebate had been cut with a regular moving fillister, the work had to be reversed so that a moulding plane could be used on the other side. Furthermore, since sash bars (the narrow bars separating one pane from another in the middle of the window) must necessarily be made with two re-

bates and two moulded edges, making such a piece with a regular moving fillister and moulding plane involved four separate operations of clamping and unclamping the work.

The solution was to design a plane that would cut the rebate on the far side of the work, which could then be left in place so that the moulding could be stuck (the proper word for describing the forming of a moulding) on the usual, that is to say, the near side. Such a plane is the sash fillister.

It is interesting to consider that had this kind of window been popular on the Continent, the sash fillister might never have been invented because Continental benches, unlike their British and American counterparts, were often fitted with back vises. A back vise—almost never seen in Britain or America—would have made all the clamping and unclamping unnecessary in the first place, and it's conceivable that instead of inventing a new plane, British joiners might have borrowed the Continental technique. After all, many basic woodworking techniques that are now part of the British tradition, from linenfold carving and mortise–and–tenoning to dovetailing, originated on the Continent before being brought over and adopted on the other side of the Channel.

Varieties of Sash Fillister

There are various references to sash fillisters throughout the eighteenth century in tool inventories, maker's order sheets and advertising, and numerous examples are known to exist, but the first written description occurs in a book by Peter Nicholson in 1812 called *Mechanical Exercises*. His definition of sash fillisters in general is a model of clarity and deserves to be quoted: "The sash fillister is a rebating plane for reducing the right–hand side of the stuff to a rebate, and is mostly used in rebating the bars of sashes for the glass, and is therefore called a sash fillister." Here also are described the two main sorts of sash fillisters that continued to be made until well into the twentieth century. Nicholson refers to them as "The Fillister which throws the Shavings on the Bench" and "the Sash Fillister for throwing the Shavings off the Bench." They were more commonly known throughout the nineteenth century (as they are to this day) as right–handed and left–handed fillisters respectively.

Right–Handed Sash Fillisters

Right–handed sash fillisters were undoubtedly the first type to be developed since they are similar in concept to the standing fillister; the only difference is that the rebate in the sole of the plane that forms the depth stop is formed on the left–hand side rather than on the right (Figure 2 below). This is necessary because the rebate is being formed on the right–hand side of the work; if the depth stop were on the right side of the plane—as it is with regular fillisters—the depth stop would rest on thin air, the wood all being on the other side of the plane!

Because of the rebate being formed on the left–hand side of the plane's sole, there can be no spur ahead of the cutting iron as is common with regular moving fillisters. Such a spur, designed to sever the fibers in the corner of the rebate, is not absolutely necessary, however, since the plane's iron is skewed with its leading corner cutting into the corner of the rebate. The skew helps pull the plane into the corner and minimizes the risk of the plane wandering away from the side of the rebate. This is, however, only a happy side effect of the real reason for the direction of the iron's skew since in any event it should be the tool's fence which controls the ultimate location of the cutting iron in the work. Due to the rebate cut in the plane's sole, the shaving exit of the plane has to be on the other, right–hand, side of the stock, and since this is therefore the side where the shavings will exit, to avoid the problem of shavings choking the mouth, the iron is skewed with its trailing corner on this side. Thus it is the fact of the shavings' exiting on the right–hand side of the plane which results in ths variety being known as the right–handed sash fillister, or the "fillister which throws shavings on the bench."

Later versions were soon fitted with adjustable depth stops. These were either simple wooden stops held in place simply by the friction of their fit or by thumbscrew–adjusted plates mortised into the bottom of the rebated section of the sole (Figure 3, next page).

Left–Handed Sash Fillisters

The skew of the left–handed fillister's iron is reversed and the shaving exit is accordingly on the left–hand side of the stock—throwing the shavings off the bench. The reason for this development is certainly not because some eighteenth century neatnik was concerned about the mess a right–handed sash fillister made of his bench. This plane was developed because the rebate in the sole of a right–handed sash fillister makes it impossible to see the working corner of the iron and watch what's going on. In any case, the addition of a depth stop, whether of wood or brass, renders the sole's

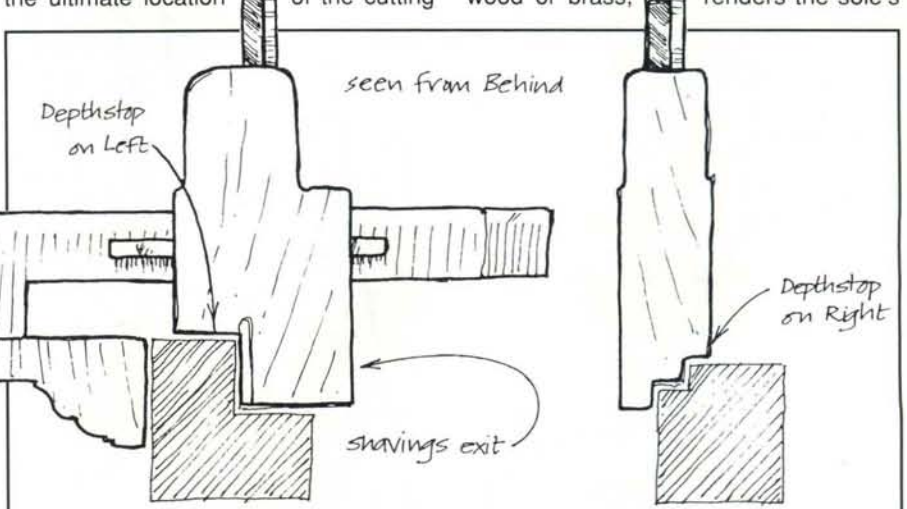


Fig. 2 Right handed Sash Fillister and Standing Fillister

rebate obsolete. Left– handed sash fillisters thus have square–bottomed soles.

But now that the iron is skewed with the trailing edge working the corner of the rebate, there exists the danger of tearing out, particularly with long–fibered woods. To prevent this, a spur cutter is usually fitted on the left–hand side of the stock just ahead of the point opposite which the leading edge of the iron sits in the mouth, in a manner similar to the way a moving fillister is fitted out. I should point out that although a moving fillister's iron is usually skewed so that its leading corner is in the corner of the rebate, the existence of a spur cutter is still necessary since this tool, unlike a sash fillister, is frequently used for cutting rebates across the grain.

Another difference may usually be seen between right–handed and left–handed sash fillisters. Although in both cases the iron extends across the entire width of the sole (unlike moving fillisters where the outside corner of the iron stops short of complete transection since it's covered by the fence screwed directly to the sole), right–handed sash fillisters are made with parallel sides whereas left–handed ones usually have moulded corners on the right–hand side of the stock (Figure 4). Obviously right–handed sash fillisters cannot have any moulded corner at this point since this is the side where the shaving exit is located and any moulding would compromise the iron's bed. However, left–handed sash fillisters, whose shaving exit is on the other side of the stock must have some relief on the right–hand side since the cheek (the side of the stock into which the throat is cut) would otherwise extend to the bottom of the sole, thus preventing the iron from extending across the entire width of the sole and thereby severely limiting the width of possible rebates that may be cut.

Since there is no rebate in the sole of a left–handed sash fillister, the depth stop is fixed to the side of the stock, usually in a shallow slot. Like the depth stop in the right–handed sash fillister, it is controlled by a brass thumbscrew whose adjusting mechanism is mortised within the plane's body.

The Fence

With one exception, fences were generally similar for all sash fillisters and are similar to the fences found on wooden plough planes—but with an important difference. Plough plane fences pass beneath the bottom of the sole while sash fillister fences are set higher and will stop against the side of the stock at their closest adjustment. This is true for right–handed sash fillisters, too, whose fences do indeed pass under the rebate cut in the right–hand edge of the sole. The fence still butts up against the body of the stock.

An exception is the combination moving and sash fillister. Several made by the Scottish company Mathieson & Sons, Ltd. not only had fences that pass below the stock but were also fitted with spurs and depth stops on both sides, and had a shaving exit made in the graceful form common to regular rebate planes.

The majority of fences are adjusted by means of boxwood wedges rather than screw arms, which while rather more fid-

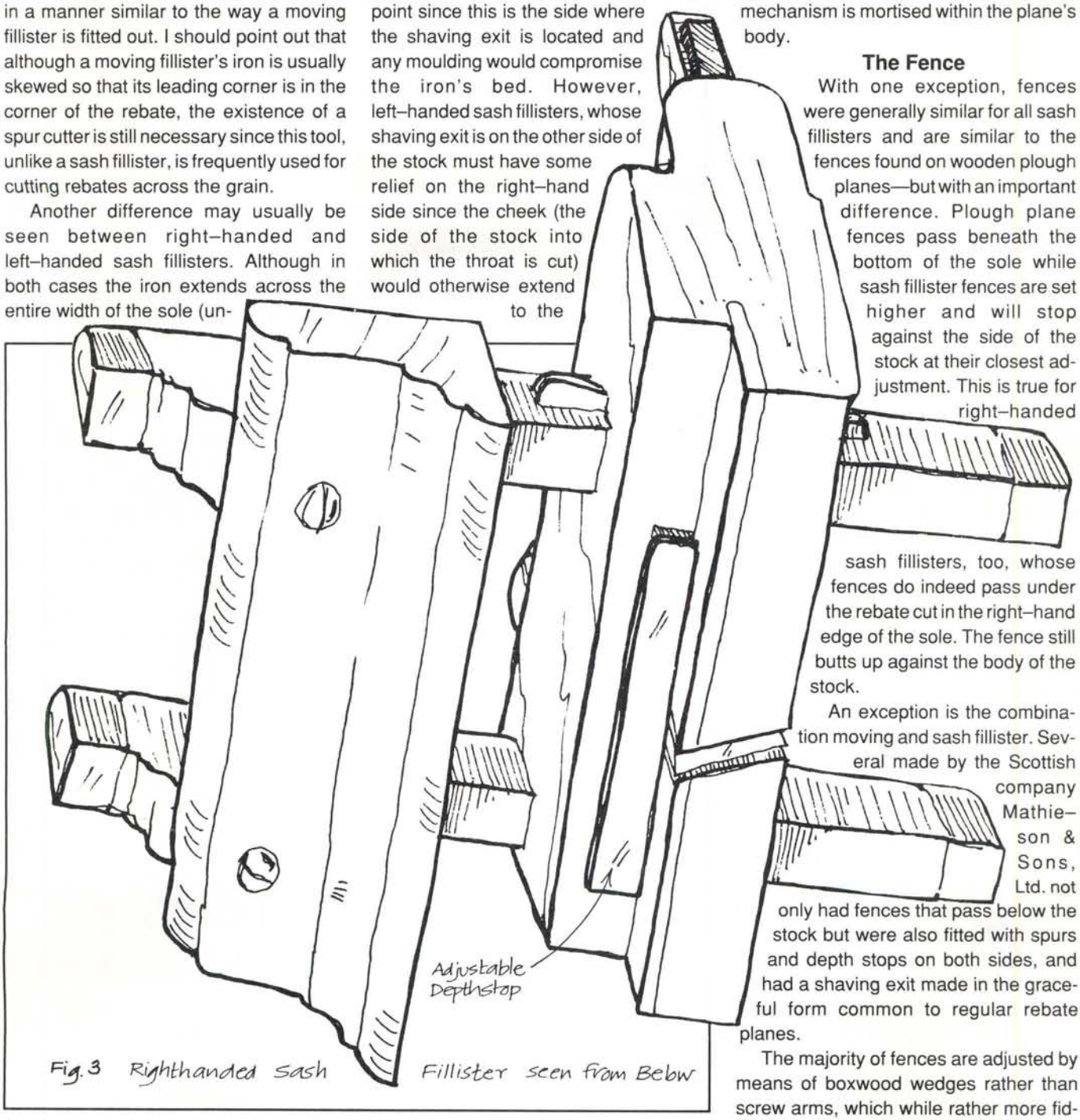


Fig. 3 Righthanded Sash Fillister seen from Below

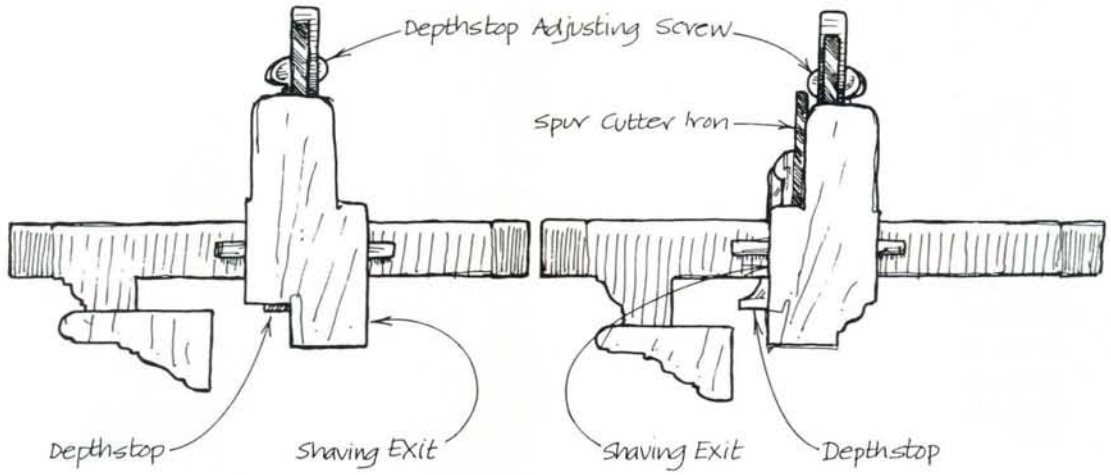


Fig.4 Righthanded Sash Fillister and Lefthanded Sash Fillister (seen from Behind)

dlesome are less subject to damage. It's easy to replace a damaged or missing wedge; it's another matter to repair a damaged screw arm. Better models also have stopped rebates cut in the upper inside edge of the fence so that it may be adjusted close to the side of the stock and still accommodate a side–mounted depth stop (see the illustration on page 19).

A word of warning when reconditioning one of these planes: do not attempt to tighten the arms firmly to the top of the fence. They are intended to swivel since they will necessarily pass through unevenly as first one and then the other is tapped on the end with a mallet—unless the arms are fitted with a bridle which regulates their adjustment through the stock in equal measure. To prevent excessive damage to the ends of the arms (or stems) from tapping, brass ferrules are usually fitted over the ends and held in place by one or more wedges inserted in the very ends of the arms (Figure 5, to the right).

It is not so vital to adjust the fence perfectly parallel to the stock as it is to adjust the fence of a plough plane perfectly parallel, since the sash fillister has no skate which must follow the course of the ploughed channel. Although it's generally a good idea to attempt as much accuracy as possible, it is indeed sometimes useful to set the fence a little askew, thereby broadening the effective path of the iron. This requires, however, that the side of the plane not be held flat against the work in order to avoid endangering the

illustrations by the author

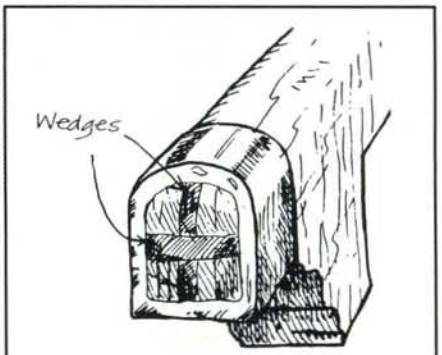


Fig.5
Brass Ferrule on Arm End

health of this part of the plane . Since it is precisely this area which receives the most wear, sash fillisters are usually boxed—fitted with hard–wearing boxwood strips—at this point in a variety of patterns according to the cost of the plane (Figure 6).

The very best models were made with integral handles and other features common to the more expensive plough planes, but even a run–of–the–mill sash fillister can usually be brought back to good working condition and will find a useful place in the discriminating shop. Although American joiners in the last century were fonder of a tool known as a stick and rebate plane (which cut both the rebate and the moulding at the same time) than the straightforward sash fillister, there were still very many made and they are by no means rare. PW

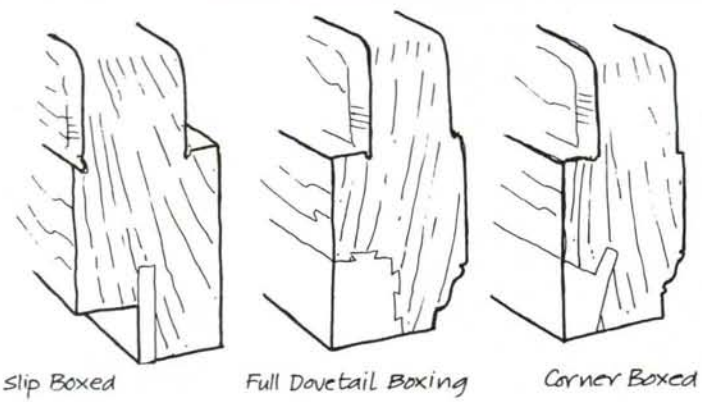
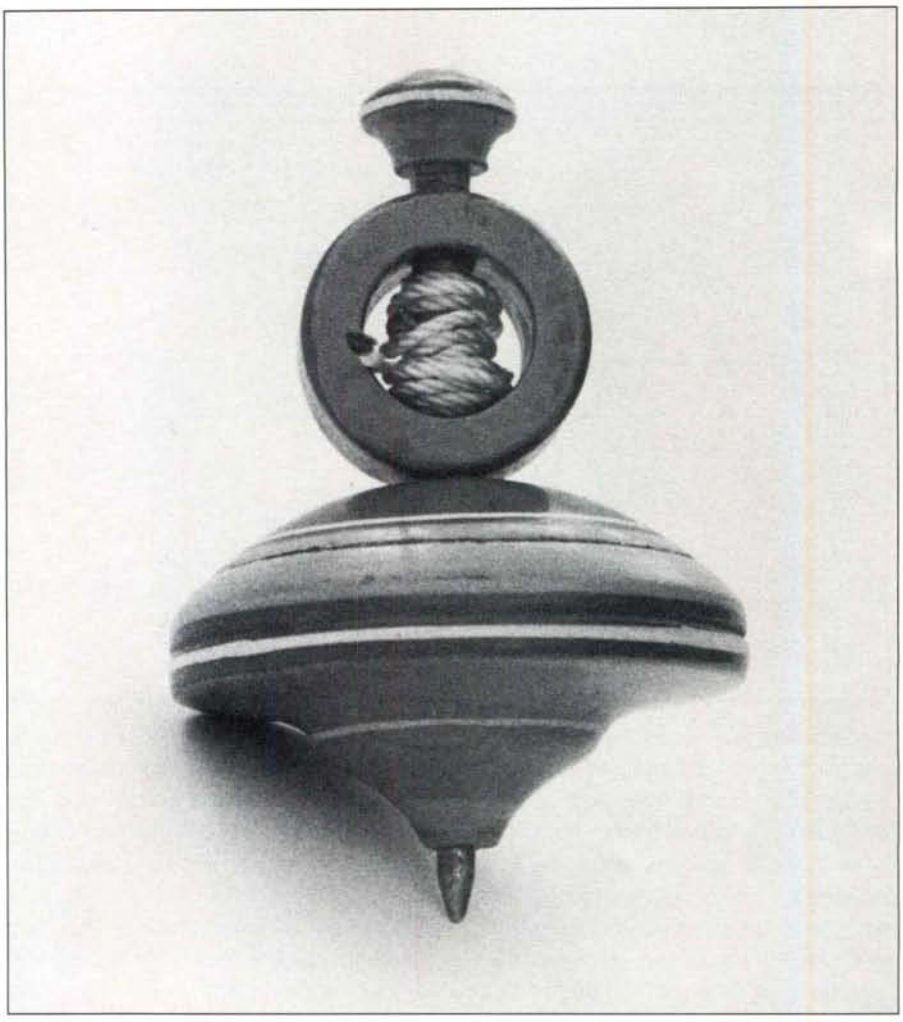


Fig.6 Different Boxings on Sash Fillisters

Toy Top

by John A. Nelson



The top is one of man's oldest and most popular toys. Eskimos made them of ice, Indians from bone, South Sea islanders from volcanic ash—even ancient Greek art shows men playing with tops. At some point in time, the top has been a favorite toy of just about everyone. They come in all shapes and sizes, and are made from all kinds of materials. In this country the most popular type is probably the peg top, which has a string wound around the bottom of the body that is simply pulled to make it spin. In recent years the top has been improved by adding a handle with a pull starter to the top. The design shown here incorporates its own built–in string and starter—and it actually rewinds itself so you're always ready for the next pull.

The top must be made of a hardwood for both durability and weight. This one consists of three parts—the center shaft, the rewind ring, and the body. To make the body, glue up sufficient stock to form a 2-3/4" X 2-3/4" square section about 4" long. Don't laminate mixed species, but use the same kind of wood throughout so the weight will be distributed evenly.

While you're waiting for the glue to set, make up the center shaft from a piece of hardwood 5/8" square and about 4-1/2" long. Take care to find the exact center at both ends, mount the stock on the lathe, and turn the knob on the end and the shaft as shown in Figure 3. Make the shaft portion slightly smaller than 1/4" and sand it all over while it's still in the lathe. Apply a coat of sealer next. Then locate and drill a 1/16" diameter hole through the center axis, 11/16" down from the knob as shown.

For the rewind ring, cut a 1-1/2" square piece of hardwood about 1-1/2" long. Use hot–melt glue to fasten this block in the center of a plywood disk mounted on a face plate. Turn the rewind ring according to the dimensions given in Figure 4, sand it all over, and apply a coat of sealer.

Turn the body between centers as shown in Figure 1. Sand while the body is still in the lathe and apply a seal coat. Use a parting tool to free the body from the block (or saw it); then drill a 1/4" diameter hole, 7/8" deep, in one end and a 1/8" diameter hole, 1/2" deep, in the other end.

Apply a top coat or *paint the* top in any way you wish—but apply paint only to the knob portion of the centershaft, not to the shaft itself. Old tops usually have bright

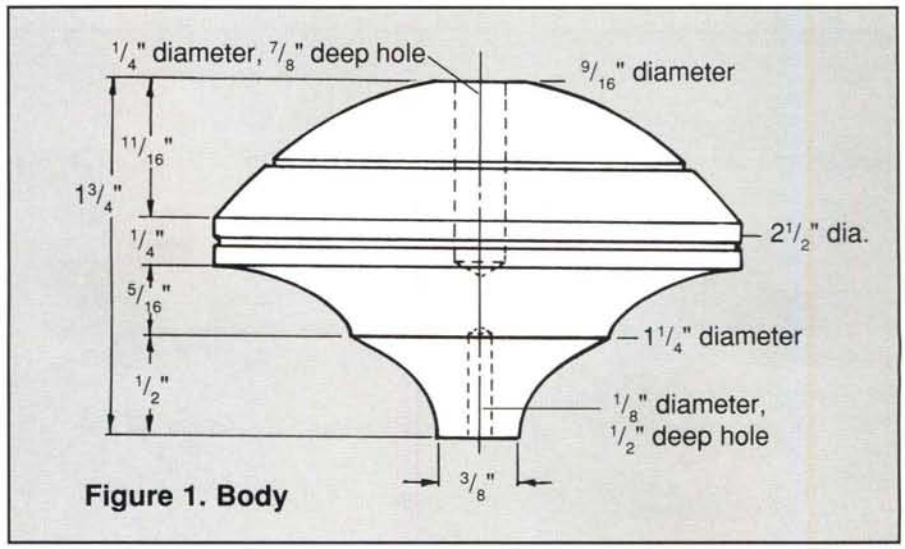


Figure 1. Body

***John A. Nelson** is a woodworker and drafting instructor from Peterborough, New Hampshire. This project will be included in his upcoming book* The Weekend Woodworker, *to be published in April by Rodale Press, 33 East Minor ST., Emmaus, PA 18908.*

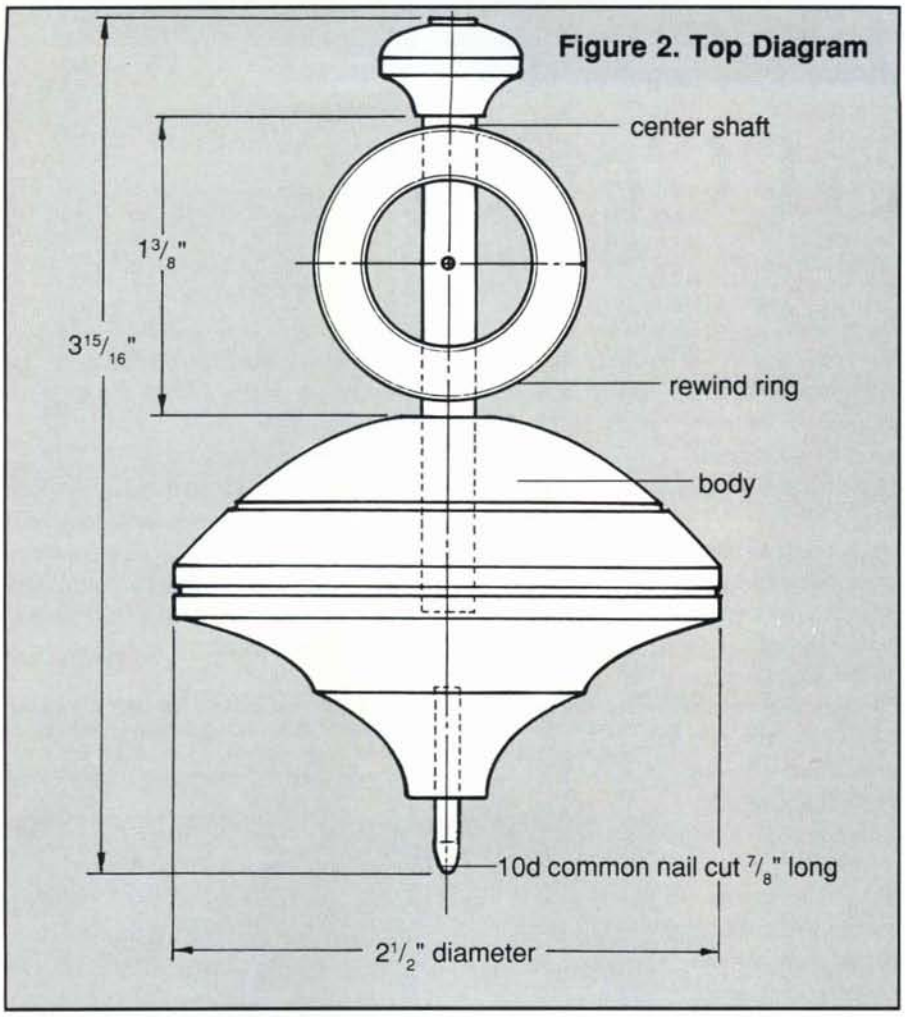


Figure 2. Top Diagram

pin stripes here and there. Use bright glossy colors. Apply a top coat of varnish, to all the parts except for the portion of the center shaft that gets glued into the body. After the finish is dry, you're ready to assemble.

Make the tip from a 10d common nail by slightly rounding the end with a file or grinding wheel. Cut it off about 7/8" long.

Check that the rewind ring turns freely on the center shaft, and glue the shaft into the body with the ring slipped on between the two parts. Leave a 1-3/8" space between the bottom edge of the shaft knob and the top of the body, as shown in Figure 2. This should leave about 1/16" free between parts. Fit the nail tip in place and secure it with epoxy.

Add a piece of string that is about 20" long. You will have to experiment with different kinds of string in order to find one that will give the top an even, smooth pull. Spin the shaft to wrap the string within the rewind ring. To launch it, cup the top loosely in your palm with the string passing between your fingers. Give the string a quick yank; let go of the string; then let go of the top. While it spins, the string rewinds around the shaft inside the rewind ring. Now, if you can only get your new toy away from the kids, you'll have a great time with it! PW

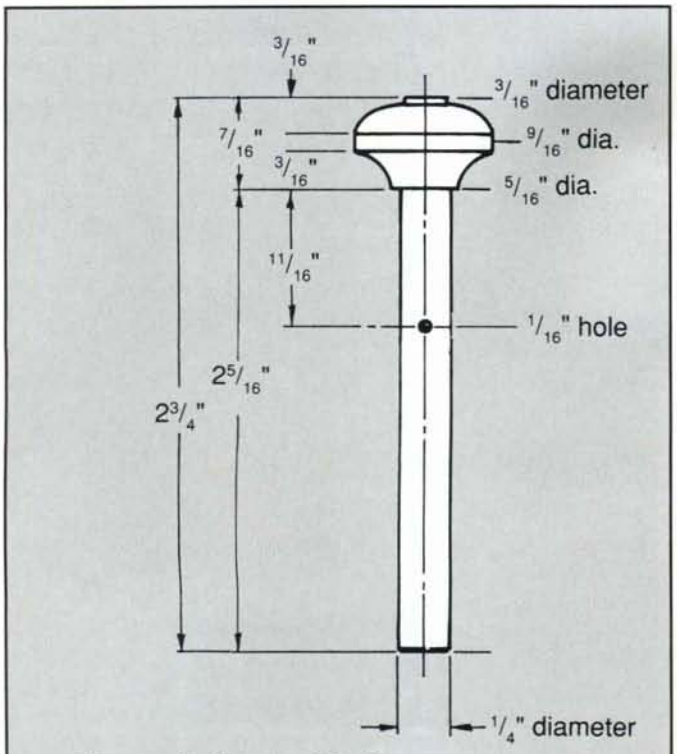


Figure 3. Center Shaft

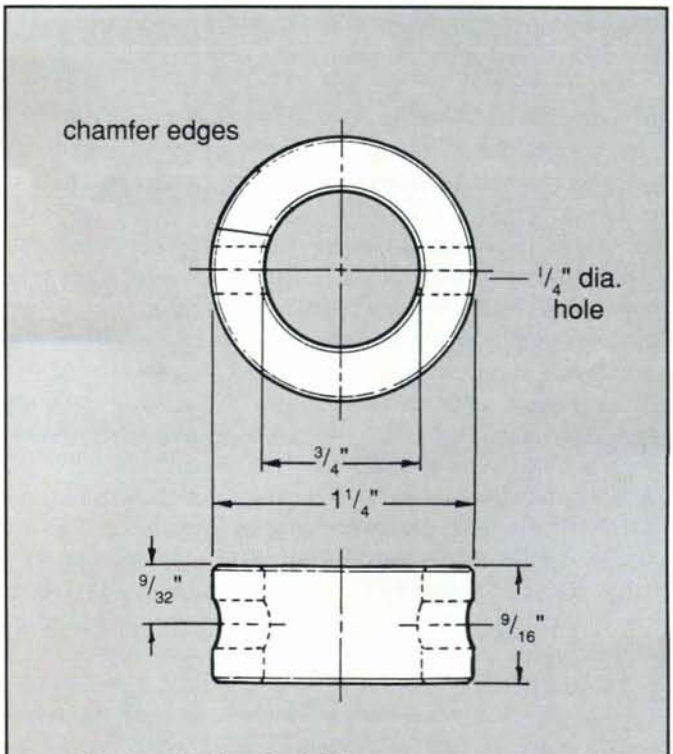


Figure 4. Rewind Ring

Red Cedar

by Ken Textor

Red cedar is more than just a pretty face. It has a pervasive and persistent smell that woodworkers and non–woodworkers alike find irresistible. Furthermore, many contend it is indispensable for preventing moths from chewing up a valuable wardrobe—but more on that later.

As early as colonial times, red cedar's pungent smell has been its calling card. In fact, it was and still often is referred to as "aromatic cedar," which helped distinguish it from other cedars that are not quite as fragrant.

True aromatic red cedar grows mostly in the Appalachian Mountain chain, from the Carolinas to Maine. It thrives on the poor soils of gravelly slopes and rocky ridges, and in moist sandy soils. Today most of the commercially available aromatic cedar is found in Virginia. The trees rarely reach a height above thirty feet, and are seldom more than a foot in diameter.

General Description

Known to foresters as "eastern red cedar," the wood is not technically a cedar at all. Classified as *juniperus virginia L.*, it belongs to the juniper family. The wood itself has a pinkish red heart bracketed by pure white sapwood. It is often knotty, which makes the red appear to be flowing unevenly around the knots and within the white sapwood. The knots are seldom loose as the tree grows relatively slowly and has a very fine grain to it.

For a softwood, aromatic cedar has a surprising amount of strength. Among cedars, it is second in strength only to Alaskan cedar, which rates in strength at the low end of hardwoods. It is quite brittle and does not lend itself to bending as readily as other cedars do.

As with most cedars, it is very resistant to decay, even when in contact with the earth. No one uses it for fenceposts any more, however. Even the smallest trees are milled into boards which are used largely in making various containers for clothing. This use is due to red cedar's reported ability to repel moths from clothing. I say "reported" because, as with just about everything else these days, there are revisionist woodworkers who disagree. While historical revisionists try to convince us that George Washington wasn't really a very honest fellow, some woodworking revisionists are trying to convince us that a red cedar–lined closet won't really protect clothing from moth damage. They contend that old cedar chests and closets were so well built that *insects just couldn't* get into them—hence no damage to the clothing inside.

However, wood chemist Andrew Smith of the College of Forest Resources, University of Maine, insists red cedar contains a chemical that repels moths and other insects. He and several of his colleagues say that building a closet, chest or whatever of red cedar is "good protection" for clothing that is susceptible to insect damage, like cottons and wools. In any case, red cedar smells far better than moth balls.

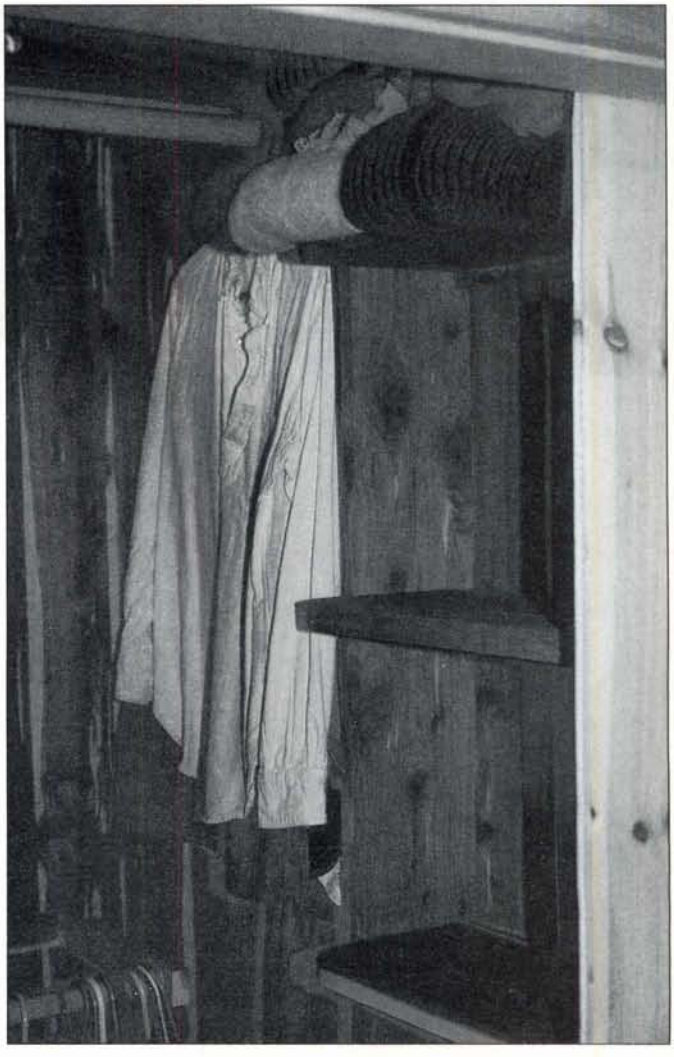
***Ken Textor** is a woodworker and writer in Arrowsic, Maine.*

Working Properties

When you build with red cedar, you will be in for a fairly easy time of it. One big caution, however—always wear a dust mask. When planing or sanding, the smell of red cedar in an enclosed shop can be almost overpowering. Happily, though, both planing and sanding produce excellent results, with planer chipping a rarity and raised grain virtually unknown.

The photo below shows a typical red cedar closet. The door to the closet and the closet poles are pine and fir, respectively. Shelving is as crucial to a good cedar closet as are the walls of red cedar. Most customers insist on lots of shelves, sometimes even drawers and hidden boxes.

photos by the author



The photo to the right shows a cedar chest made years ago by the author. It's propped open with a freshly planed cedar board, showing the contrast between the old wood and the new. As with most woods, red cedar darkens with age, but the smell never quite disappears.

Screws are the best mechanical fasteners for red cedar. Nails often split the wood because of its brittle nature. All conventional woodworking glues work just fine, with no special surface preparation necessary.

Finishing

For me, the best part of working with red cedar is finishing, mainly because you don't have to do anything. Sealing the surface of red cedar would prevent its odor from escaping, so most customers prefer that it be left as is. Occasionally, when making a chest, the exterior surface may be finished. No one has ever asked for and I've never seen a painted cedar chest. Most people want to see those natural colors. So clear polyurethanes, varnishes or shellac are the best options. The wood takes all of these equally well.

Over time, red cedar may lose some of its pungent smell. To bring it back, a quick hand sanding with 120–grit sandpaper should do the trick. The smell should stay strong for fifteen years or so.

Availability

Since eastern red cedar grows only in the east, it's easiest and cheapest to buy it there. There is a western red cedar, but it doesn't have the same properties as eastern. Aromatic cedar is rarely milled into anything but 1" thick planks, rarely found in lengths greater than ten feet, and seldom over 12" wide.

Prices for red cedar begin at just under a dollar per board foot and work up to just over two dollars. But it can be even cheaper if you do what I did—buy rough boards, plane them yourself, and save the shavings, packing them in old grain bags. When you have a dozen bags or so, take them to local pet stores. I got up to eight dollars a bag wholesale, which cut the cost of the original planks by one–third. PW

photos by the author

The first trolley built by the Blue Ox—for the Eagle House Inn—is an exact replica of an 1866 trolley made for Brazil's Emperor Dom Pedro.

The Blue Ox—Making History Come Alive

by Deborah R. Upshaw

Restoration and preservation is a prime concern for many residents of Eureka, California—an attractive northern coastal city surrounded by redwoods. Here the fine architecture is as much a fascination as the area's natural wonders. More than 10,000 old homes remain in Eureka, and many buildings date back to the 1860's, reflecting styles that were popular in the Victorian era.

One man dedicated to the preservation of the town's local history and architectural treasures is Eric Hollenbeck, founder and owner of the Blue Ox Millworks. Situated on the shores of Humboldt Bay, his company specializes in reproduction and custom millwork. The Blue Ox makes wood products for residential and commercial structures, and has recently started manufacturing old–fashioned wooden trolley cars. Hollenbeck and his five employees shape interior and exterior mouldings, siding, gutters, rails, columns, door casings, balusters, banisters, wainscotting, and fancy fretwork.

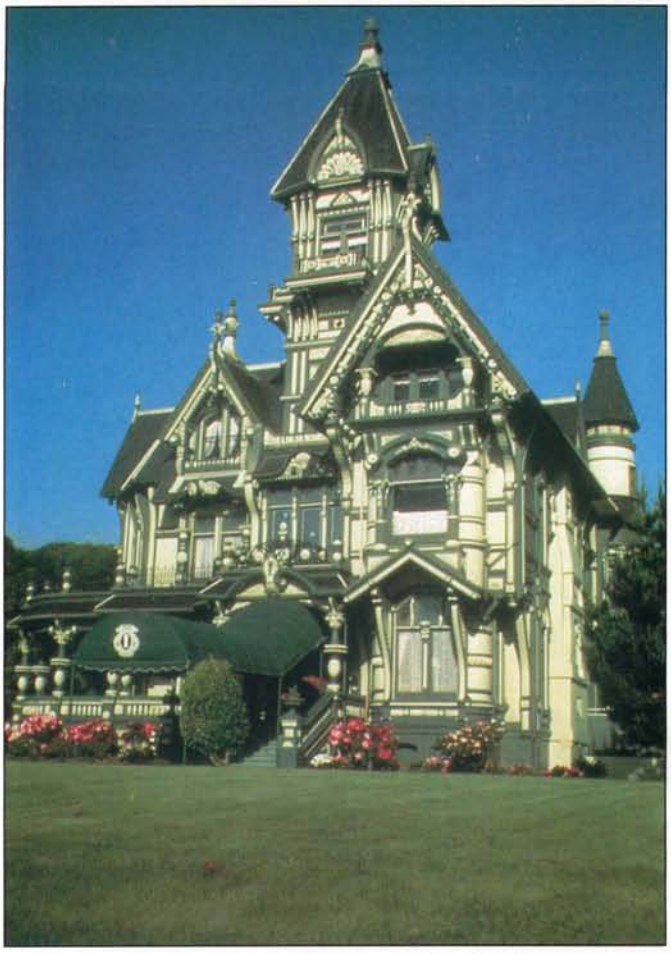
"We do the gingerbread trim on the Victorians, and we can match any moulding desired, including original designs," Hollenbeck explains. "We work a lot with redwood, but we also use oak, mahogany, fir and birch."

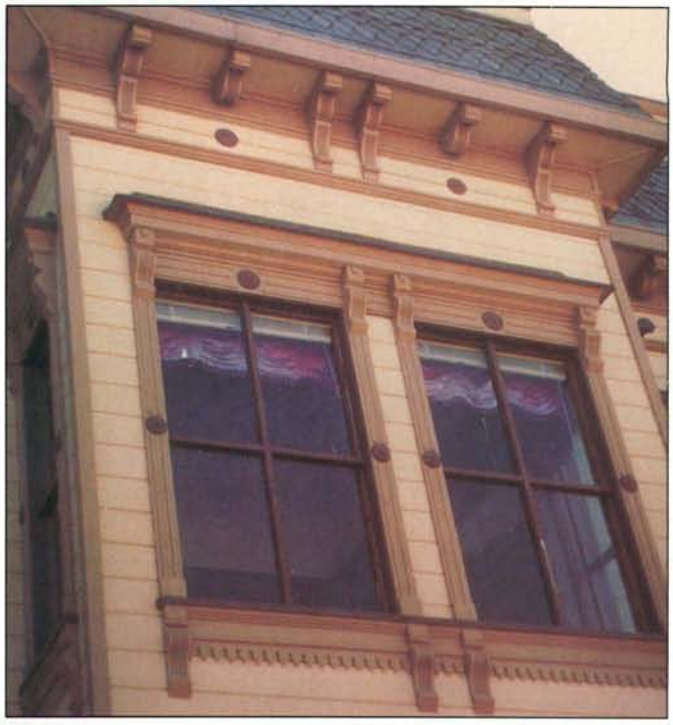
Remarkably, the very machinery used to make the handsome wood embellishments are historical relics themselves, dating back to the turn of the century. Hollenbeck, who has been interested in reproducing bits of history since childhood, searched out the vintage machines capable of producing the fancy woodwork. He found some of the equipment sitting idle outdoors and facing disintegration, but he willingly restored them.

"My two square–headed moulding machines—a 1904 Woods and a 1922 Hermance—are among my most interesting woodworking machines. I pulled one out of the weeds near Yreka, and I found the other in some blackberry briars in Miranda. It took a year to put them together. Most of the parts were there, but I had to make a few myself to get them running," he recalls.

Hollenbeck's machines can cut dozens of styles of exterior and interior mouldings and complicated fretwork, as well as nine different styles of redwood gutters. They are capable of patterning wood up to 12" wide. The enormous and powerful machines each require two men to operate. Hollenbeck describes a typical scene of operation:

***Deborah R. Upshaw** is a freelance writer from Eureka, California, and a frequent contributor to Popular Woodworking.*



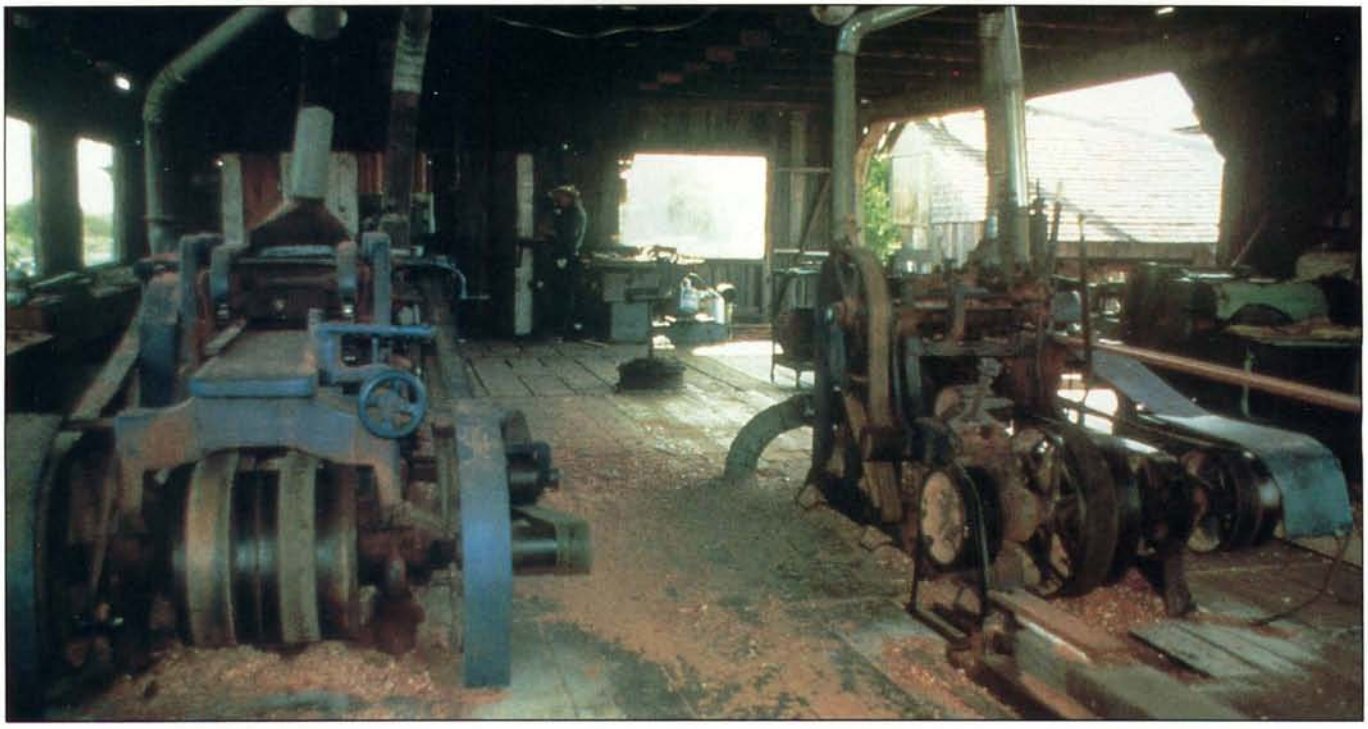


The Carson Mansion above attracts thousands of visitors to Eureka each year to admire its beautiful architecture and trim. In the window close–up to the right are shown casings, corbels, plinth blocks, and a few of the 2,000 rosettes embellishing the Eagle House Inn.

"With the motor on, the heads start spinning rapidly. You push the wood through and suddenly you're surrounded by shrouds of sawdust. You can feel a tremendous power. Then, at the opposite end, a huge finished rain gutter comes poking its head out."

Each moulding machine has four heads with cutter knives in each. This makes it possible to cut four sides of a board at once, although it isn't always necessary to use the four heads simultaneously. "In some cases I may not want to use all four heads. For example, with a door casing, you need a pattern only on one side. I have to decide whether to run the pattern off the top or bottom

Two square–headed moulding machines—a 1904 Woods and a 1922 Hermance—rescued from weeds and blackberry briars, and rebuilt by Eric Hollenbeck, now make fancy gingerbread trim, gutters, and other custom Victorian woodwork at the Blue Ox Millworks.



Hollenbeck takes the trolley—here, about 90% complete—for a test drive through Old Town, Eureka, during a fund–raising event.

One of his first wooden vehicles, this Model T Depot Hack runs on a 2–cylinder gas engine and features redwood wainscotting.

head. Then I drop the belts to the other heads that aren't being used, and they remain static.

"On the other hand, there are some cases where I might use up to seven knives in one head. This series of knives, put in a certain order, cuts differently than the others and makes a pattern across the board."

Hollenbeck has one of the largest collections of cutter knives for these machines in existence—over 3,000! And if he doesn't have the knives necessary for a certain design, he hand grinds them himself. Other rare machines at the 12,000 square foot facility are a carriage saw mill equipped with a 52" circle head rig, a lathe capable of turning wood pieces 24" in diameter and 17' long, band saws up to 36", and a 1905 single–sided planer that can handle 32" wide planks. Another building houses a 1902 double drum sander which Hollenbeck discovered on an old logging skid road near Phillipsville. He disassembled it, pulling it out part by part, and then meticulously restored it. Today the sander is used regularly on the many intricate moldings and wood products they make, some up to 42" wide.

"The sander has oscillating drums which prevent sanding marks from appearing on the wood. And it sands in any direction," Hollenbeck explained. "I use coarse grit sandpaper on one drum and fine grit on the other. It's able to sand the cross grain, too, so when a door goes through, it comes out smooth all over."

An 1866 tenoner is his oldest machine; his newest piece is a 1947 band resaw. The shop has other tools dating from 1862 to 1942. Hollenbeck intends eventually to turn his company into a public showcase.

"I am going to make this company a working museum," he says, "where people can see what the old–time machines can do. I plan to put up large convex mirrors above the machines so people can watch them spew out sawdust and make the fancy

The three trolley cars currently being built by Hollenbeck's Blue Ox Millworks are modeled after an old time trolley car that ran in Eureka, California, at the turn of the century. The fancy trim, interior details and side–facing seats will take riders back to an earlier, more gracious era.

gingerbread trim for homes and buildings. It would be a real kick for tourists." The tour would proceed along a catwalk where people could look through several large picture windows and see the work going on inside. The setting of the Blue Ox Millworks is an attraction in itself—on the edge of Humboldt Bay, overlooking sea lions basking in the sun on small islands, with herons, egrets and seagulls flying overhead.

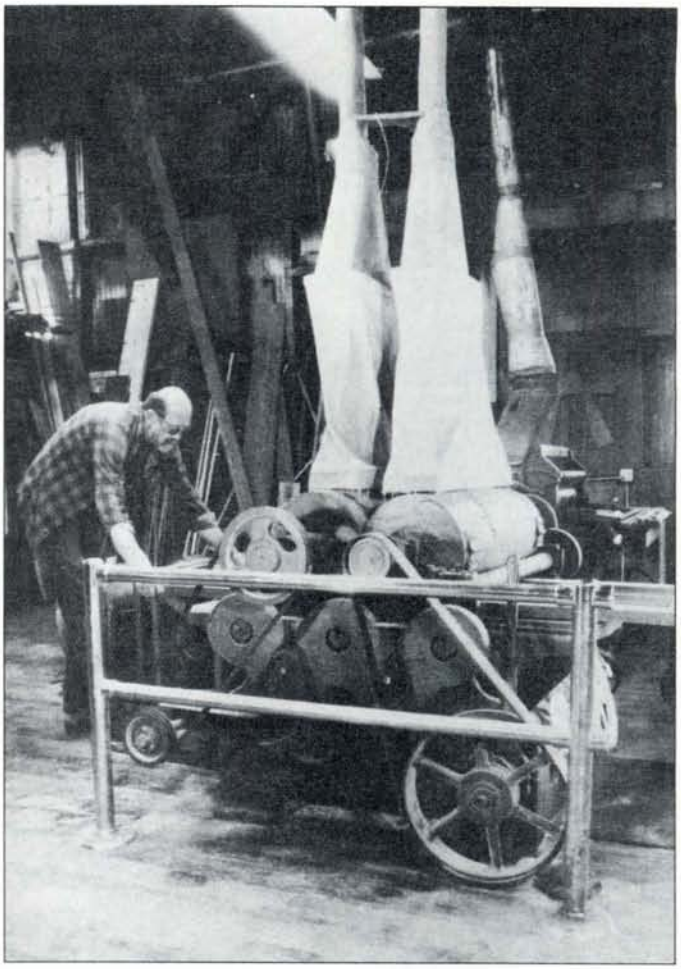
One of the biggest jobs recently completed by the Blue Ox was millwork for the Eagle House Bed and Breakfast Inn, established in Eureka in 1888. The machines turned out thousands of board feet of mouldings, siding, wainscotting, balconies, turned columns, rosettes, and much more for the restoration of this historic building. Then, knowing that Hollenbeck had experience building old–time wooden vehicles, including a Model T Depot Hack and a 1912 Franklin, the owners of the Eagle House commissioned him to build a trolley car—a replica of the trolley built in 1866 for Emperor Dom Pedro of Brazil. The trolley has a body made almost entirely of 3/8" fir plywood and stained mahogany, and is finished with a clear marine urethane finish. The interior features handsome oak accents and plush leather upholstery.

His successful trolley car project led to a major commission—building three gas–powered trolleys for the City of Eureka. The local Historical Society, Heritage Society, and the Eureka Business Improvement District Association are the organizers and funders of the trolley car undertaking, and it will mean steady work for the folks at Blue Ox during the coming months.

"I'm patterning them after the original Trolley Car #3 that ran in this city from 1903 to the mid 1940's," Hollenbeck explains. "Each 30–foot long trolley will have a 671 GMC diesel engine with an Allison transmission. The wooden framework or skeleton will be made from Douglas fir 3 X 8's, and the skin will be 3/8" fir plywood. Redwood will be used inside and out."

Hollenbeck, who's always been curious about what could and couldn't be done with wood in automotive applications, feels that his design ideas are feasible. "We are rediscovering applications of wood to automotive design that the early auto manufacturers used in the teens and twenties. We have found that wood and steel can be combined to produce both an aesthetically pleasing and a strong and durable vehicle."

Hollenbeck has collected or made over 3,000 cutter knives for his vintage moulding machines.



Blue Ox employee Todd Jensen runs a door through the 1902 Heath double drum sander.

Eventually these 32–passenger trolleys will serve local citizens and tourists in providing transportation around the city, as well as special charters and holiday tours. The trolleys will harmonize well with the historic flavor of the Old Town district and the many old neighborhoods. Amazingly, the location of the Blue Ox Millworks where the trolleys are being built is the same site where the old North Mountain Power Company once stood—the company which housed the electric–powered trolley fleet of yesteryear.

Hollenbeck hints that the Blue Ox may become even more involved in manufacturing similar vehicles in the future. "I think it would be a real boon to this community to have a non–polluting manufacturing company building trolley cars, cable cars and the like. It would blend right in with my idea of turning the Blue Ox into a theme park or working museum." Certainly this new development will have positive effects on a business that began humbly fifteen years ago.

Hollenbeck hasn't let these modest achievements alter his outlook or his business philosophy. Dressed casually in jeans, a pipe between his teeth, wearing a hard hat painted with a rainbow and redwoods, an aura of small town friendliness about him, he states his claim to success:

"The thing you have to do is stay with it. Some things work and some things don't. But you keep going along with your hopes and dreams. I think you're only beaten when you quit." PW

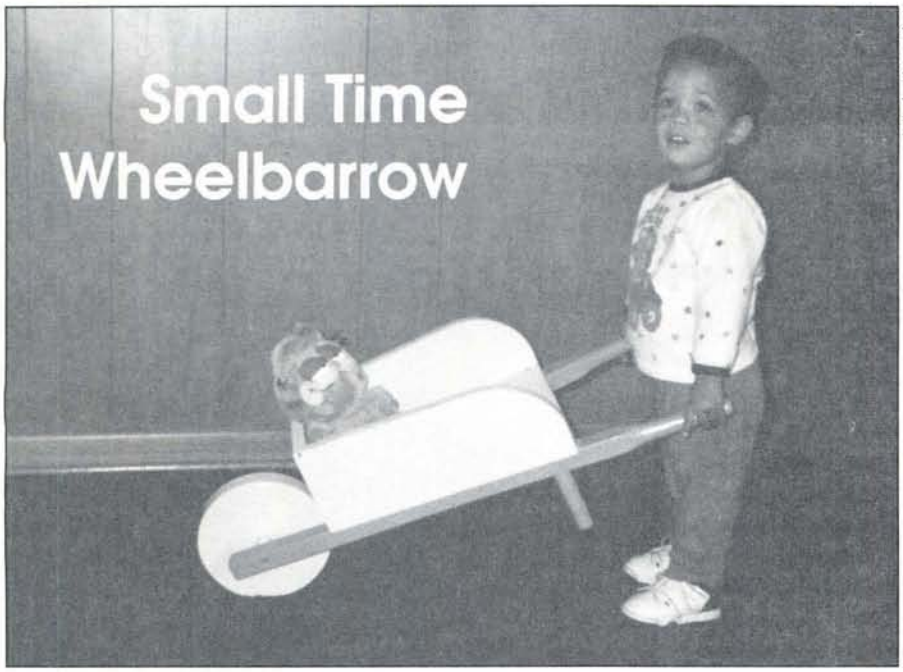


photo by the author

by Howard V. French

This sturdy and attractive wheelbarrow design is easy to construct and has a number of potential uses. It can serve as a floral display vehicle for flower arrangements or for a prized potted plant. It can also help you move the bigger plants around. And you might wish to make one as a toy to delight the kindergarten set—it's just their size.

Handles and Legs

First, cut the two handles (A) to size according to the cutting list. Locate the center on each end and turn one end of each piece as shown in Figure 1 on the following page. Next, use a 3/4" Forstner bit to drill a 3/4" deep hole, centered on the underside of each handle, 10-1/4" from the turned handle end. Cut the two legs (B) to length from a 1" dowel rod. Turn a tenon on one end of each piece to a diameter of 3/4" for a length of 3/4". Round the opposite (bottom) ends of the legs a bit, as shown in Figure 1. Apply glue to the turned ends of the legs and drive them into the holes in the handles.

Drill and counterbore a pilot hole into the side of each handle piece, centered 2" from the square (front) end. Drill them at 7-1/2° as shown in Figure 1. Be sure to maintain the proper relationship between these holes and the position of the leg on each handle piece—one assembly should be right–handed and the other left–handed. These holes will accept the axle screws to be installed later.

Howard V. French *lives in Abilene, Texas, where he spends his time dreaming up woodworking project ideas.*

Sides and Bottom

Cut out the two sides (C) from 3/4" material using the pattern in the PullOut™ Plans section of the magazine. Stack them and cut a 4" radius on one corner of both. Cut the bottom (D) from 3/4" plywood, again using the PullOut™ Plans. Locate and drill the four screw holes through the bottom which will later secure the box to the handle assemblies.

Cut a 3/8" X 3/8" rabbet in the side edges of the bottom (D) as shown in the PullOut™ Plans. Make the same cuts on the long edges of the two side pieces. Remember to run each piece through the saw starting from opposite ends, or you will wind up with two right–hand (or left–hand) pieces.

Front, Sides and Bottom

Rip the front end piece (E) to width; then tilt the saw blade to 82-1/2° to trim the ends to length. While the table saw is tilted, make 3/8" deep cuts, 3/4" from the front ends, in the side pieces, as shown in the PullOut™ Plans. To complete these angled rabbets, you can edge–cut each piece on the table saw, using a jig to hold them firmly and squarely upright. Or you can use dado blades to waste out as much of the grooves as possible, cleaning up any wood left next to the beveled shoulders with a chisel or hand saw. Again, make certain that these rabbets are made on the same (inside) surface of the side pieces as the 3/8" X 3/8" rabbets already cut in their bottom edges.

Fit the front end piece to the front of the bottom piece. Glue and finish–nail it in place. Next, check the right and left–hand sides for proper fit. You may have to sand the sharp edges of the front end piece a bit to obtain a good fit with the sides. Glue and finish–nail the sides to the bottom and front end, completing the box assembly.

Getting It Together

After cutting the 8" diameter wheel (F) from 1-1/2" stock, round the edges as you wish. Drill a pilot hole dead center and, with a 1" spade bit, drill a hole about 1" deep. Turn the wheel over and continue drilling until the holes meet. Cut the 3-1/2" axle (G) from a 1" diameter dowel and turn a spherical radius on each end. Locate centers and drill pilot holes in each end for the 3/16" wood screws that will secure the axle to the handle assemblies. Install the axle in the wheel.

Now, drive a 3/16" round head wood screw, 2-1/4" long, through the 3/16" hole in one handle assembly and into one end of the axle. Repeat the procedure for the other handle. Place the box assembly on top of the right–hand and left–hand handle assemblies. On a level workbench, the wheelbarrow should now stand alone.

Align the wheel with the bottom piece centerline, leaving a 3/8" clearance be-

Wheelbarrow

Cutting List

Qty	Part	Finished Size T	W	L	Piece
2	A	1 1/4"	1 1/4"	30"	handles
2	B	1" diameter		4 3/4"	legs
2	C	3/4"	5 1/2"	14 7/8"	sides
1	D	3/4"	11 1/4"	14"	bottom
1	E	3/4"	5 1/2"	7 5/16"	front end
1	F	1 1/2"	8" diameter		wheel
1	G	1" diameter		3 1/2"	axle

Supplies

2	3/16" X 2 1/4" round head wood screws
4	#10 X 1 1/2" flat head wood screws

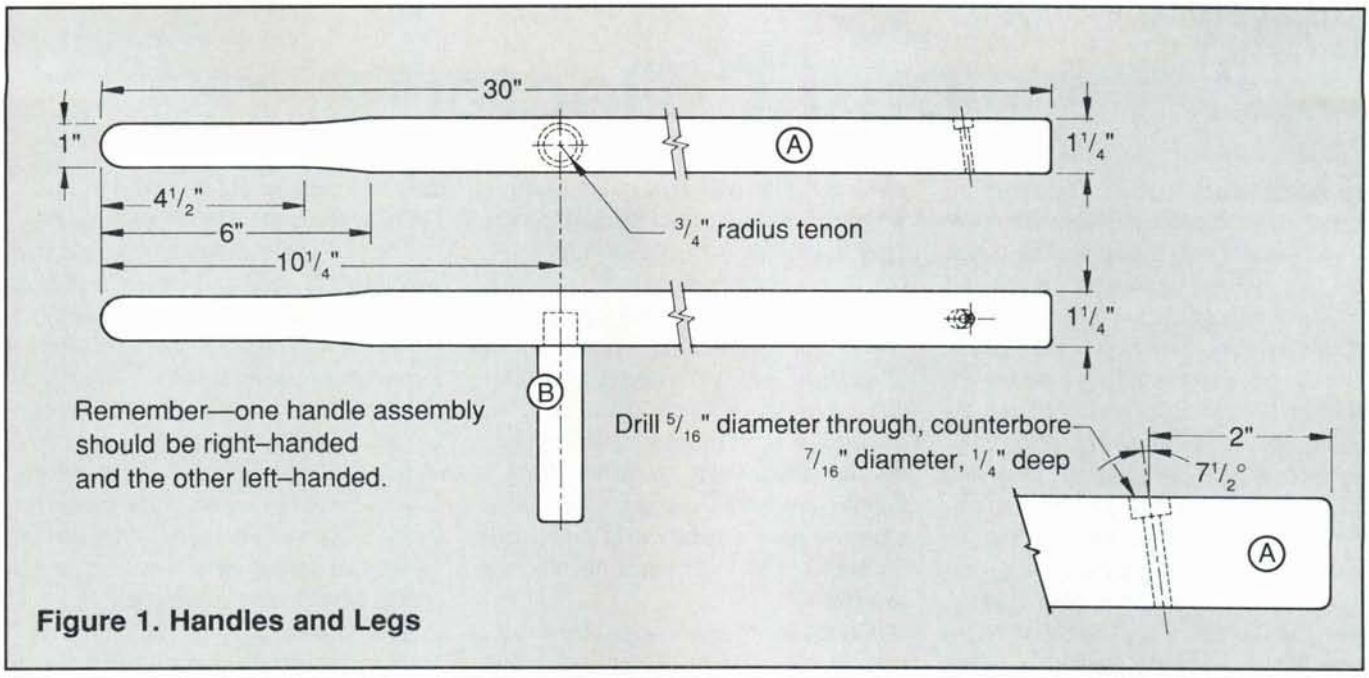


Figure 1. Handles and Legs

tween the wheel and the front end. The handles should be parallel with the sides, which will extend about 3/8" over the handles on either side. Poke an awl through the four screw holes already drilled in the bottom piece, and mark the hole locations on the upper surface of the handles. Install the four #10 X 1-1/2" flat head wood screws, and you've completed the final assembly step.

Suitably round all sharp corners by sanding and finish the wheelbarrow as you wish. The handles, legs, wheel and axle of mine are finished in avocado green enamel, while the box is almond enamel. However, there is no reason why the project can't be stained or left natural if the wood grain is interesting. PW

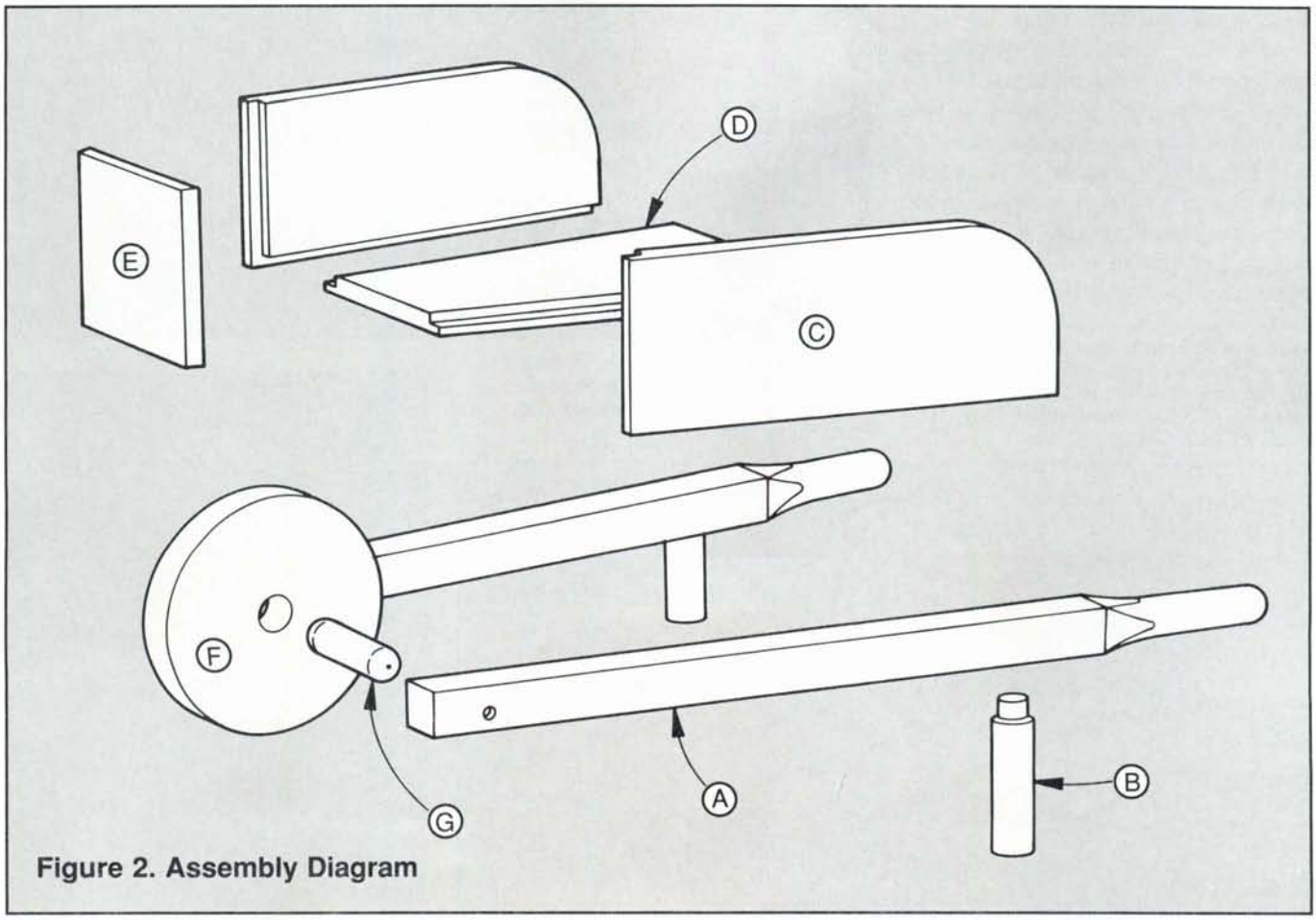


Figure 2. Assembly Diagram

illustrations by Tom Larson

Dust Collector

by Alice and Robert Tupper

Salvaged vacuum cleaner motors can be converted into shop sawdust collectors. We took the motor and fan unit from a Sears household cleaner and remounted it to pick up most of the sawdust from our band saw. Tank type motors and fans can also be used, and, of course, the unit can be used with any machine outfitted with a hole or coupling for a dust collector. The design described here also eliminates the need to use (and buy) disposable bags to catch the dust.

We used a five–gallon plastic pail as *the collection* bin. A section of used hose threaded through the neck of a plastic bottle starts the dust and air in a circular path in the pail. The locking lip on the pail lid must be trimmed up to the rubber gasket. We placed it on edge between the rip fence and the table saw blade. With the blade just cutting through the plastic, rotate the lid forward and the lip will trim off cleanly (see the illustration).

Attach the vacuum motor to a plywood disc using long machine screws in the threaded holes of the fan housing. To hold the entire assembly together, use 1/8" bolts through the plywood disc, through dowel spacers, through another plywood disc, through the plastic pail lid, and finally through the bottom of a five–quart ice cream pail. Before attaching the ice cream pail, cut a large hole in its bottom, leaving a 1" rim. Locate the bolt heads in this rim. This assembly then sits on top of the plastic pail collection bin.

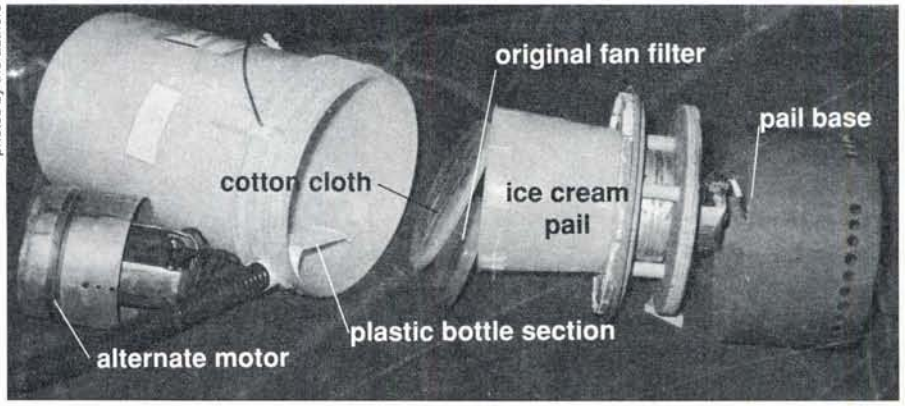
The ice cream pail lid has a piece of cotton cloth sandwiched between it and a 6" diameter washer made from the piece you cut from the bottom of the pail. This assembly is held together by four double–cap rivets, available from a leather workers' supplier. The dark, crown–shaped disc shown in the photo is the original filter that covers the motor fan assembly.

On top of the entire assembly sits the base of a second five gallon plastic pail. Cut it to length against the rip fence as described above. Holes around the upper edge of the inverted pail base let clean air back out into the shop. We kept drilling holes until the air escape rate permitted the pail's own weight to hold *it in place.* Two screws fasten it to the plywood disc.

The vacuum is wired into the band saw switch so that it comes on when the saw is started and shuts off when the stop button is pushed. The photo (below right) shows the switch relocated to the left–hand side of the band saw frame. A standard electric box is bolted to the frame, and wires to the motor, light and vacuum come off the original switch mounted in the box. This location lets you keep your attention on the work and blade while reaching for the switch. No stooping is involved.

The hose is held in place on the saw with a friction fit between a rolled sheet of thin aluminum inserted in the hose end and in the machine's dust hole or coupling. When the pail fills up, empty it with a shop vacuum, or remove the hose and empty it in your garden compost pile. PW

photos by the authors



The photo above shows the unit dissassembled. At right, the vacuum is hooked up to the band saw. Note the rewired and repositioned switch box.

Alice and Robert Tupper *are husband and wife woodworkers who together design and build projects, restore antiques, and are interested in old farm machinery. They live in Canton, South Dakota.*

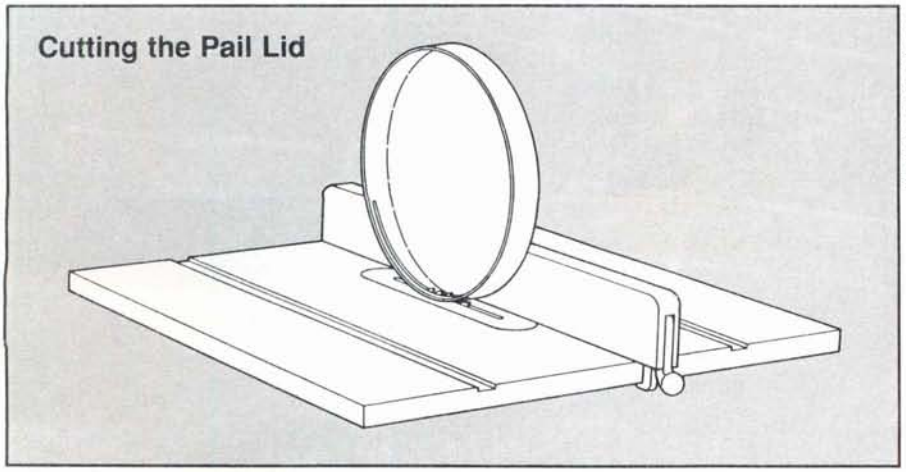
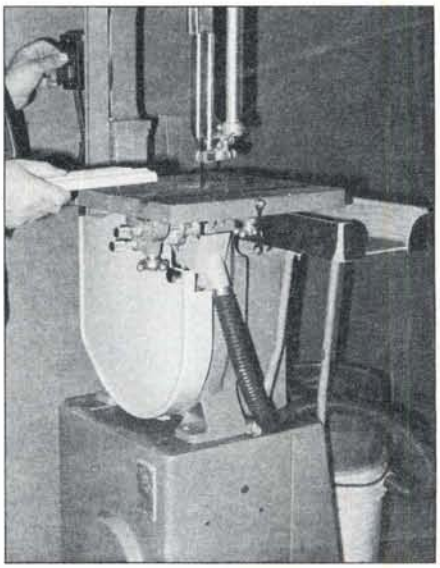
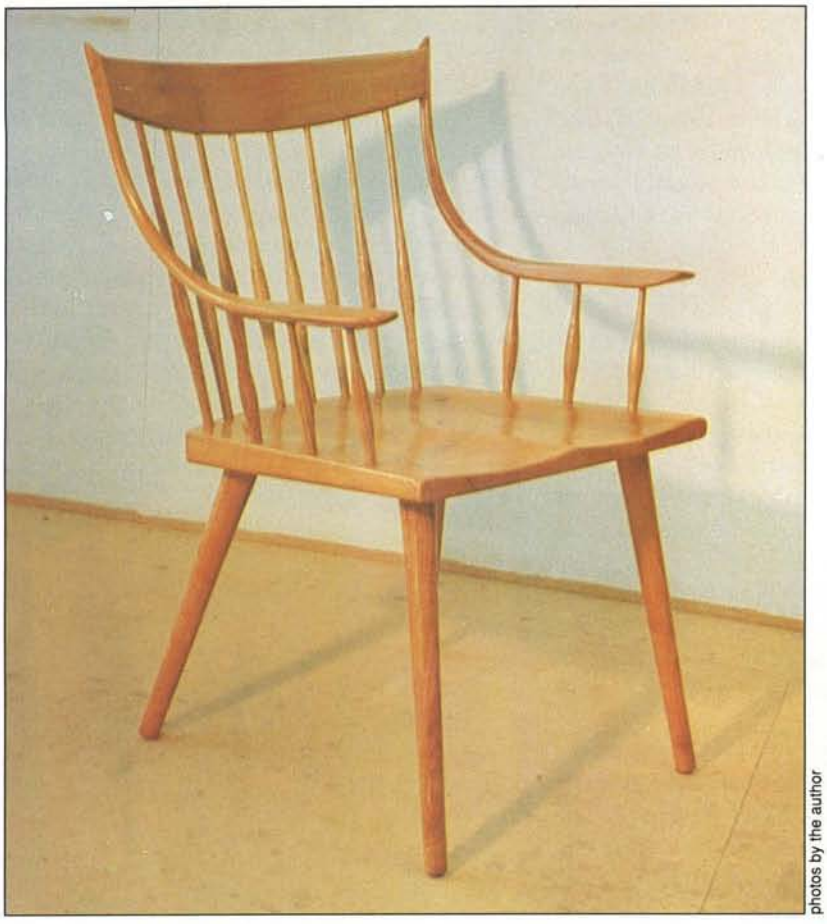


illustration by Tom Larson





photos by the author

Be An Artist in Wood

Design Your Own Furniture

by Ken Sadler

Designing your own furniture is an adventure. It stretches your imagination and challenges your ingenuity. Building your own designs creates an unmatched sense of achievement. It's not easy, but if you can work with your hands, you can acquire the skill to make anything you want to design.

Before You Start

Furniture design is more than drawing pretty pictures. You will need some knowledge of cabinetmaking and an understanding of some important principles, such as the characteristics of wood in general, the particular characteristics of the wood you want to use, how wood can be joined—and how it can't.

Wood has characteristics that other materials don't have. One is that it shrinks or expands with the changes in weather. It changes considerably across the grain, and almost not at all along the grain. Consequently, two pieces rigidly fastened together with the grain running at right angles will cause trouble because one will move and one won't. The result will be a split or a buckle.

Different species of woods differ in their characteristics. As an example, red oak is supple and can accommodate bending, while alder is brittle and can't. A case in point is the spindles in the chair shown above. They are made from red oak because they are subjected to flexing. If alder were used, it would snap. I know because I had to remake the first two chairs I built.

The joining of the parts is the most important consideration in any design. If a joint is weak or unsuitable for a particular application, it will fail and your piece will come apart. End grain glued to long grain won't hold and shouldn't be used in a vital location. If you're making a bookcase with several fixed shelves, the intermediate shelves can be simply dadoed into the sides, but the top and bottom need more strength and should be fastened with a dovetail, mortise and tenon, or dowel joint.

***Ken Sadler** is a retired furnituremaker in Sheridan, Oregon.*

It doesn't take long to learn how to make a joint but it takes practice to acquire the skill to make good joints. You can learn how to make a dovetail joint in about fifteen minutes. However, you'll have to make quite a few of them on the backs of drawers before you'll be good enough to use one as an exposed decorative element in a piece of furniture. In the meantime, design with joints you know, and learn to cut the others by studying books such as *Woodwork Joints* by Charles Hayward. Mr. Hayward covers every joint you will ever need and does it with drawings and simple descriptions. I have leaned on it for years.

When designing a piece of furniture you must consider whether you have the tools to make the parts or the joints you're designing. Again, the chair is a case in point. There are only two ways to make those legs: on a lathe or with a spokeshave. The latter method, is difficult, long, and tedious.

Making dowel joints that fit properly requires a doweling jig. Butt joining two boards to make a table

top or panel requires a jointer or a good hand plane. Should you want to use thin panels in a door, the best way to make them is to resaw heavier stock. This can be done by hand, but it is difficult and slow. It's easier to use a band saw or table saw. If you have an 8" table saw then you'll be restricted to resawing 4" wide boards. If you're stymied in your design because you don't have the necessary tool, you have a choice: change the design, or buy the tool. I usually found a way to buy the tool so that in time I had a well equipped shop and could tackle almost anything.

The Principles of Design

Among furnituremakers, there are two schools of thought about design. One says that the design or shape is everything and that the wood is merely a medium in which to work. These people are more sculptors than furniture-makers. The other approach is to keep the lines plain and simple, and let the wood provide the beauty in the piece. That I'm a student of the latter school is evident in my work, and the rest of this article is based on that belief.

When you start thinking about a piece of furniture, the first thing to consider is what you want it to do; what is its reason for being? Next, where are you going to put it; how much space can it occupy? Remember, this is your piece; you're starting from scratch and can do anything you want. The piece will have a purpose and it should fulfill that purpose expeditiously. For example, a chair should be comfortable to sit in when used for the purpose for which it was designed. A lounging chair is different from a dining or desk chair.

A dining table should be between 28" and 30" high, it should have a top big enough to accommodate the chosen number of people comfortably, without crowding (lay out a place setting on your present table and see how much space it occupies), the legs should be arranged so that nobody has to fight with one of them, and there should be no crossbars or stretchers that interfere with one's knees. There are similar considerations for any piece of furniture (see the sidebar "Furniture Standards" on page 38).

Once purpose and size have been settled, it's time to think about lines in the shape your piece will take. The Shakers made very plain, very simple furniture. Its appeal has lasted almost two hundred years. It fits into any decor and mixes with any other style. You're designing a piece for yourself, it's true, but you want your children and your grandchildren to use it over the years. Not just because you made it, but because it fits into their lives.

When I started making furniture, I favored the Shaker designs. After a while I grew weary of the straight lines and sharp corners typically used. They made the piece seem harsh. Instead, I turned to slightly curved lines and rounded edges and corners. For example, a table top, whatever size, will have a slight curve to each side—not much, just enough to be noticeable. The upper edges will be

The walnut TV cabinet above looks less "squatty" because of the stong vertical lines in the door frame and the wood grain.

The slight inward curving taper on the legs of this serving table (right) softens the lines of the piece.

The author's Western maple breakfront (far right) gets a horizontal element from the row of curved drawer fronts across its middle. Note that the fixed shelves align with the cross pieces in the doors.

You can use solid doors on small cabinets, like the one to the extreme right.

either rounded slightly or have a small bevel. The same approach is applied to legs, whether straight or tapered. The legs on the chair on page 35, have a slight inward curve to their taper, as do the legs of the serving table below left. These are things that you will develop for yourself. What's important is to keep it simple.

If you want to make a piece look wider than it is, emphasize the horizontal lines; if you want it to look taller, emphasize the vertical lines. The small walnut TV cabinet in the photo at left center illustrates this. Notice that the vertical members of the door frames go through the horizontal ones and are slightly thicker. Also the figures in the door panels are vertical. On the other hand, in the breakfront below, the row of drawers with carved handles provides a strong horizontal line. If you have glass doors with wood shelves behind, use vertical bars but not horizontal ones. If you do and the shelf positions don't match the bars, it will look terrible. This consideration doesn't arise if you use glass shelves. On the lowback chair at the beginning of this article, notice the ears at the upper ends of the arms. Since the arm fits on the outside of the top rail, it can extend above it. The ear was hand carved and sanded to a pleasing shape as the mood dictated. I made a set with and a set without the ears—the latter because the client insisted on it. The difference was so striking that I never made another without them.

photos by the author

Doors are usually the focal point of any piece on which they are used. They can be made in two ways, solid or framed. Large doors are better framed, as on the armoire on the following page and the walnut TV cabinet far left. Smaller doors can be successfully made solid, as on the small walnut cabinet below right. Solid doors will shrink across their width. They also tend to warp. In a framed door, only the panel will shrink, and since it "floats" in the frame, the shrinkage will not be noticeable.

People don't give much thought to handles, but they're an important part of any cabinet. In fact, a bad handle can ruin the appearance of an otherwise fine piece. Handles can be of any shape or size, they can be attached or carved as part of the door or drawer front. They can be machine made or hand carved. The important point is that they must look right for that cabinet. No one can make that decision but you, the one who conceived the basic design. I never did anything about handles until the design was complete, and then only if they were to be carved into doors or drawer fronts. Otherwise I left them till the piece was built.

There is a design element I call diversity—a collection of little details that become visible as you get ever closer to a piece. Some you can't see at all from a distance. Diversity adds interest to your design. Like handles, these details have to come

from your imagination. They'll be ideas that occur to you as you're working with the piece. With this sort of an adventurous approach, furnituremaking becomes exciting. It is your individuality, your imprint that you're putting on the work.

Executing the Design

It will help to make a drawing of your design, or at least the major parts; you'll work out the details as you go along. Not being an artist, I am limited to ordinary, three–view, working drawings. However, I draw them to scale and just put in the major dimensions. The rest can be scaled from the drawing as I work. Since the drawings are only for the use of the craftsman, they can be in pencil and don't need to be very fancy. The most important use of them, at least for me, was to make sure of the proportions. It's sometimes hard to visualize this, and putting it on paper clarifies things. Also, it's nice to have a guide to remind you of your ideas as you work.

I said earlier, let the wood provide the beauty in the piece. In order to do this you must choose it very carefully. In some cases I spend almost as much time picking out the wood as I do building the piece. Go to a hardwood lumber yard, ask to be shown their stock of whatever kind of wood you're after, and then have them leave you there alone. You should have brought with you a cutting list of the rough sizes of all the parts in the piece, a measuring tape, a stick of chalk, and a sharp block plane. Why the block plane? Most hardwood is stocked in the rough. It is often hard to see the details of the grain pattern unless you shave off a little of the rough surface.

What are you looking for? You want boards with unusual and interesting grain patterns that you can use in the major portions of your piece. If you're building a table, you'll want to find boards for the top that will match so they'll look like they belong together. You may want to find a grain pattern that will follow, at least to some degree, the contour of your cabinet side or table top. You'll look for a board from which you can create a striking panel for a cabinet door. You discover these things by pulling the boards out of the stack and studying them. I've had them spread all over the lumber shed. When you find a board you want, outline the part or parts in chalk and check it off your cutting list. When you've found everything you need, put the stack back the way you found it. (If your present lumber yard won't let you do this, find one that will.)

photos by the author

This walnut armoire features beautifully book–matched panels.

You can easily spend most of a Saturday morning doing this, but the final result will justify whatever time and effort you spend.

As a particularly fine example of what I am talking about, study the walnut armoire in the photo above. Notice the matching grain on all the drawer fronts. Then study the door panels. This is what is known as book–matching. It is done by taking a thick piece, resawing it down the middle and laying it open like a book. In this case, because of the width of the panel, two boards were matched; both were then resawed, finished to proper thickness, and glued together to form the panels.

Your Skills as Your Guide

Being familiar with the basic elements of cabinetmaking is important. Your skills should be your foremost guide to what you design and how you design it. Each time you plan a new project, you should reach out further than on the last one. But not too far. You can't be proud of a piece you clobbered together because you ignored the limitations of your skills. On the other hand, you can be very proud of a piece that shows off the skills you have acquired.

I hope I have convinced you that you can design and build your own furniture. As I said in the beginning, it's not easy. It takes a lot of thought and a lot of imagination, coupled with some ingenuity and a few mistakes along the way. But once you've done it, you will have created something that is all yours. You will have become an artist in wood. PW

Furniture Standards

How Big Should It Be?

by Don Kinnaman

Several years ago someone unknown came up with a "set of standards" dealing with the sizes of furniture. It has been very helpful to me through the years in deciding how big to make a basic piece of furniture. For people ranging in size from 5'-3" to 6'-6" (most of us) the following basic dimensions work well:

Bookcases: upper shelves spaced 9-1/2", lower shelves not less then 12-1/2", at least 8" deep, 10" for oversize books

Chest of Drawers on Legs: 48" high, 36" wide, 18" deep

Lowboy Chests: 29" high plus leg length of 7" for a total overall height of 36", 36" wide

Bedside Table: 24" to 26" high, 24" wide, 15" deep

Blanket Chests: 24" high, 36" long,18" deep

End Tables: 24" high, 12" wide, 30" deep

Coffee Tables: 16" to 22" high, 15" to 30" wide, 30" to 48" long

Service Cart: 27" high, 16" wide, 27" long

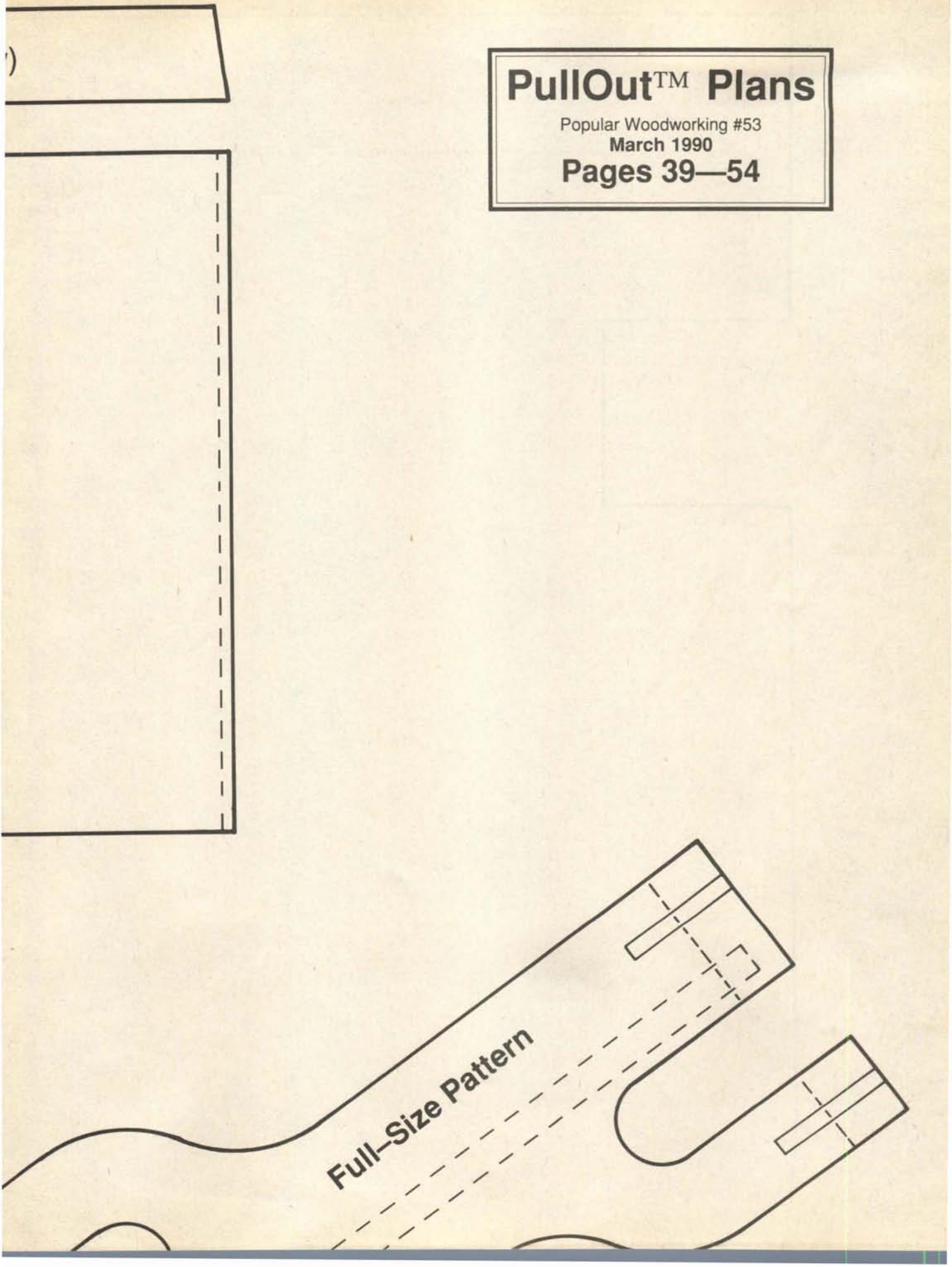
Dining Tables: Allow at least 23" around each person, 20" minimum between table legs. A square top 40" X 40" can seat four, 30" X 60" can seat six, 44" circular can seat four, 48" circular can seat six.

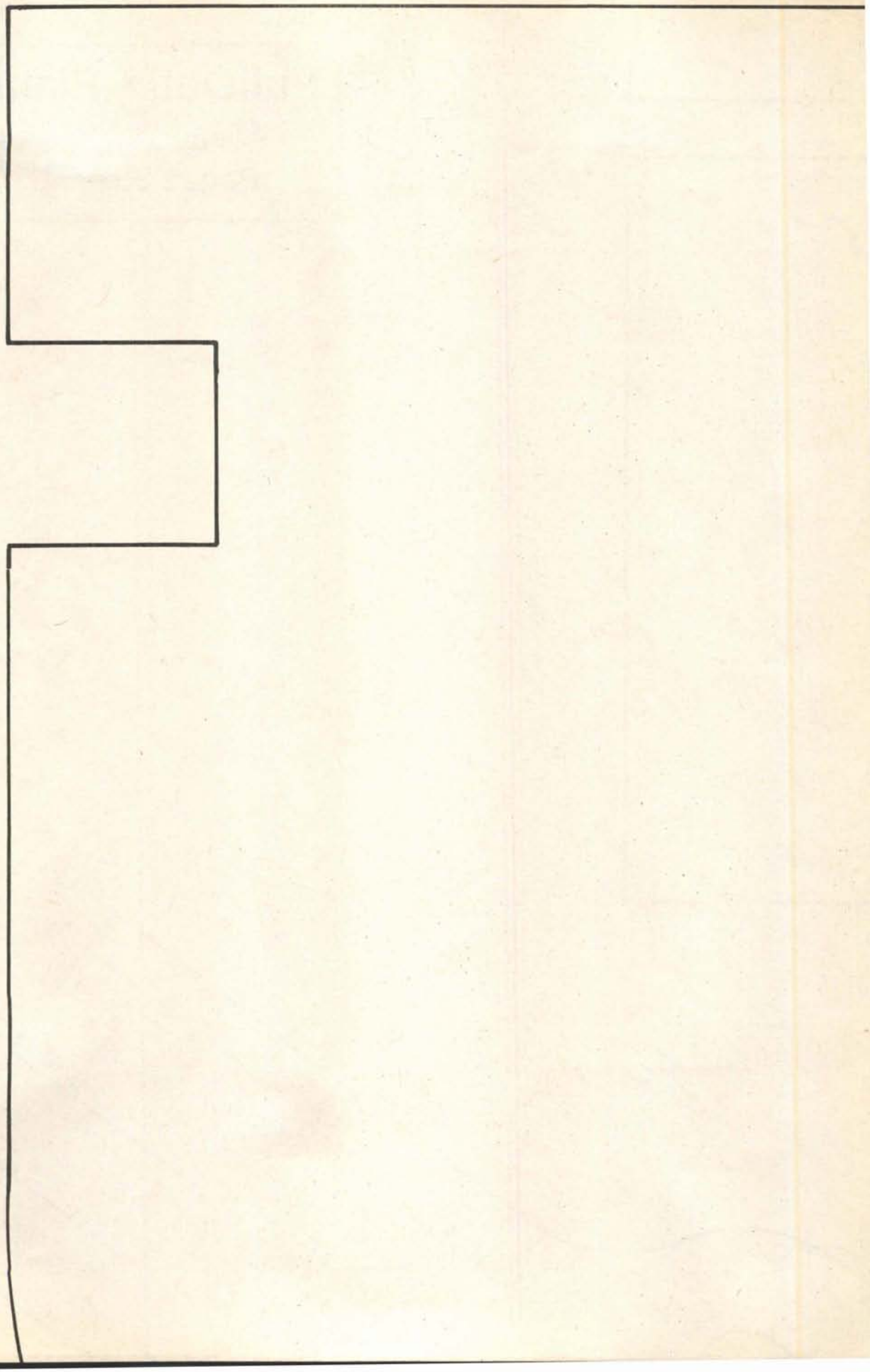
Tabletops in General: 28-1/2" to 30" high, 30" to 34" wide

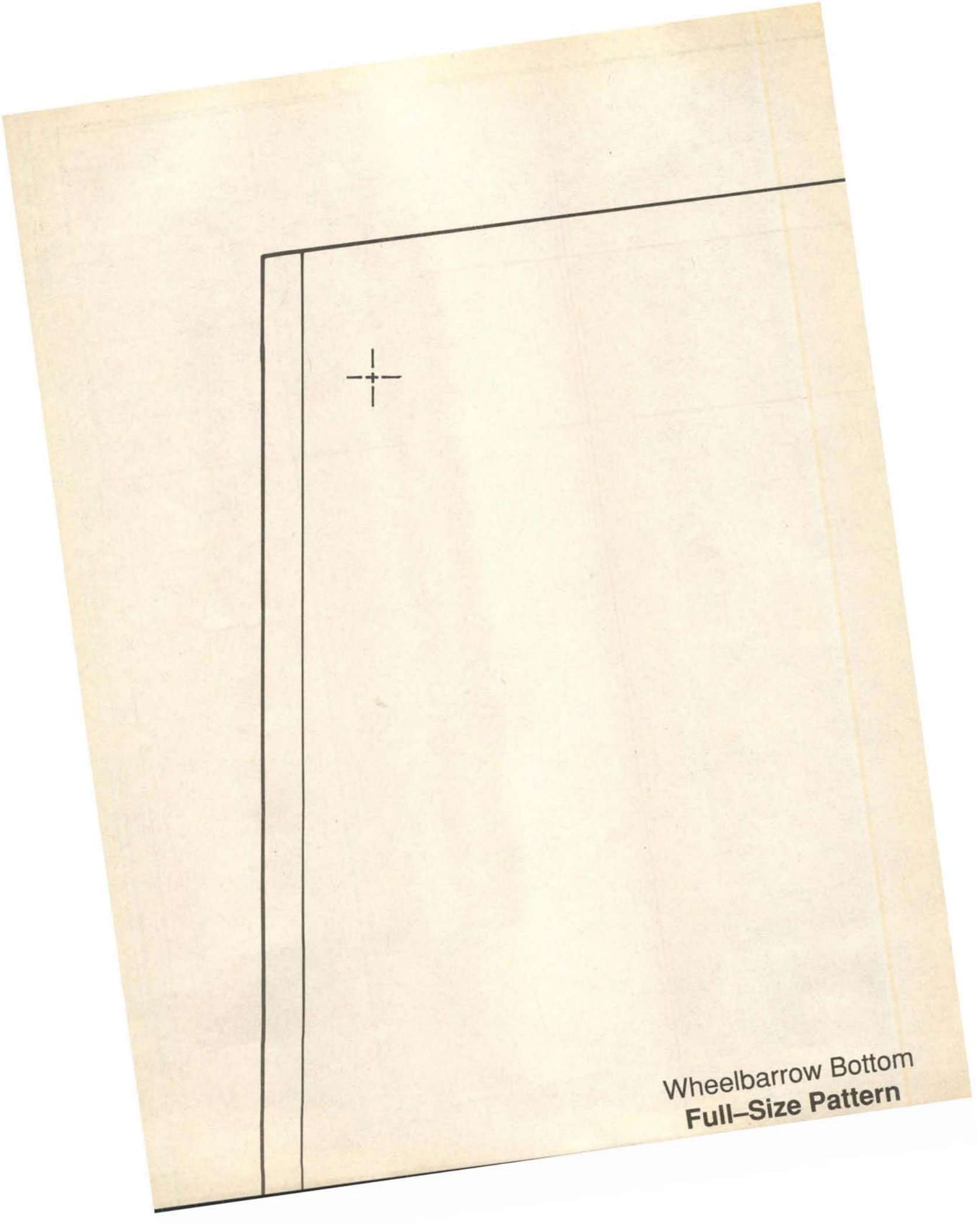
Chair Seats: 10-1/2" to 11-1/2" lower than the tabletop height

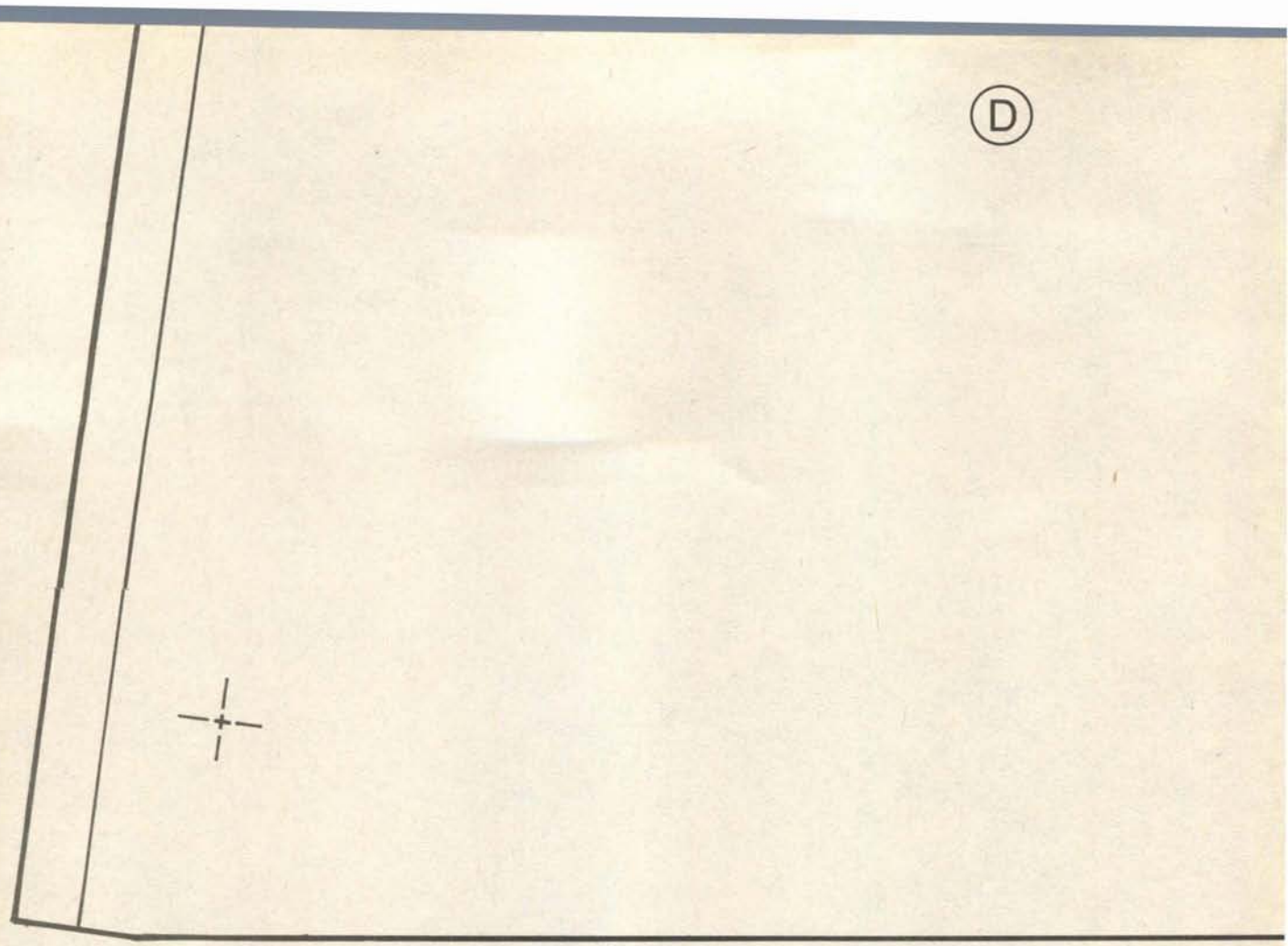
***Don Kinnaman** is a retired woodshop teacher in Phoenix, Arizona.*

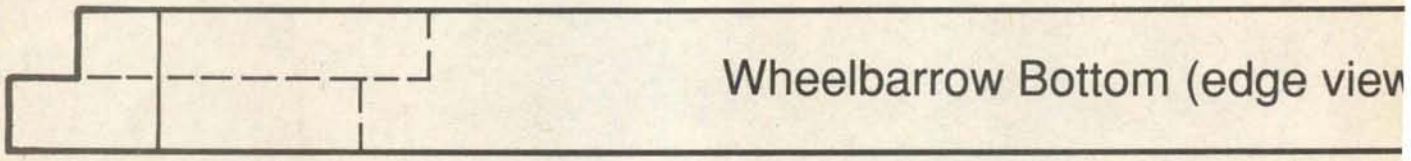
PullOut™ Plans
Popular Woodworking #53
March 1990
Pages 39—54



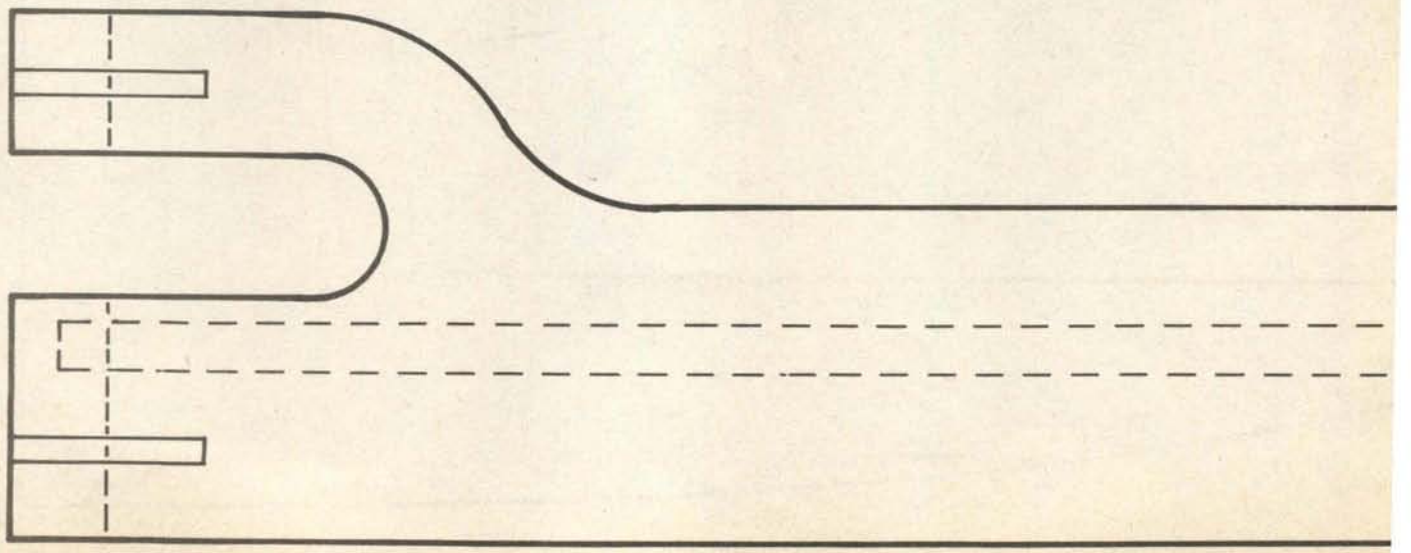


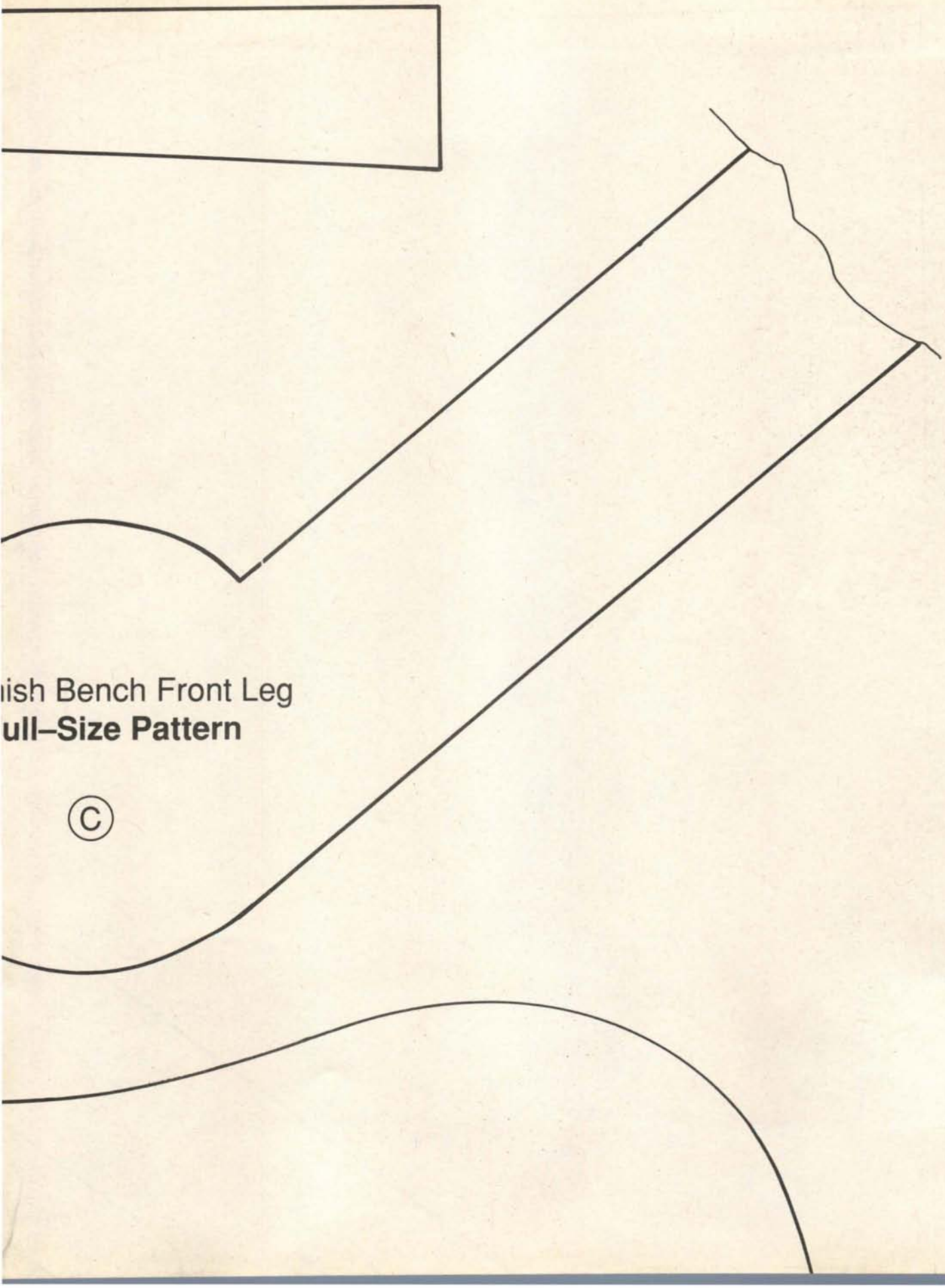

Wheelbarrow Bottom
Full–Size Pattern





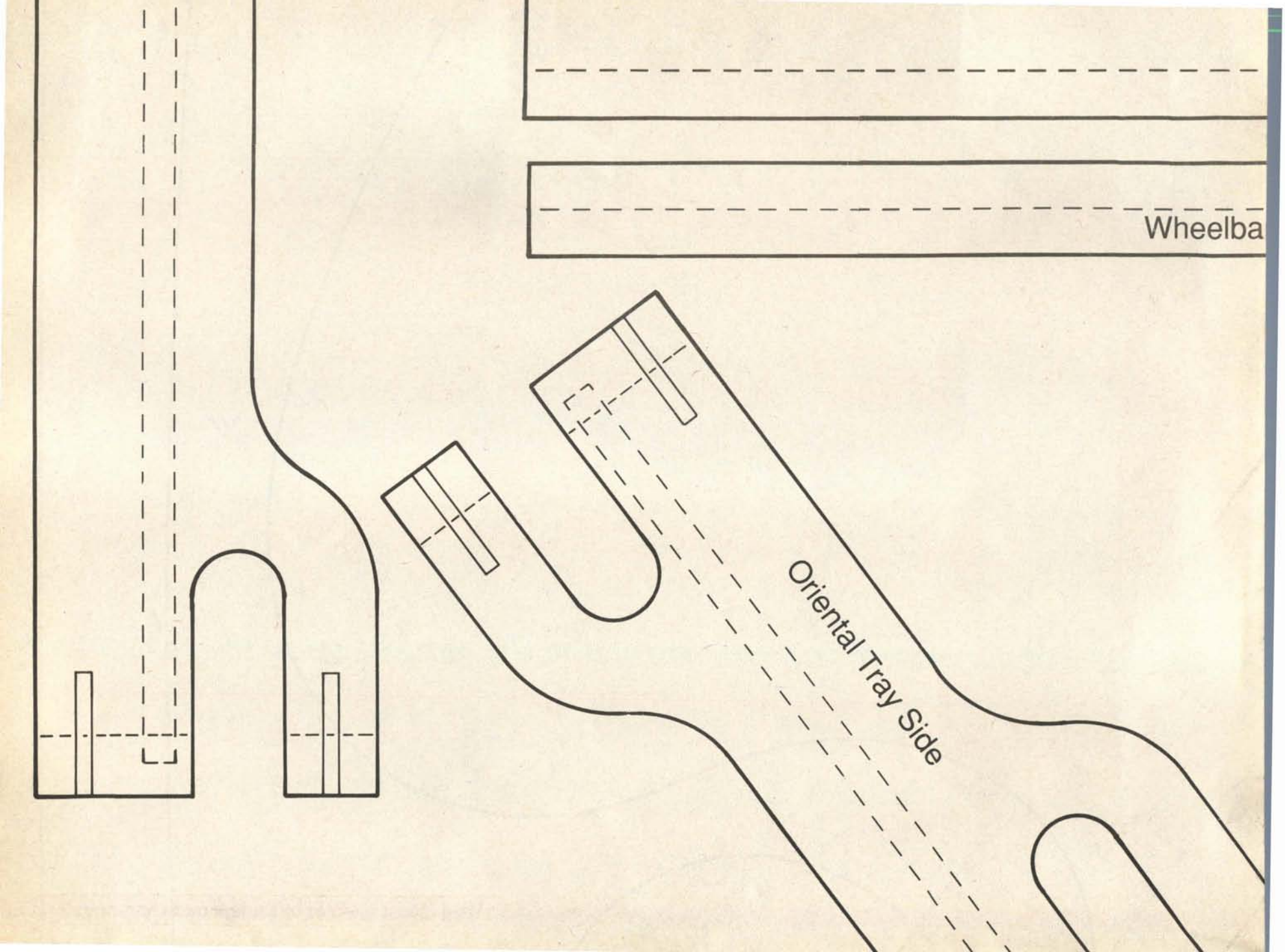
Wheelbarrow Bottom (edge view





ıish Bench Front Leg
ull–Size Pattern

Carefully open staples to remove plans, then bend them closed again.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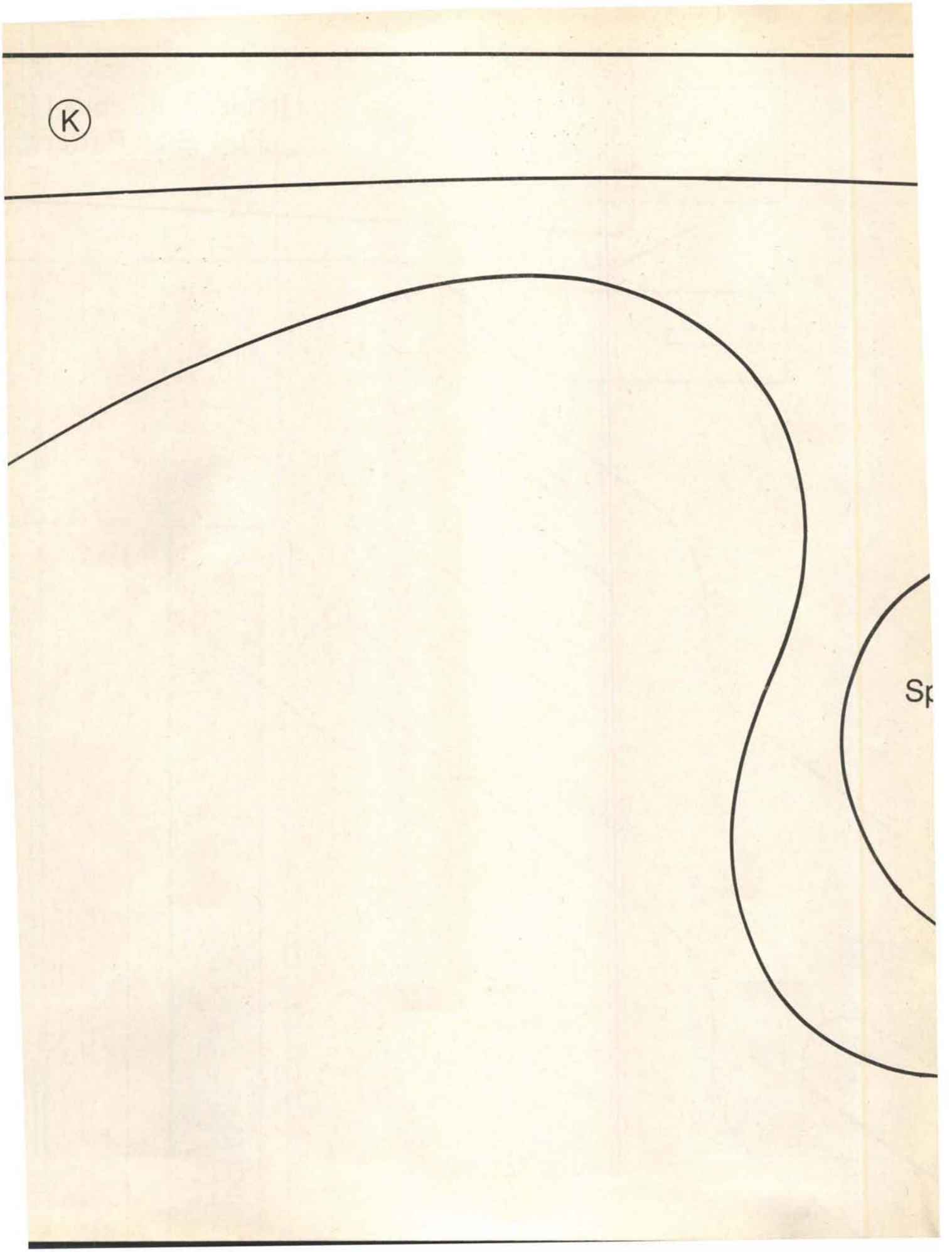
Oriental Tray Side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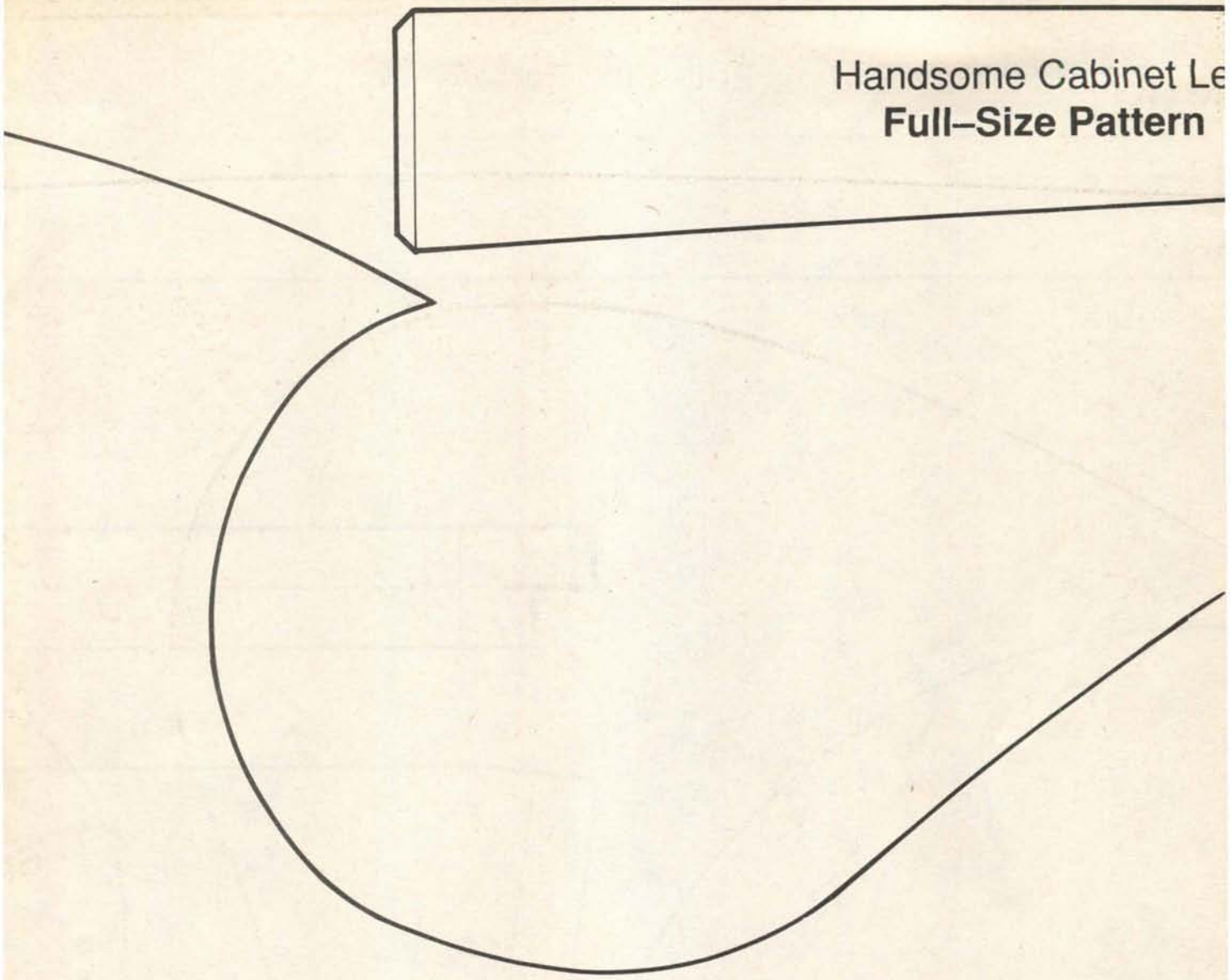
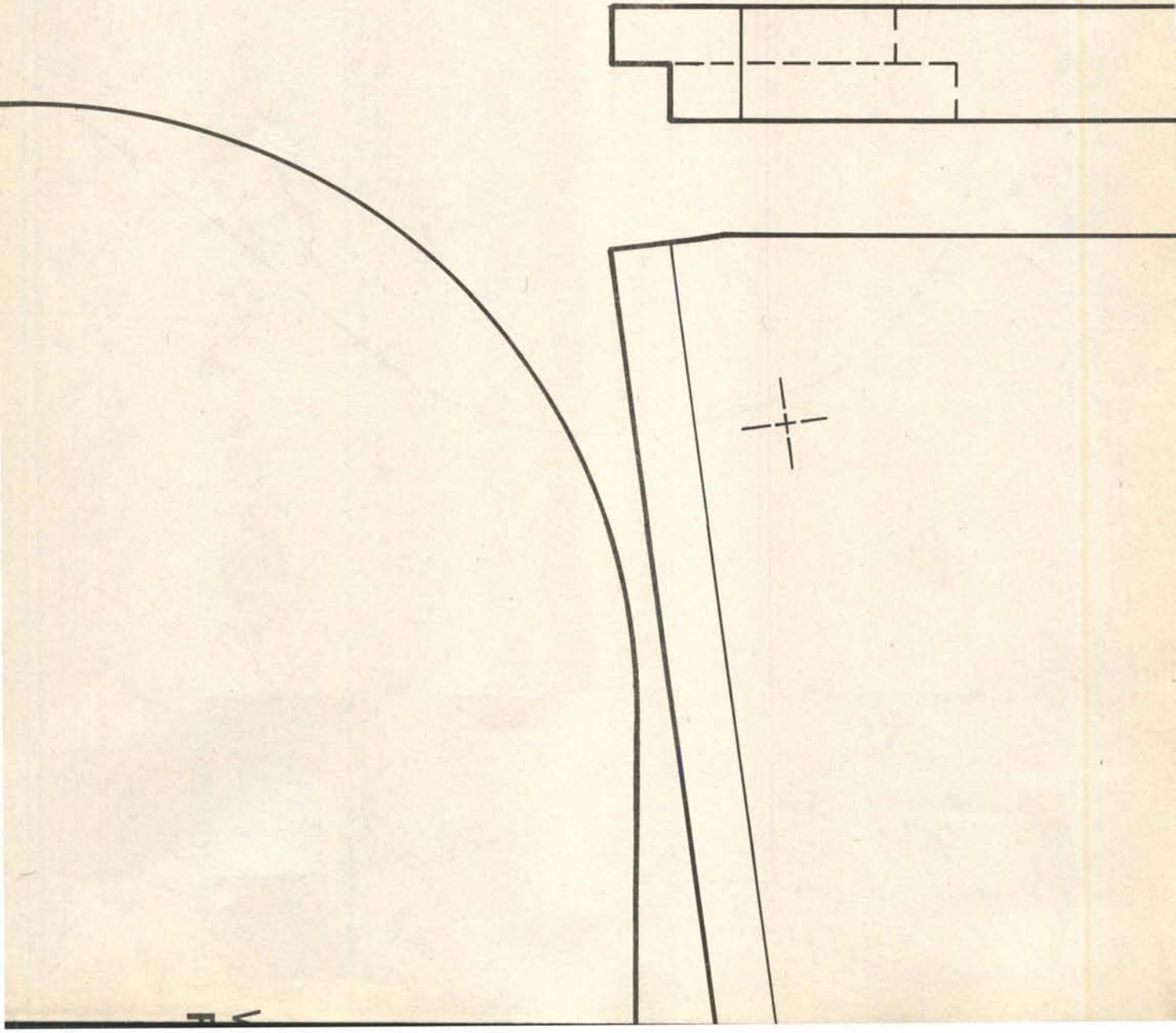
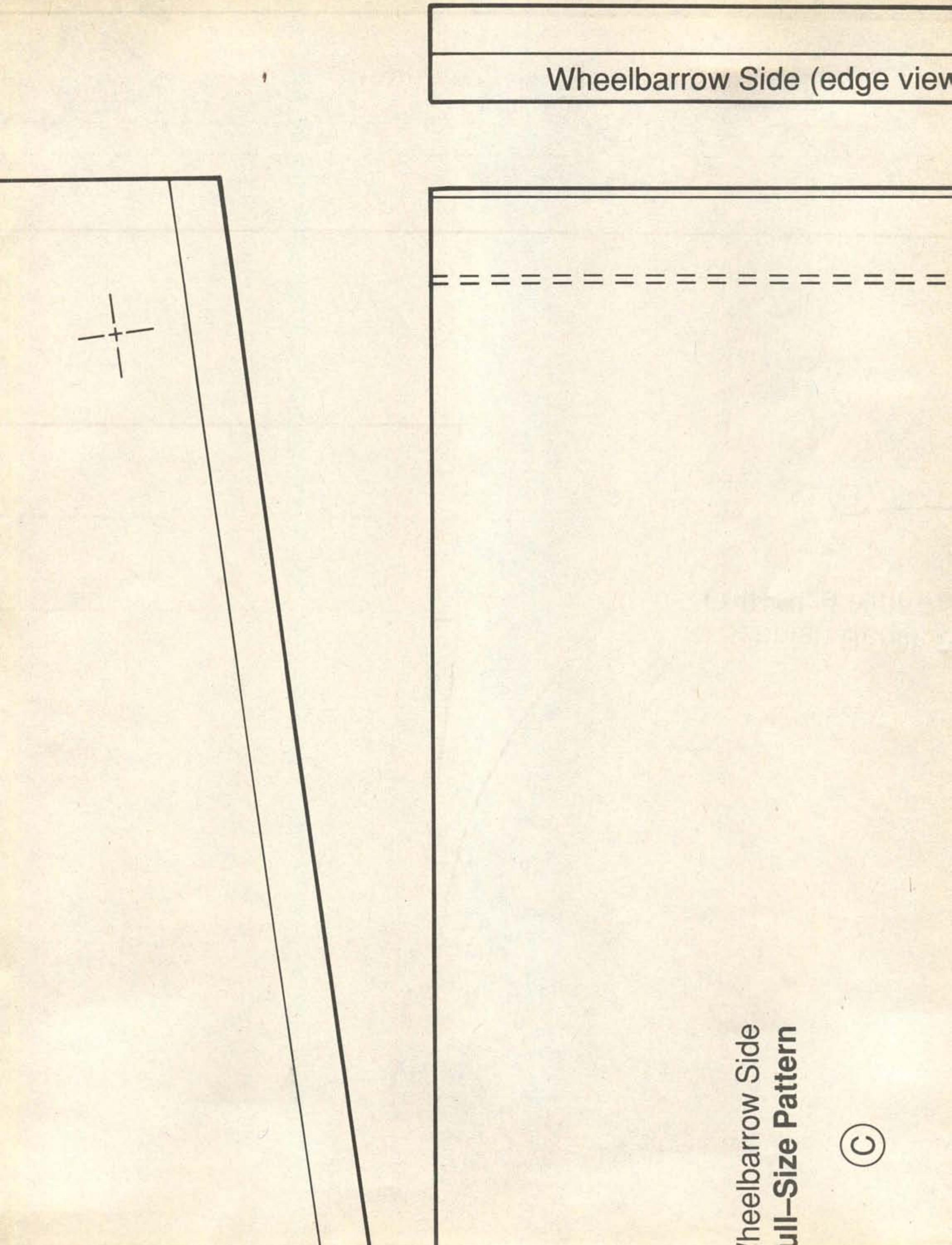


Oriental Tray End **Full–Size Pattern**

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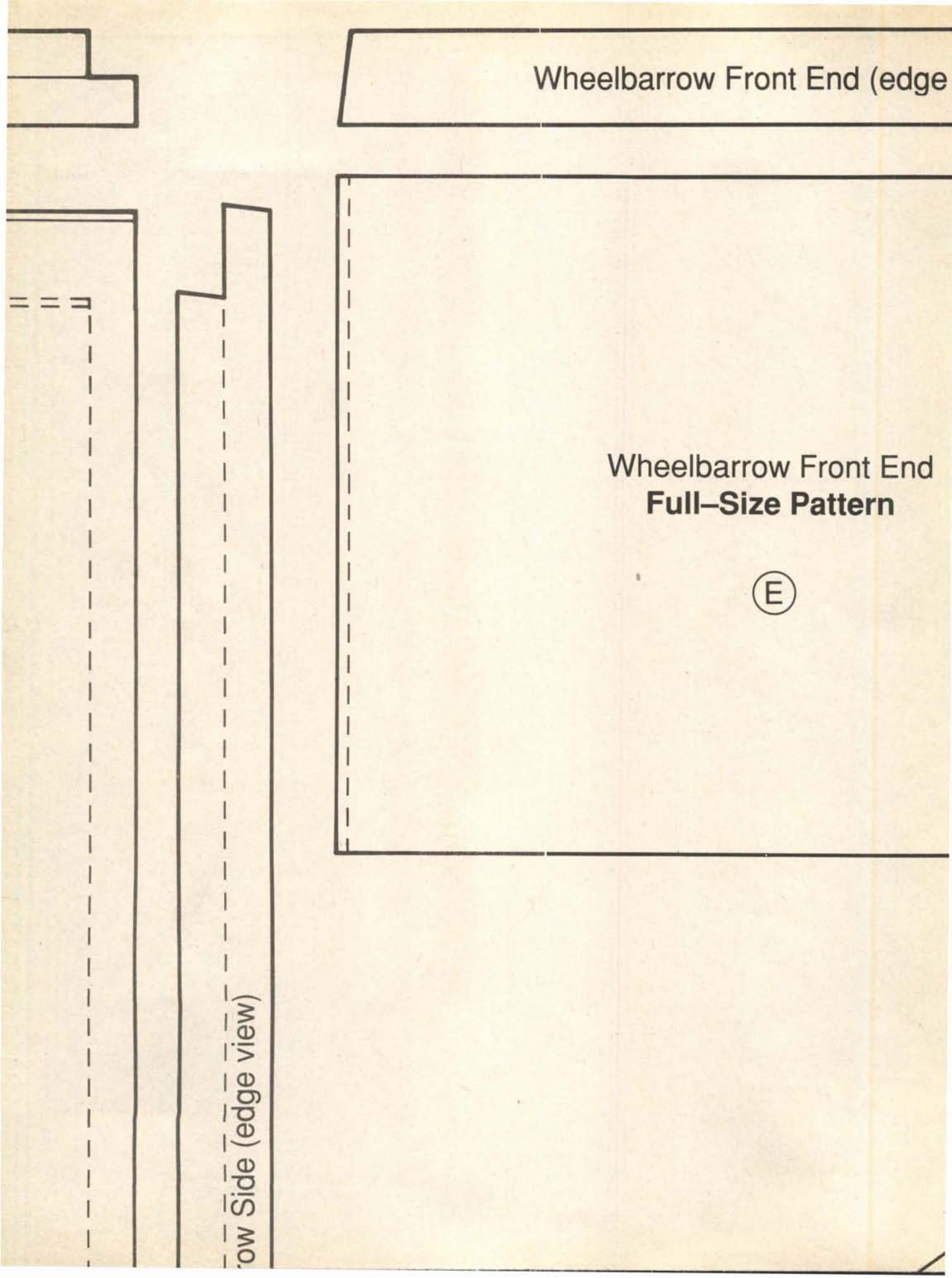
Wheelbarrow Front End (edge
Wheelbarrow Front End
Full–Size Pattern
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row Side (edge view)

photos by the author

Oriental Serving Tray

by Warren Asa

Over the years I have made a number of serving trays, but recently when I gave them a critical inspection, I discovered them all to be heavyweights. They all looked like they belonged in a medieval castle where hefty waiters served even heftier diners from solid trays loaded with prodigious amounts of food. I decided to look for a lighter, more open design for my next tray. I found it—in my recollection of trays I saw in the Orient. This project is based on my memory of those trays.

The long, sleek lines, cut–out feet and handles of this tray give it a graceful, even delicate appearance, but don't be misled—it's both strong and functional. I especially like the repeated curves on both handles and feet that endow it with a touch of Oriental style.

The trays I remember were always made from reddish woods. I looked through my stock of lumber and found some red lauan, but the boards were not well matched. Instead, I decided to use a 3 X 3 piece of cherry given to me by a friend about 25 years ago. He was about eighty at the time and could well have had the timber for 25 years or more, so to say the least I would be working with a well seasoned piece of wood. It was a lovely, tight–grained piece with a pleasing red–orange color. Other reddish woods that would be ideal for this project include African or Honduras mahogany, padauk, purpleheart or koa, or you could try staining a domestic wood with a red mahogany stain.

The main panel was sawn from the cherry in 3/8" thick pieces, glued up and clamped. After planing, it should be about 1/4" thick. Be careful if you are gluing wood this thin because it may buckle under the clamp pressure. I prevented this by placing several pipe clamps on each side of the panel, and then clamping the panel to the pipes with wax paper–covered blocks held in place by hand screws and C–clamps. If this sounds a bit complicated, you can sandwich the panel between two pieces of plywood for clamping. Just be sure to use wax paper or plastic wrap to keep the glue that squeezes out from the joints from sticking to the plywood (see the photo on page 56).

Consider book–matching the pieces, or employ any other attractive layout. An even quicker approach, of course, is to use veneer–covered plywood for the panel and eliminate gluing altogether. Saw the bottom panel to 13-1/2" X 21-1/2" after completing and dry –fitting the rest of the pieces.

For the sides and ends I wanted thicker stock, so I sawed the cherry 5/8" thick and planed it down to 1/2". I had to glue up pieces for the ends, but you won't if you start with 4" wide boards. The overall tray dimensions are 14" X 22". That makes for a rather large tray, but considering the elegant simplicity of the design, why not? You can make yours larger or smaller, but these proportions are hard to beat. An accurate template greatly simplifies layout, so full–size patterns for the end and side pieces are included in the PullOut™ Plans section of the magazine.

After laying out the side and end patterns, I mitered the corners, and cut dadoes for the bottom panel to float in before bandsawing the shape. If you're using 1/2" stock, cut the dadoes 1/4" deep and about 1/4" wide to accommodate the 1/4" thick bottom panel. To cut the

Warren Asa *has been whittling and woodcrafting since his scouting days. He specializes in native American folk craft.*

handles, drill 3/4" diameter holes at each end, then cut out the waste between the holes with a sabre saw. Sand the edges and especially the inside surfaces next, and dry–fit the four pieces to ensure that the inside dimensions for the main panel are indeed 13-1/2" X 21-1/2". Then saw the *main* panel to size. At this point, another dry run is a good idea to make sure everything fits, both at the mitered corners and in the dados holding the main panel. Then set up the clamps for gluing. I used plenty of clamps in order to bring pressure to bear on the sides and ends and to pull the mitres up tight. When you unclamp, clean up any glue that shows.

If memory serves, some of the trays I saw in the Orient had spline joints at the corners. They look great on my tray and definitely add to its strength. Two at each corner is about right—any more could result in a crowded look. I worked up a corner notching jig as suggested in "Lathe Tool Rack," *Popular Woodworking* #49, June/July 1989, and sawed two grooves at each corner 5/16" in from both top and bottom edges (see the PullOut™ Plans). I cut some scrap to the thickness of my saw kerf (1/8") and glued these pieces in place. A triangular piece of scrap wood and a hand screw work well in clamping the splines during the gluing.

After the glue has dried, saw the inserted pieces off almost flush with a very fine toothed backsaw, and then sand the splines completely flush. At this point, all that's left to do is smooth out the various joints, sand and finish.

During sanding, pay special attention to corners, handles and places where glue has leaked out. I started with 80–grit and proceeded through 100, 150, 220 and finished with 600–grit wet–and–dry paper. Rounding all the edges on the sides and ends as you sand seems appropriate on a tray that will be handled and rubbed from every side during use.

Selecting a finish is a major consideration with any wood object that will be used *around* food and drink. The experts seem to agree that no finish is perfect when it comes into direct contact with beverages. Danish oil or hand–rubbed linseed oil would probably be best for bringing out the natural beauty of the dark cherry I used, but neither finish holds up well to alcohol. Brushing lacquer is another possibility, but I passed it up in favor of spar urethane. Even though spar urethane will react to long exposure to alcohol, it is not much affected if spills are taken care of quickly, so it appeared the obvious choice for a working food and beverage tray.

Removing all the sanding dust from the project before finishing is a very important and challenging task. My solution was to dampen a clean cloth with mineral spirits and wipe every nook and cranny before each coat of varnish. In accordance with the instructions on the can, I thinned my first coat of spar urethane, and sanded lightly between coats with 600–grit wet–and–dry paper. Just as when finish-

photos by the author

The photo and the illustration show the bottom panel glued and clamped. Note how the panel is clamped to prevent buckling.

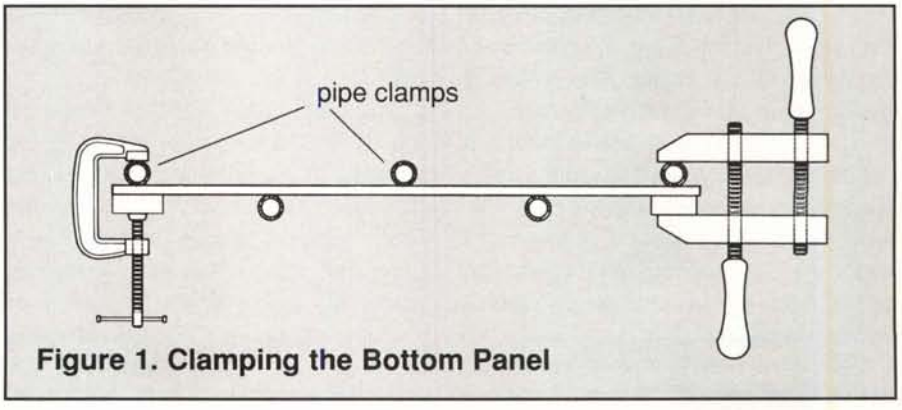


Figure 1. Clamping the Bottom Panel

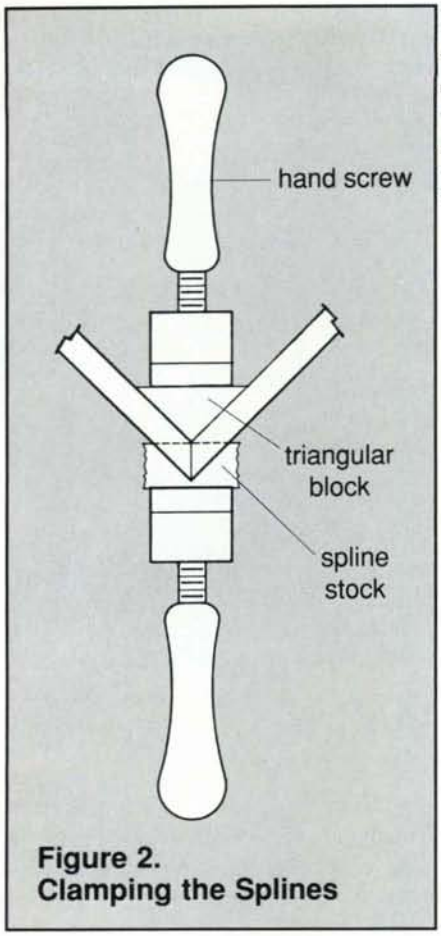
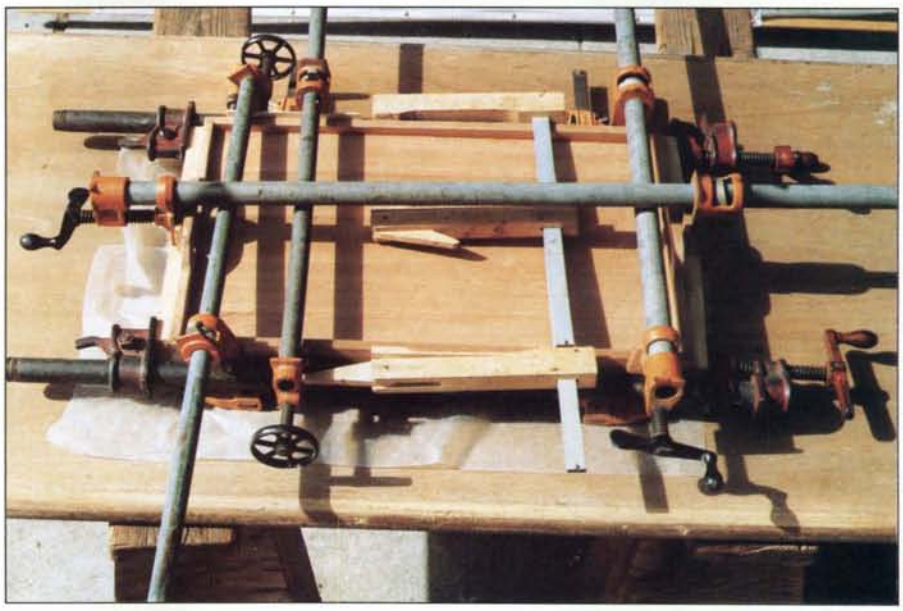
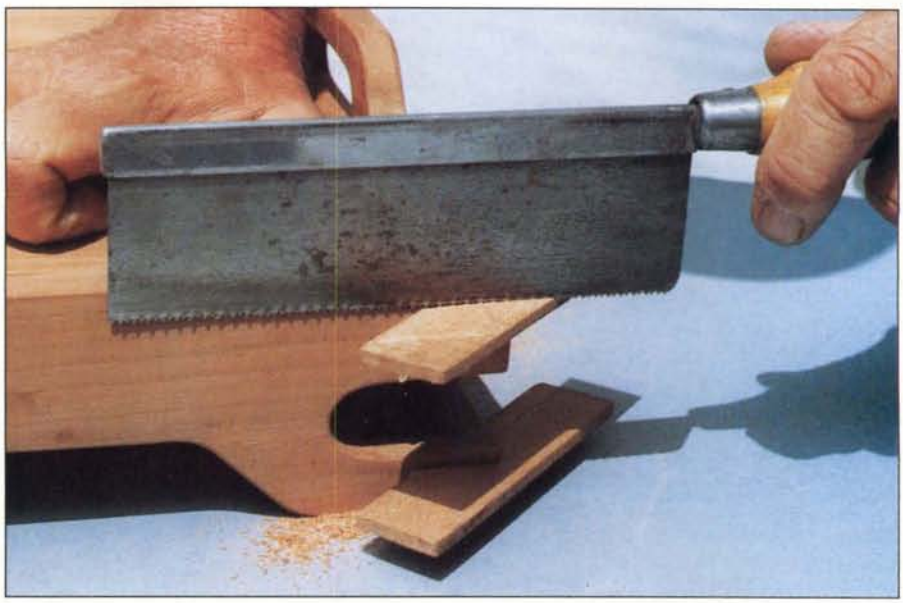


Figure 2.
Clamping the Splines

illustrations by Tom Larson



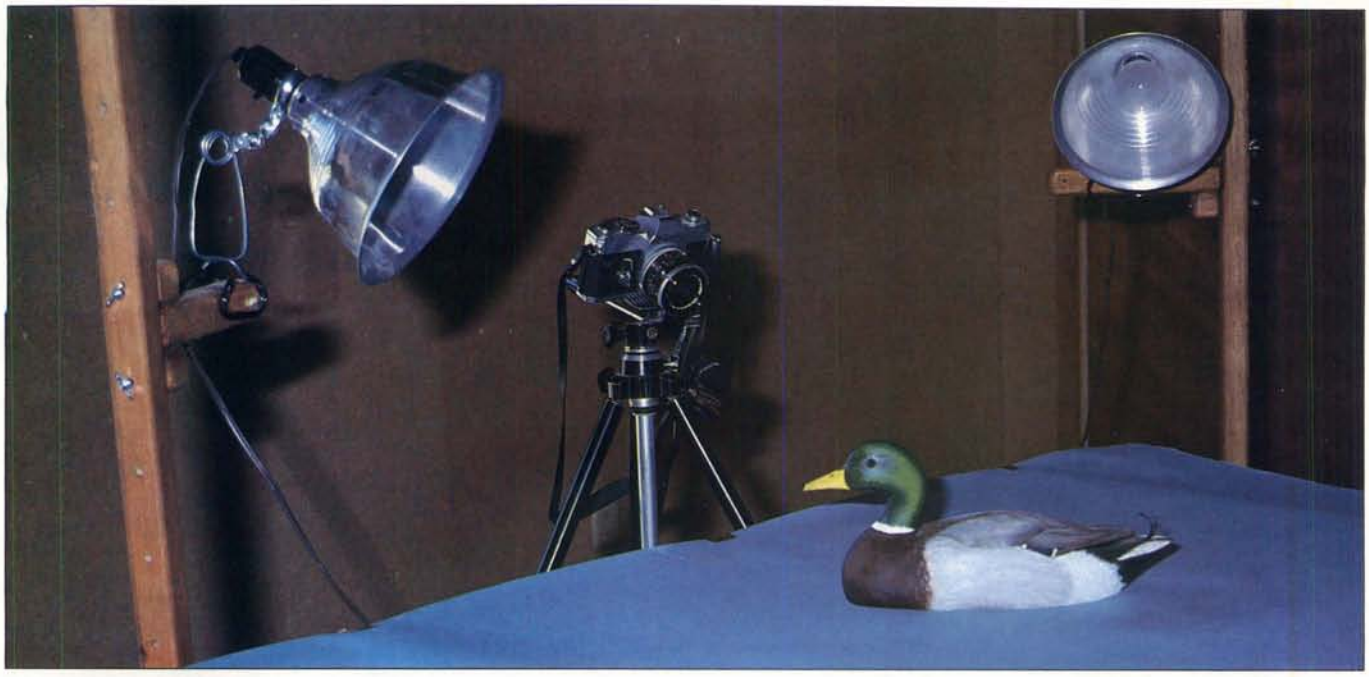
Above right, the author uses a jig to saw grooves for the splines. All parts have been assembled, glued and clamped in the photo to the right. Below right, after the tray has been assembled and glued, the splines are trimmed flush with the sides and ends.



ing any fine piece of furniture with varnish, it is important to work in a dust–free room and to be alert for drips and runs. Keep your brush as dry as possible.

After four coats of varnish, I sanded with used 600–grit wet and dry, and then polished the tray with pumice in mineral oil. After removing every trace of pumice with a cloth dampened in mineral spirits, I gave the tray a second polishing with rottenstone in mineral oil. Don't spare the elbow grease or the rottenstone in this operation. Once the rottenstone was completely removed, I applied a coat of paste wax. A final buffing and the tray has a lustrous finish that is pleasant to handle and easy to wipe clean.

My tray turned out to be everything I had hoped for. It's sleek looking, with a subtle feel of the Orient, yet also rigid. I'm especially happy that it makes good use of a beautiful piece of wood given to me long ago by a good friend. PW



Photographing Your Work

by David D. Peck

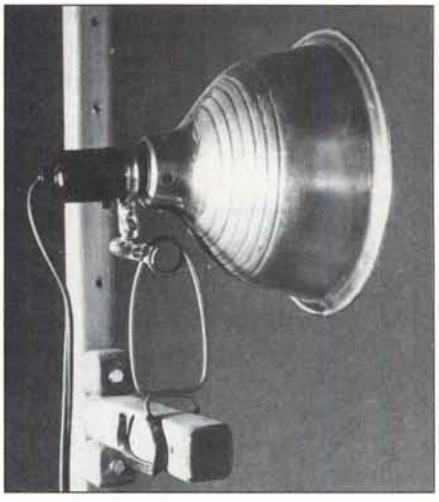
Many woodworkers want to photograph their work, but the results are often less than satisfactory. The two most common problems, shadows and reflections, involve lighting—its source and placement. Now shadows and reflections are not necessarily bad, but deep shadows can black out all detail, and reflections or highlights in the wrong place can ruin a fine photo. The two basic sources of light are photoflood (photo lamps) and flash, and each has its advantages and disadvantages.

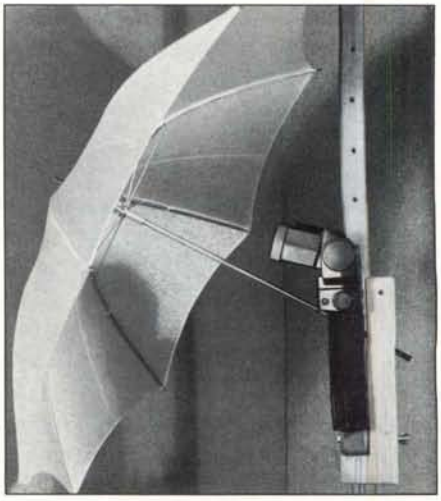
Photofloods are the easiest to use and can be bought at photo supply houses and larger department stores. They look like ordinary light bulbs, and ordinary bulbs are fine for black and white, but photofloods are designed to radiate light at the higher color temperature needed for color photography. Photofloods come in 500 watt and 250 watt sizes. If the project you want to photograph is small, say two square feet, then the 250 watt size will be adequate. For larger work, use the larger bulbs. You'll also need a reflector to make the light source more efficient. Hardware and department stores carry reflectors for as low as five dollars (see the photo to the right). Though they are usually rated at less than 500 watts, they will do for short photo sessions. For long sessions, consider purchasing the larger reflectors available at photo stores.

The basic set–up consists of two photofloods, each with a stand, and a reflector; Figure 1 shows the usual arrangement. Use either one 500 watt and one 250 watt bulb at equal distances from the project to be photographed, or equal size bulbs at different distances. The difference in size or distance gives you a main light source and a fill light—a natural combination. The photo on page 67 shows a duck decoy illuminated by just one (main) light. Notice that the shadows are completely black, concealing all detail. The photo next to it has an additional, "fill" light coming in from the opposite side, filling in the shadow and bringing out more detail. Try various light arrangements before starting to shoot—the more experimentation, the better your pictures will be.

For color photography, your film must match the light source. If you're like me, you've shot color indoors and noticed the photos came out with a definite orange cast. That's color imbalance caused by using a film intended for daylight. Most films are made for use in daylight, but some, including Ektachrome 160 and Kodachrome 40, are made especially for

Below are a photoflood bulb in a clamp–on reflector and a light umbrella, used to soften shadows. The flash is aimed away from the subject and light bounces back from the umbrella to the subject.





photos by the author

Dave Peck *is a woodworker in Redwood Valley, California. He's especially interested in drafting, carving and marquetry.*

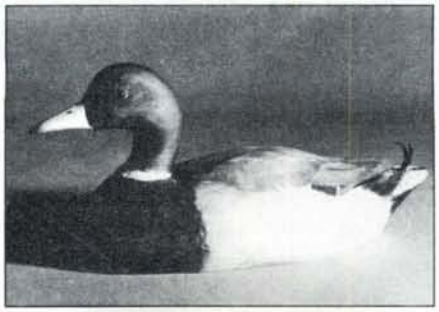
use with photofloods (see the chart on this page). When using these films, you have to block out all sunlight, direct and indirect, or it will upset the color balance and the color in your photos will look strange at best.

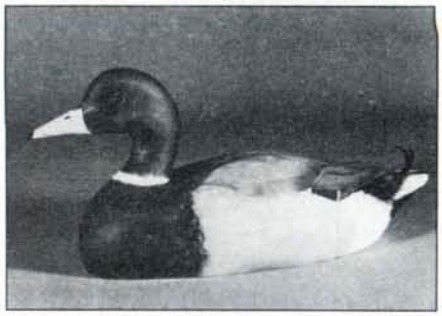
When buying photofloods, be sure to ask for a specific color temperature. They come in either 3200°K or 3400°K, but usually they are not clearly marked on the carton. The 200° difference doesn't seem like much, and you can get reasonably good pictures with either, but for perfect pictures you need to make sure that your film matches the light source, or that you have the correct filter for the light source.

There will be times when you already have film in the camera and you don't want to change it. A filter that screws onto the camera lens can make the color correction. They cost about ten dollars at camera stores and can be rather handy when you decide to photograph indoors on the spur of the moment or want to take pictures at night (again, see the chart).

Another light source combination is to use "daylight" film with blue photofloods. If the main source is a window and the blue photoflood is used for fill light, this combination works well, but don't try to use blue photofloods as the primary light source. Use them to fill in the dark areas and eliminate shadows.

Now on to flash photography. The big advantage of flash is that its light is balanced with daylight film—no filters to worry about. The disadvantage is that the short, almost instantaneous duration of the flash makes it impossible to preview the results of a particular set-up. Overcome the problem by hanging a utility light or some other light source on the stand where the flash unit will be clamped. Professionals call this a modeling light. Once you have things set up the way you want, turn off the modeling light and fire away. Figure 2 diagrams a basic flash set-up.





In the left photo a single main source of light results in completely black shadows. On the right a second equally strong light eliminates the harshness, but also the feeling of depth to the decoy.

A final technique you should consider is diffusing the light. An unshielded light source creates harsh shadows. A larger light source will soften them, and there are several other ways of achieving "soft" light. Shining the light through a translucent barrier, such as a piece of drafting paper or a sheet of acetate, works well. Or you can bounce the light off a white surface such as a ceiling, a piece of matte board, or a light umbrella (see the photo on page 66). Soft light is especially desirable for photographing small objects like jewelry boxes, or for eliminating harsh shadows in the details of a woodcarving.

A word of caution concerning the heat generated by photofloods. These are big bulbs in comparison to ordinary household bulbs, and they generate a tremendous amount of heat. The reflectors get hot very quickly so handle them by the clamp only. If you are using a paper diffuser, make sure it is not touching the reflector where it could scorch or actually catch on fire. If a bulb burns out (and they frequently do since their average life is only three hours) either let it cool or wear a glove or other protection as you unscrew it. And when you screw in a new bulb, turn off the power first just on the off chance that the bulb might explode when electricity first reaches it.

Film and Filters for Use with Photoflood Lamps (Type A—3400°K)

Film	Filter
color prints	
Kodacolor 100	80B
color slides	
Kodachrome 40	none
Kodachrome 64	80B
Ektachrome 160	none or 81A
black and white	none

For further information on lighting, I recommend *How to Control and Use Photographic Lighting*, by David Brooks (HP Books). PW

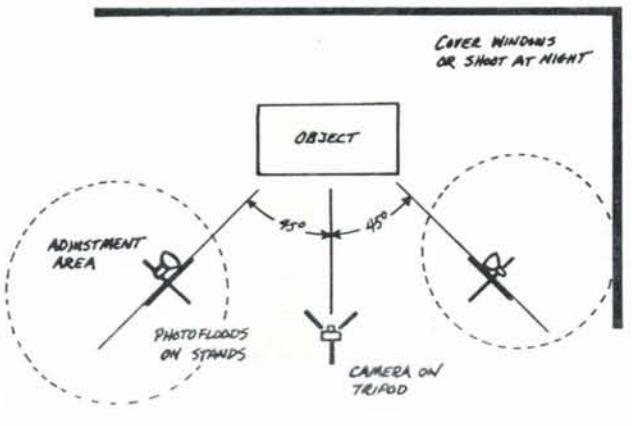


Figure 1. A Basic Photoflood Setup

illustrations by Ginny Pruitt

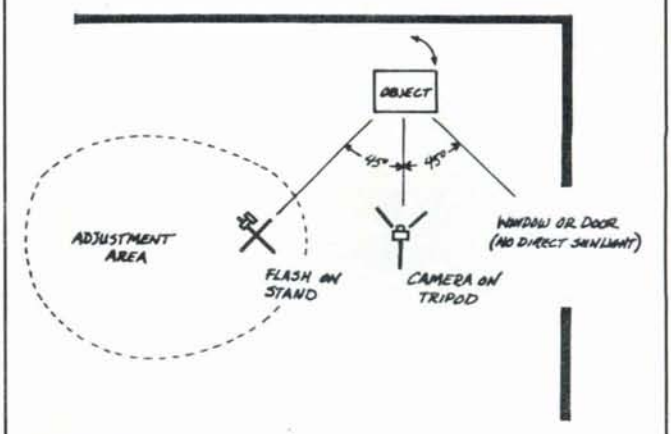


Figure 2. A Basic Flash/Daylight Setup

A Popular Woodworking Project

Make Your Own Light Stands

by David D. Peck

To get better photos you need a set of light stands—you look through the camera while a helper moves the lights. This procedure makes it easy to see an out–of–place reflection, and with a little practice you'll be able to tell which shadows are too dark. When you're happy with what you see, it's time to snap the shutter.

Yes, you could stack up chairs or brace sticks between a table and a chair and clamp the light to a leg or stick. At first, I tried this rubber band and baling wire method, but it's a pain to have to move makeshift setups just that little bit which makes the difference between a fair picture and a really good one. I knew I had to have a set of light stands, but photo stores sell them for $30 each and up—way up. So I designed and built my own from 2 X 4 stock. The price was right and I'm still happy with the results.

Begin by ripping a kiln–dried 2 X 4 into 1-1/2" X 1-1/2" stock. Do not use wet wood or even kiln–dried wood that has recently undergone a change in environment. A kiln–dried board that has been brought into a humid basement, for example, will start to absorb moisture. If you cut it before the moisture has completely penetrated the wood, the imbalance will cause the board to twist or warp as it is ripped. Now cut each piece requiring 1-1/2" stock to length as specified in the cutting list—the long upright (A), two base pieces (B), clamping arm (C), and clamping arm extension (D). Rip the remainder of your 2 X 4 again (or use 3/4" stock) to make the braces (E). Finally, cut a 10-1/2" length of 2 X 4 and shape it as shown in Figure 2 for the diffuser support (F). Note the holes drilled through the support at various angles—they permit varying the set–up of the diffuser screen or light umbrella in order to obtain different lighting effects.

To correctly space the holes in the upright, use the clamping arm (C) as a jig.

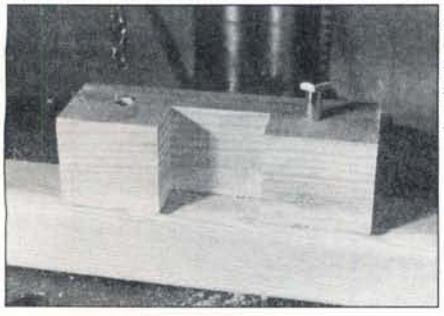


photo by the author

Make the half lap joints required in the two base pieces (Figure 1). Round the edges with a router now or after assembly, but an initial sanding should be done before assembly. To make the stand more storeable, glue a 2" length of 3/4" dowel (G) into the base. I fits into a 3/4" diameter, 1" deep hole drilled in the bottom end of the long upright. By using bolts to hold the parts of the stand together, you can dissassemble it easily.

The holes for bolting the braces (C) to the upright must be offset one above the other. Drill the 1/4" holes in the upright and in each end of the braces. When you bolt the braces to the upright, check with a square to make sure the upright is vertical, and use the holes already drilled in the braces as guides to drill the holes in the base pieces. A similar technique works well when drilling the series of holes in the upright for the clamp arm. Make the holes in the arm first, then drill the topmost hole in the upright. By putting a bolt through the clamp arm and upright, you have a jig that guarantees a perfect fit as you repeat the procedure all the way down the upright.

After assembly and final sanding, I stained my light stand with a dark oil stain. The reason for making the stand dark is to reduce the possibility of a reflection of the stand showing up in a photo. Flat black paint will work well, too. PW

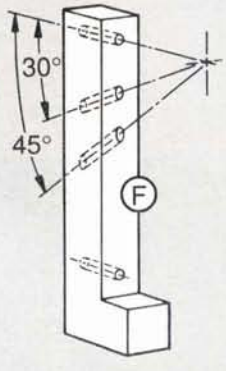


Figure 2. Diffuser Support

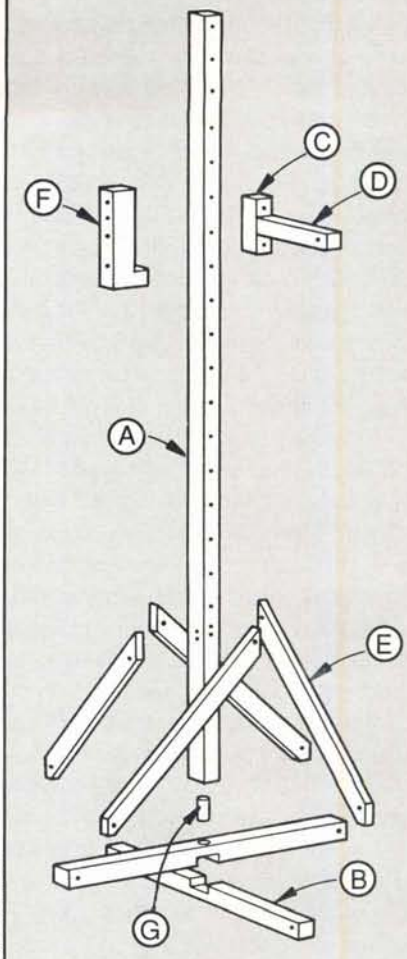


Figure 1. Stand Diagram

Illustrations by Tom Larson

Light Stand Cutting List					
		Finished Size			
Qty	Part	T	W	L	Piece
1	A	1 1/2"	1 1/2"	72"	upright pole
2	B	1 1/2"	1 1/2"	32"	base pieces
1	C	1 1/2"	1 1/2"	4 1/2"	clamping arm
1	D	1 1/2"	1 1/2"	9"	arm extension
4	E	3/4"	1 1/2"	24"	braces
1	F	1 1/2"	3 1/2"	10 1/2"	diffuser support
1	G	3/4" diameter		2"	dowel
Supplies					
4	1/4" X 2 1/2" hex bolts				
5	1/4" X 3 1/2" hex bolts				
9	1/4" wing nuts				

A Popular Woodworking Project

photo by the author

Typing Table

by Jacob Schulzinger

Here's a classic design for a typing table that will enhance any office or study. Fashioned in maple, it has wide aprons at the back and sides for stability, and tapered legs that "slenderize" its overall appearance.

Prepare the legs (A) from 2 X 2 stock. Square and surface the material to 1-1/2" X 1-1/2", and trim the ends to about 29" in length. You'll cut them to their finished size later. Mark each leg to identify which corner of the table will receive it, and mark the surfaces in which the mortises will be cut. Because the front apron will be narrower than the other three, it is important that the leg positions be clearly marked.

Leg Mortises

Lay out and cut the mortises on each of the four legs (Figure 1 below). The top of each mortise should begin about 1" down from the top of the leg to prevent splitting while you're chopping out the wood. This 1" clearance will be trimmed to 1/2" during final fit–up. Each of the eight mortises should be 5/8" deep and, in length, 3/4" less than the total width of the apron.

***Jacob Schulzinger** is an industrial engineer in the aerospace industry. Woodworking is his part-time business and hobby.*

illustration by Tom Larson

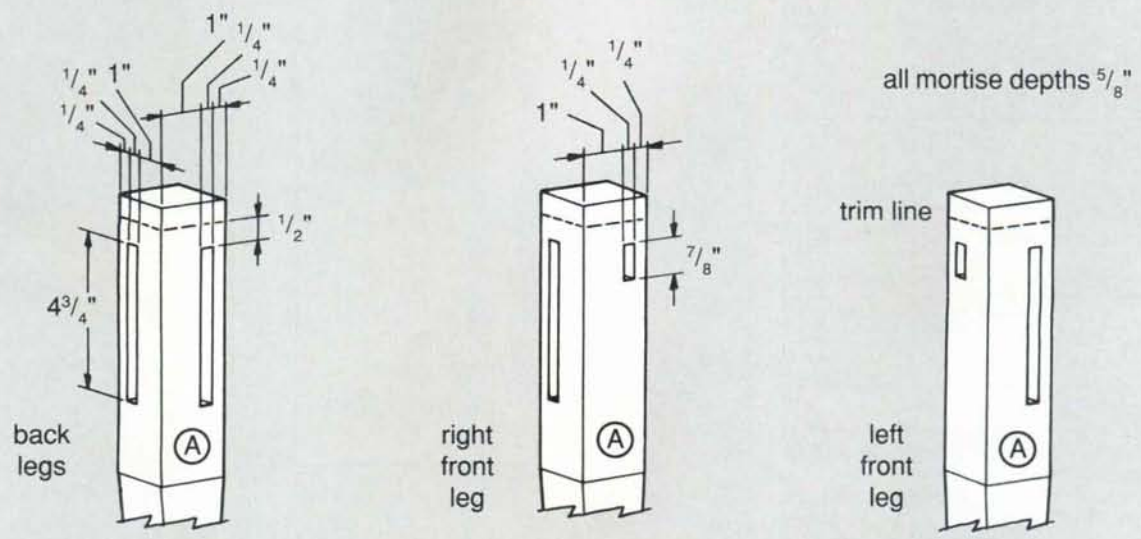


Figure 1. Mortises

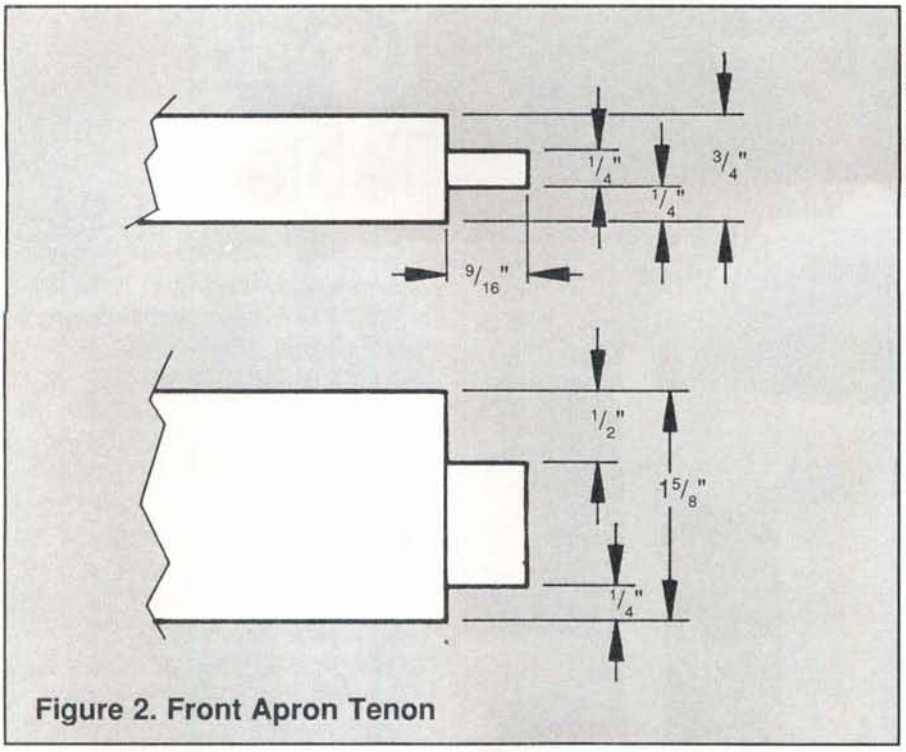


Figure 2. Front Apron Tenon

illustrations by Tom Larson

While long mortises are not the easiest to cut, the resulting surface area for each large apron glue joint will be about 5 square inches. This should be more than enough to stabilize the table for typewriter use. The legs may be set aside and completed after the aprons have been fitted.

Apron Tenons

Use 1 X 2 stock for the front apron (B) and 1 X 6 stock for the rear (C) and side aprons (D). The front apron is narrower than the other three to allow you to fit your knees under the table in a comfortable working position. Cut the front and rear aprons 22" long, and the two side aprons 14" long. Trim them to width, cutting off just enough material to clean up the sides. Surface the pieces and trim them to their final lengths.

A piece of scrap stock should be used to make trial cuts for each of the tenons before completing the aprons. See Figures 2 and 3 for the tenon dimensions. Once a test cut has been fitted to its mortise, the apron should then be cut with the same settings. Mark the joints to prevent confusion during assembly. You may balk at the idea of making so many test cuts, but rest assured that when final cuts are made and parts assembled, there will be no surprises or disappointments.

Now dry–fit all joints and verify the squareness of the entire assembly. Mark the top ends of each leg for trimming as shown in Figure 1, disassemble them, and trim to 1/2" clearance between top and mortise. Reassemble dry, stand the base

Typing Table

Cutting List

Qty	Part	Finished* Size T	W	L	Piece
4	A	1 1/2"	1 1/2"	29"	legs
1	B	3/4"	1 5/8"	22"	front apron
1	C	3/4"	5 1/2"	22"	back apron
2	D	3/4"	5 1/2"	14"	side aprons
1	E	3/4"	16"	30"	top

Supplies

6	*table top fasteners and screws*

Table top fasteners are available from: The Woodworkers' Store, 21801 Industrial Blvd., Rogers, MN 55374-9514, (612) 428-2899; Armor Products, Box 445, East Northport, NY 11731, (516) 462-6228, and Constantine's, 2050 Eastchester Rd., Bronx, NY 10461, (212) 792-1600.

*apron lengths include tenons; leg dimensions are before tapering and trimming

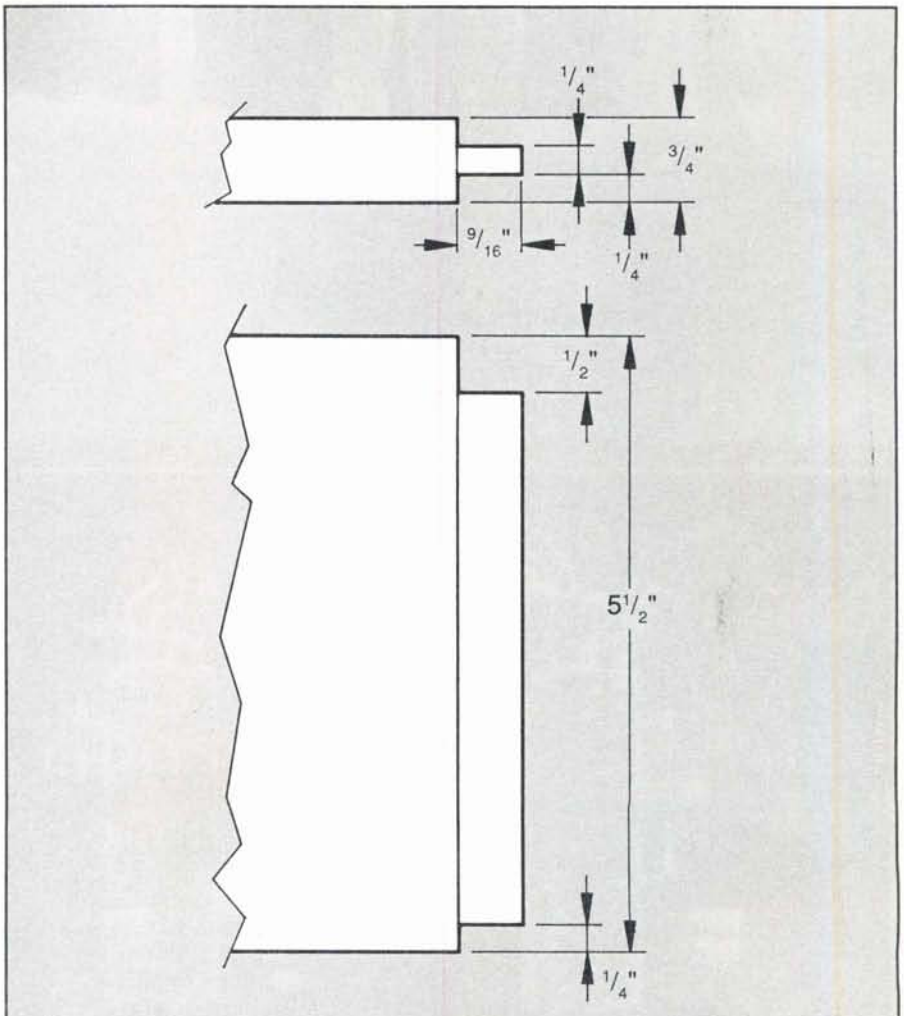
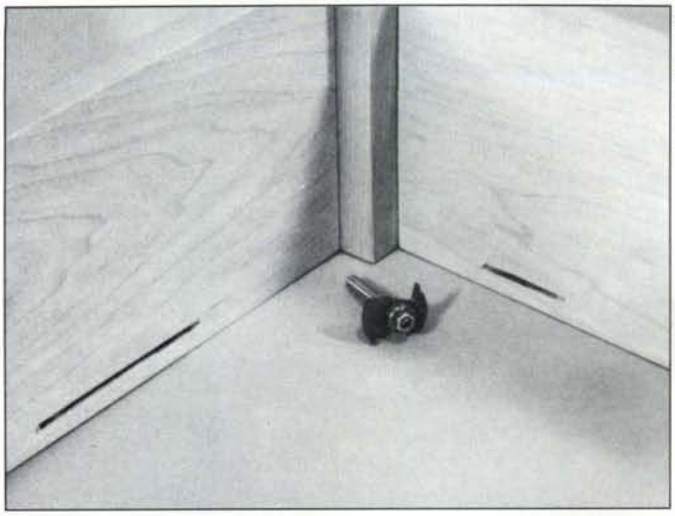
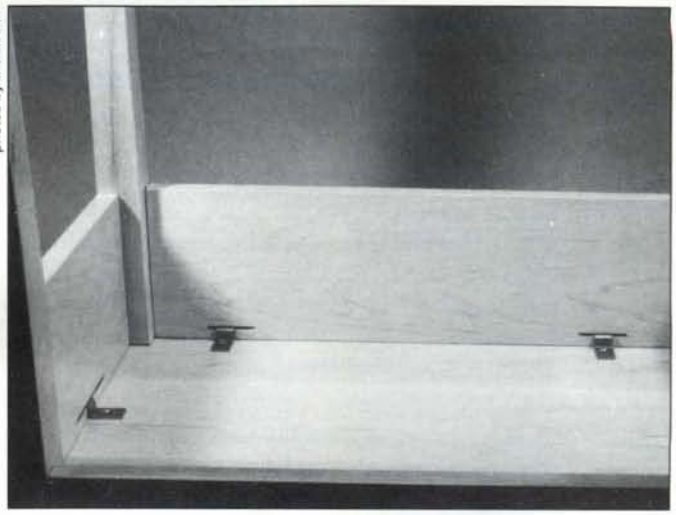


Figure 3. Side and Back Apron Tenons



photos by the author



Use a 1/8" slotting cutter to cut slots in the aprons for the mounting brackets which secure the top panel to the leg and rail assembly.

unit upside down, and mark the legs for overall length. At 27-3/4", the height of the table will be 28-1/2", or you can make the legs a bit longer or shorter to suit the size of the person who will use the table. Take everything apart again, finish–cut the legs (lower ends) to length, and reassemble dry one more time to check the results. If done correctly, all four legs will touch the ground at the same time and you'll have a straight, level surface on which to mount the table top (E).

Tapering the Legs

With the aprons removed, you can now begin the final work on the legs with the taper–cutting jig described in "Jig Journal" on page 74. The taper cuts are made only on those surfaces that will face other legs,

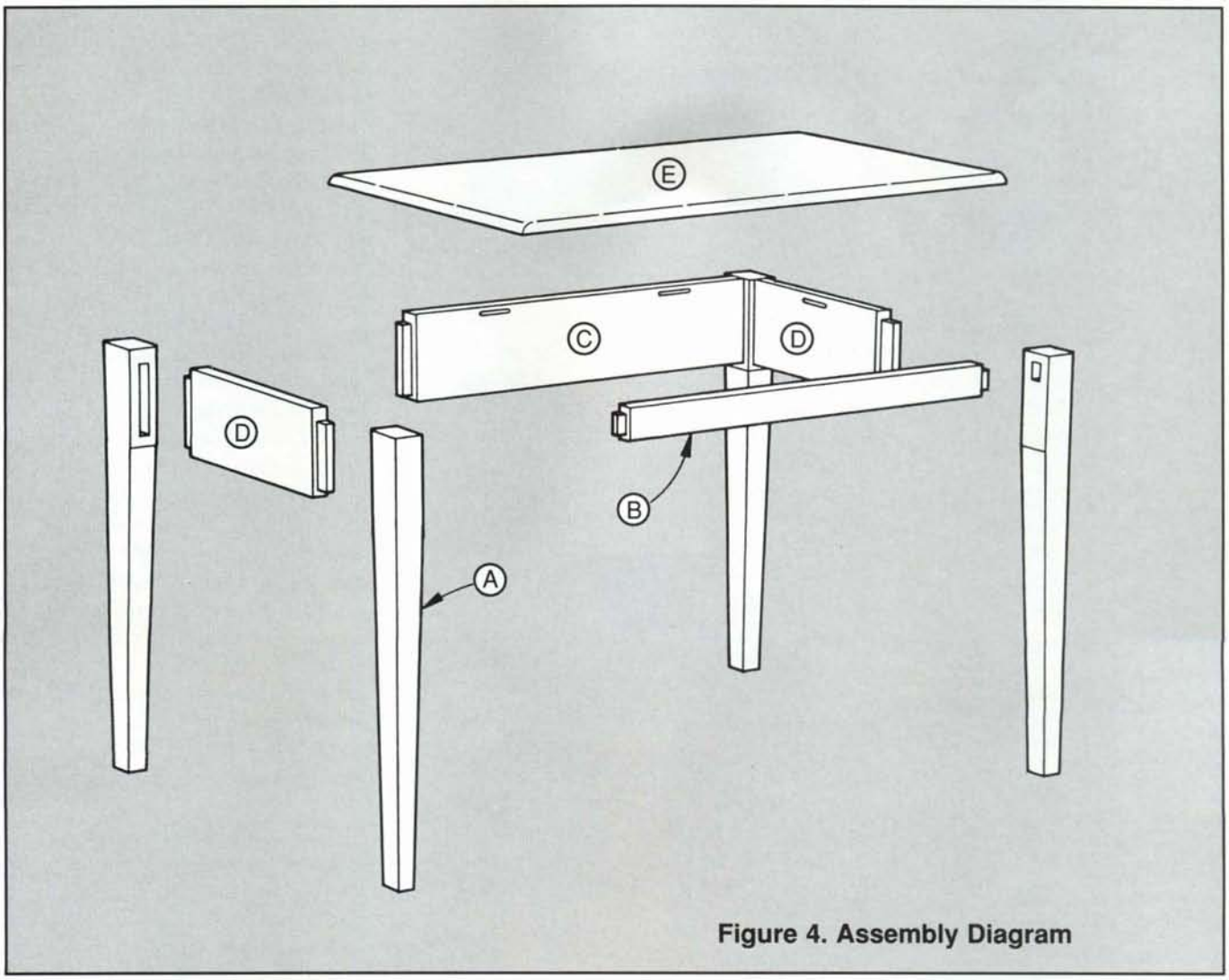


Figure 4. Assembly Diagram

that is, the two surfaces of each leg having mortises cut in them. The procedure below will ensure that you taper the correct sides and that you always cut with a flat surface on the saw table.

Lay the right front leg (check Figure 1 for proper orientation) with the long mortised side down flat on the saw table. The short–mortised side should be facing the *blade*, ready to be tapered. With the piece up against the jig and its stop block, adjust the fence so that the saw blade will enter the piece and start the taper exactly 6" down from the top (mortised) end. Make the first cut.

Turn the tapered side up.The long–mortised side should now be facing the blade. Make the second cut and the right front leg is complete.

Reverse the procedure for the left front leg. Begin with the short–mortised side down flat on the table and cut the taper in the long–mortised side. Then turn the long–mortised side up and cut the taper in the short–mortised side.

To taper the back legs, lay them on the table so that one mortised side is underneath, flat against the table, and the other mortised side faces the blade. Cut, turn, and cut again.

Base Assembly

Break all edges, soften corners, and final sand all of the base parts at this time. For ease of assembly, put the base together in two separate stages. Glue the long (front and rear) aprons (B and C) to the legs, checking for square before clamping. After the glue has cured, join the two assemblies with the short (side) aprons. This two–step method makes it easier to square up the base without the hurry that normally accompanies the assembly process.

Table Top

After the base assembly has cured, use a router with a 1/8" slotting cutter to prepare the aprons for the brackets that will attach the top to the base (see the photos). The slots on the front and rear aprons should be about 1-1/2" long, while those on the sides about 2" long. These lengths will allow you to make positioning adjustments when you install the brackets.

The top is edge–glued from three pieces of 1" X 6" X 33" long maple stock. After gluing, you can use a belt sander to dress the top and bottom surfaces. Final sanding should be done either with a vibrating sander or by hand, and should be completed immediately after you've cut the top to final width and length. Treat the top edges of the board with a 3/8" roundover bit in a router, and the bottom edges by softening with a hand plane.

Finishing

Finish the pieces before going any further. I selected tung oil for this project because it enhances the color and brings out the natural beauty of the wood grain. Three coats of oil with light steel wool buffing in between coats will give a beautiful finish that is easily renewed. Final assembly is easy. Center the top under the inverted base, position the mounting brackets, drill, and attach them with wood screws. The brackets in the side aprons should be installed with about 1/16" of clearance between them and the aprons, while those on the front and rear aprons should have about a 1/8" gap. The extra clearance will allow for seasonal expansion of the wood.

Your typing table is complete. Let me add one caution—mark the table clearly for your personal use. It is just the right size and height to be taken over by someone wanting a stand for her portable sewing machine. PW

Jig Journal

Tapering Jig

photo by Phil Fischer

Make this adjustable tapering jig from two boards slightly wider than the height of your saw fence. A length of 24" to 30" will be more than enough to hold the 21-3/4" leg section to be tapered. The extra length will permit more distance between the blade and the fence for any given taper, making the jig safer to use. Cut a shallow dado at one end of each board to accept a butt hinge, and hinge the pieces together as shown above. Across the top edges install a chest lid support with a wing nut to lock the jig at the proper taper angle. Attach a block as shown to act as a stop. For safety and ease of use, install a handle on the front end and top edge of the jig piece that faces against the fence.

Now measure down 21-3/4" from the hinge point and scribe a line across the jig's top edges to serve as the reference point for setting up the leg taper cuts. They taper 1/2" over 21-3/4", so measure 1/2" between the inside surfaces of the jig pieces at the reference point and tighten the wing nut. See the article text above for instructions on cutting the typing table legs with this jig.

To cut any taper, mark the reference lines at a distance from the hinge equal to the taper length required; then separate the lines a distance equal to the taper width. To cut tapers in opposite sides of a piece, double the taper width at the reference lines for the second cut.

Jigs for Routing Detail Grooves

by Don Kinnaman

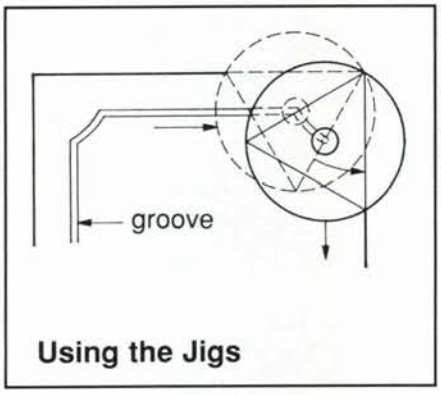
The two jigs described here will help you rout decorative grooves in door panels accurately and quickly. We'll make the frame guide routing jig first. You'll need four pieces of 2 X 4, each 2' to 4' or more long. The length depends on the overall dimensions of the panel you want to decorate. You'll also need four 1/4" X 2" carriage bolts, wing nuts, and washers in order to adjust and secure the frame at the size you want.

With the band or table saw, or by hand, cut a tongue on all four pieces as shown in the illustration to the right. The tongues should be 3/4" thick, centered edgewise on the 2 X 4's, and 3-1/2" long. Now draw a centerline on the face and edge of each piece. Bore a 1/4" hole through each tongue for the carriage bolts. Be sure the holes are on the centerline and 1-3/4" from the inner edge of the tongues. Bore 1/4" holes at the ends of the centerlines on the top faces of the pieces. These holes start the adjustment slots into which the carriage bolts will fit. Very carefully jigsaw, sabresaw or rout the slots as shown.

Turn the pieces and bore 3/4" holes at the ends of the edge centerlines for the tongue slots. Carefully saw them out. Assemble the frame with the bolts, washers and wing nuts (Figure 1), and your frame routing jig is ready to adjust and use.To cut the decorative groove shown in the illustrations, you'll need to make a new base for your router. Most router bases are 6" in diameter. Duplicate yours from a good grade of 1/4" plywood—birch is excellent—or use 1/4" plexiglass.

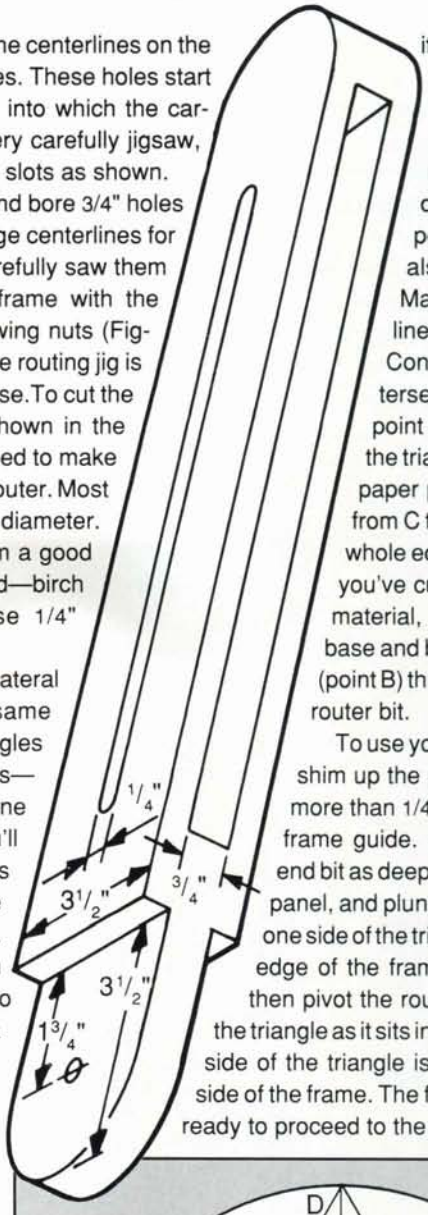
Now cut an equilateral triangle from the same material. These triangles can be different sizes—the size will determine what arc radius you'll get on the corners as you rout the groove inside the frame jig. Make a paper pattern first. An easy way is to start by drawing a 60° angle (lines *x* and *y*) with a protractor and bisecting it. From point A, measure along the bisecting line to point B—a distance equal to the arc radius you want. Now draw a line that's perpendicular to line *x* and also intersects point B. Mark where it intersects line *x* and call that point C. Continue this line until it intersects line *y* and mark that point D. You now have half the triangle and, by folding the paper precisely along the line from C to D, can easily form the whole equilateral triangle. Once you've cut the triangle from 1/4" material, glue it to the auxiliary base and bore a hole in the center (point B) through both to accept the router bit.

To use your jigs, you may have to shim up the panel so that it's a little more than 1/4" below the edge of the frame guide. Set a cove–box or flat end bit as deep as you want to go in the panel, and plunge in the router, holding one side of the triangle against the inside edge of the frame. Rout to the corner, then pivot the router around the point of the triangle as it sits in the corner until the next side of the triangle is snug against the next side of the frame. The first arc is cut and you're ready to proceed to the next corner. PW



Using the Jigs

Illustrations by Tom Larson



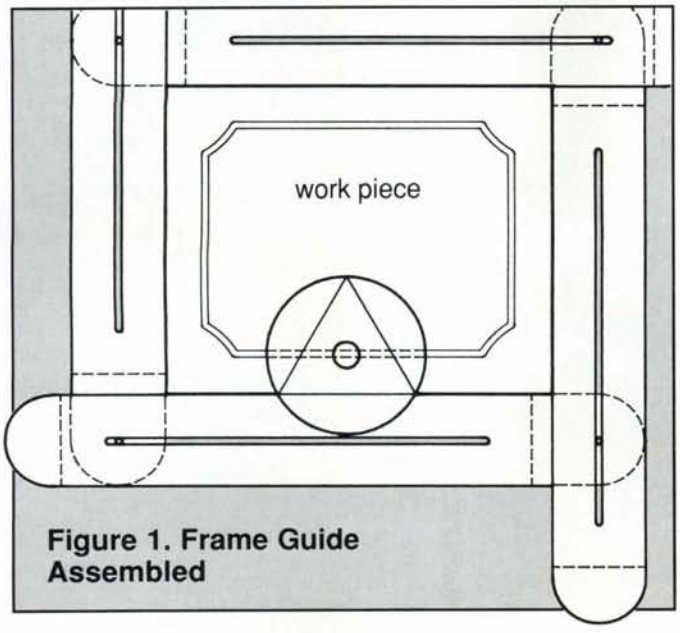


Figure 1. Frame Guide Assembled

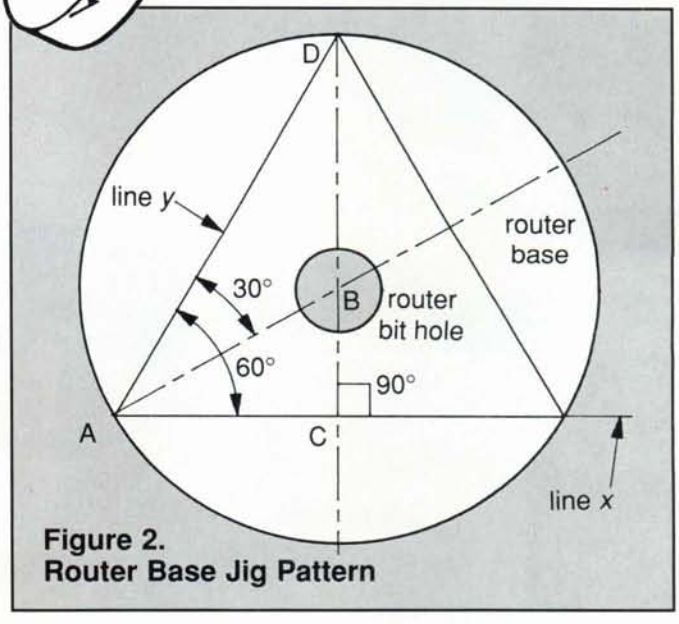


Figure 2. Router Base Jig Pattern

A Popular Woodworking Project

A Handsome Cabinet on a Stand

by Ken Sadler

This cabinet will challenge your skill as a cabinetmaker. It will be a handsome addition to any room in any style home. It can hide a 13" TV set, house all or most of your stereo components, or it can just store things, like big books that don't fit on ordinary book shelves.

Building the cabinet starts with choosing the wood. The design is simple and plain so that the wood itself imparts the beauty to the piece. Use any wood that suits your fancy, but to fulfill the idea behind the design, you should choose one in which the grain has a distinct character and pattern. The cabinet in the picture is western maple and the drawers are walnut.

The parts shown on the cutting list are all rough sizes and I've allowed considerable leeway in them. There are four important panels in the piece; the sides and top are readily seen, but the doors create the real visual impact.

All of the panels will have to be glued up. In choosing the wood for the side and top panels, take care and try to get pieces in which the grain patterns look like they belong together. For the doors you will want something striking. The figures should be as similar as possible so that the doors match. Another approach for

***Ken Sadler** is a retired furnituremaker in Sheridan, Oregon.*

photos by the author

At the Lumber Yard

You'll need 24 board feet of 4/4 material for parts A, B, E, G, J, L and M; 6 bf of 8/4 material for C, D, H and I; and 2 bf of 8/4 material for K. Parts C and D could also be made from a piece of 3/8" hardwood plywood that is 18" X 30", and G and J could be made from a 21" X 48" piece of 1/4" plywood; if you opt for this approach, subtract 6 bf from the amount of 4/4 material you buy.

A Handsome Cabinet

Cutting List

Qty	Part	Rough Size T	Rough Size W	Rough Size L	Piece
2	A	1"	18"	24"	sides
2	B	1"	18"	24"	bottom & top
1	C	1/2"	17"	23"	drawer shelf
1	D	1/2"	4 3/4"	17"	drawer divider
2	E	1"	12"	21"	doors
4	F	5/8"	1 1/2"	24"	frame members
1	G	3/8"	20"	21"	back panel
4	H	1/2"	4 1/2"	17"	drawer sides
4	I	1/2"	4 1/2"	☆	drawer ends
2	J	3/8"	☆	17"	drawer bottoms
4	K	1 5/8"	1 5/8"	18"	base legs
2	L	1"	1 3/4"	16"	side stretchers
2	M	1"	2"	23"	front & rear stretcers

Supplies

2	pair L-shaped knife hinges
1	1/4" bullet catch

☆determined by the builder

the doors is to create a book–matched panel.

If you've decided to make the doors by book–matching, here's how to go about it. Let's say you've found what you want in one 12" wide, 2" thick board. Rip it in half, and mark the halves so you know how they went together. Joint the same face on each piece flat, then joint both edges on each piece square to the flat face. Set your saw blade at just over 3" high. Set your rip fence at 7/8" and rip both edges of both pieces, referencing the same face of each against the fence. Lay them open and you have your book match, in the rough. Lightly joint the faces you've opened just enough to clean up the saw marks. The more you take off, the more of the book–match you'll lose. Plane them to proper thickness, and then glue them up.

When all the panels have dried, use a smooth plane to clean off all the excess glue and smooth up the panel faces along the joints.

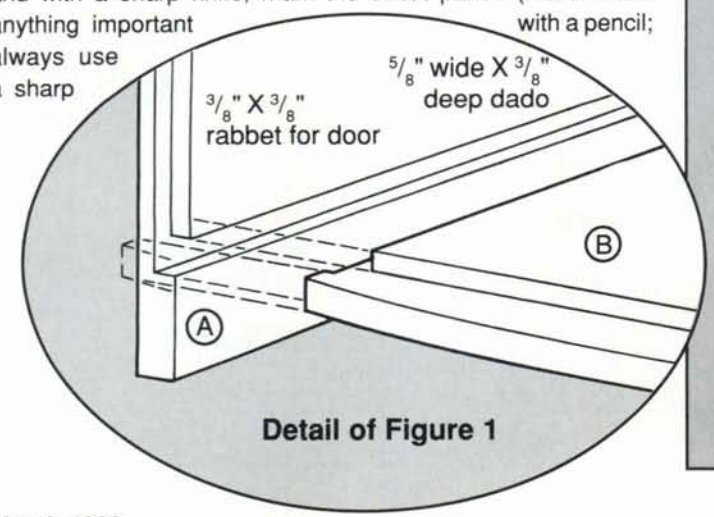
The Case

As you start building the cabinet, please study the drawings carefully—there are a few tricky spots in this project. Familiarize yourself with the drawings and try to visualize how the different parts look and fit together

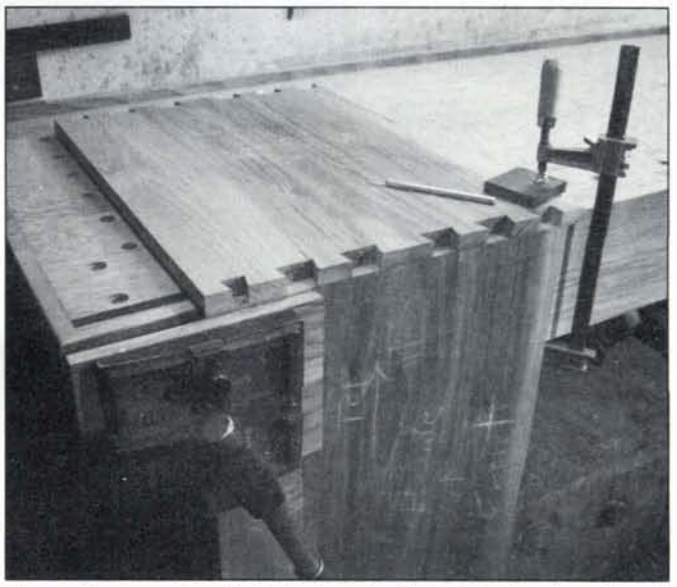
In making the case, start with the two side panels (A). Cut them to finished size and be sure that the corners are truly square. Decide which face of each is to be the outside face and which end will be the top, and mark them boldly with chalk. The reason for this is that each panel will have two dadoes and two rabbets cut on the inside face. None of the cuts is the same, and if you haven't marked the faces and ends you could ruin a panel.

The first cut will be the dado for the case bottom (B). It's 5/8" wide by 3/8" deep and it's a through–dado; therefore you can cut both sides with the same setup.

Next cut the rabbets for the back and for the doors (see Figure 1 and Figure 2). Notice that they are different in size and that they are blind, running from the top to the dado you've just cut as shown in the detail below. Therefore, you will have to cut them with a router. Cut a 3/8" X 3/8" rabbet on the front edges of the sides, and a 1/2" wide, 3/8" deep rabbet on the back edges. The 3/8" dado for the drawer shelf (C) is also blind and will have to be routed. Stop it about 1/2" from the front rabbet. Be sure that this cut is in exactly the same position on both side panels. If it's even a little bit off, the drawer pocket won't be square and the drawers won't fit properly. The best way to be sure is to cut one side, then place the two pieces back edge to back edge, flush at the bottom, and with a sharp knife, mark the uncut panel. (Never mark anything important with a pencil; always use a sharp knife. I use an X–acto® with a #11 blade; it's especially good for marking mortises and dovetail cuts.)

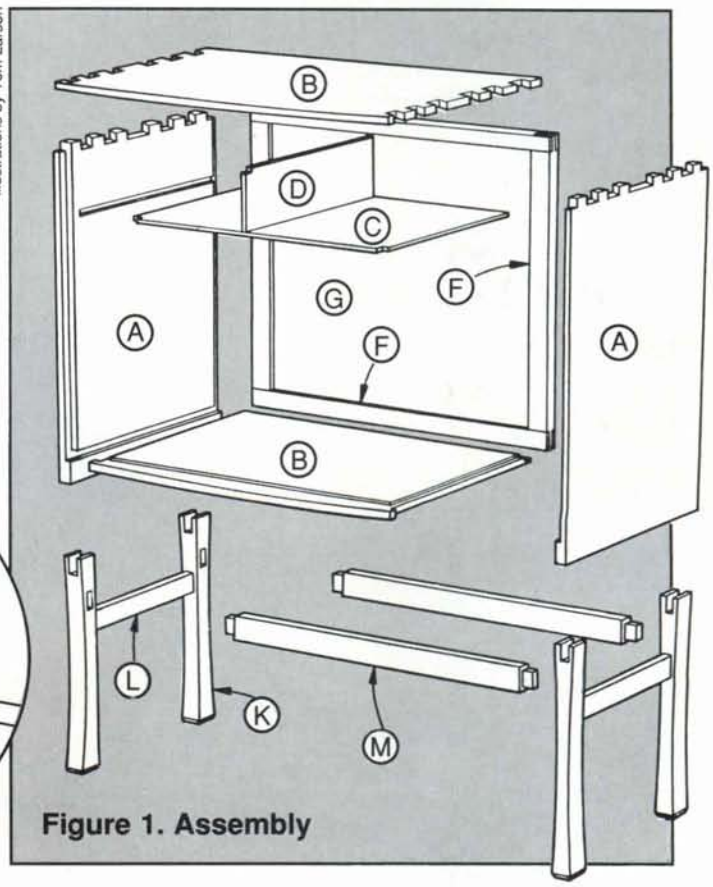


Detail of Figure 1


Secure the top and a side to the bench with their back edges aligned, and use a knife to mark the pins by tracing the tails.

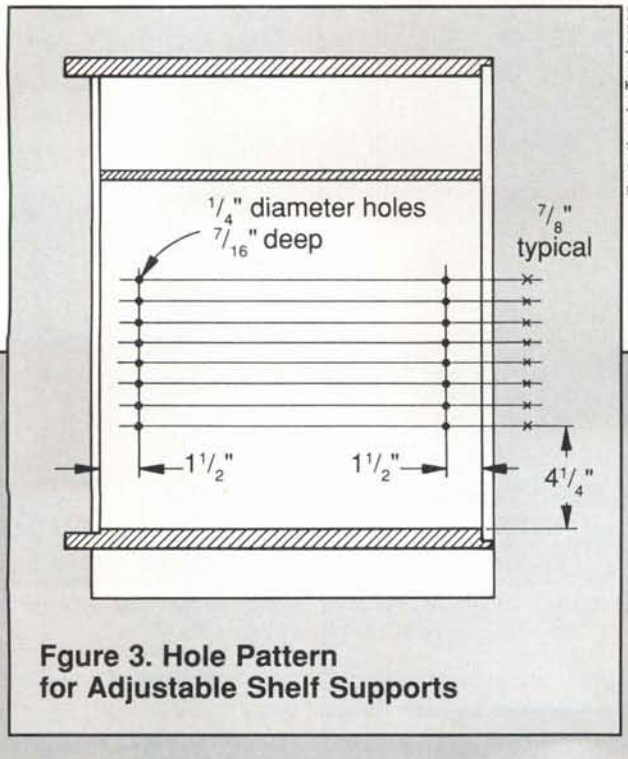
If you plan to use shelves in the cabinet, now is the time to drill the shelf support holes on the inside faces of the sides. Just follow the pattern shown in Figure 3, and drill them 1/4" deep. Whatever the intended use for your cabinet, it's a good idea to include these holes; then you can install shelves at any time. Put the sides away for the time being, and we'll go on to the top and bottom panels (B).

Cut both panels to their exact length, and their width to



Illustrations by Tom Larson

Figure 1. Assembly



Fgure 3. Hole Pattern for Adjustable Shelf Supports

illustrations by Tom Larson

17-1/2", but don't curve the front edges at this time. Now set the bottom aside while you work on the top. Decide which surface is to be the top and which edge is to be the back, and mark them. Now, starting from the back edge, lay out on the top surface, the dovetail joint between the top (B) and sides (A). The top panel will have the tails and the sides will have the pins. The layout of the tails can be any way you want it. There are only two requirements: the socket for the rearmost pin must not cut into the rabbet for the back, and the forwardmost socket must have its front edge straight and exactly matching the inner face of the door rabbet

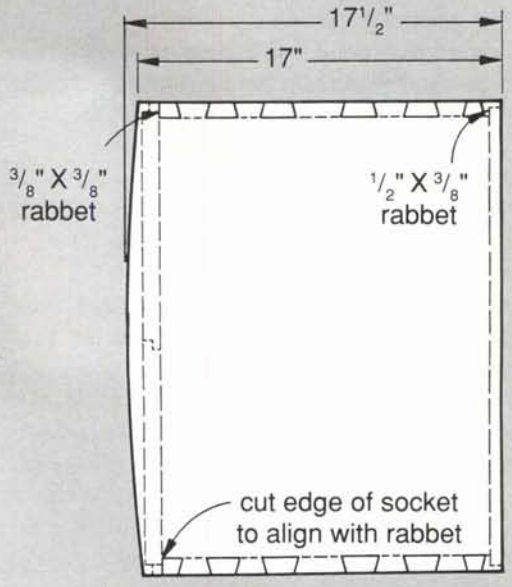
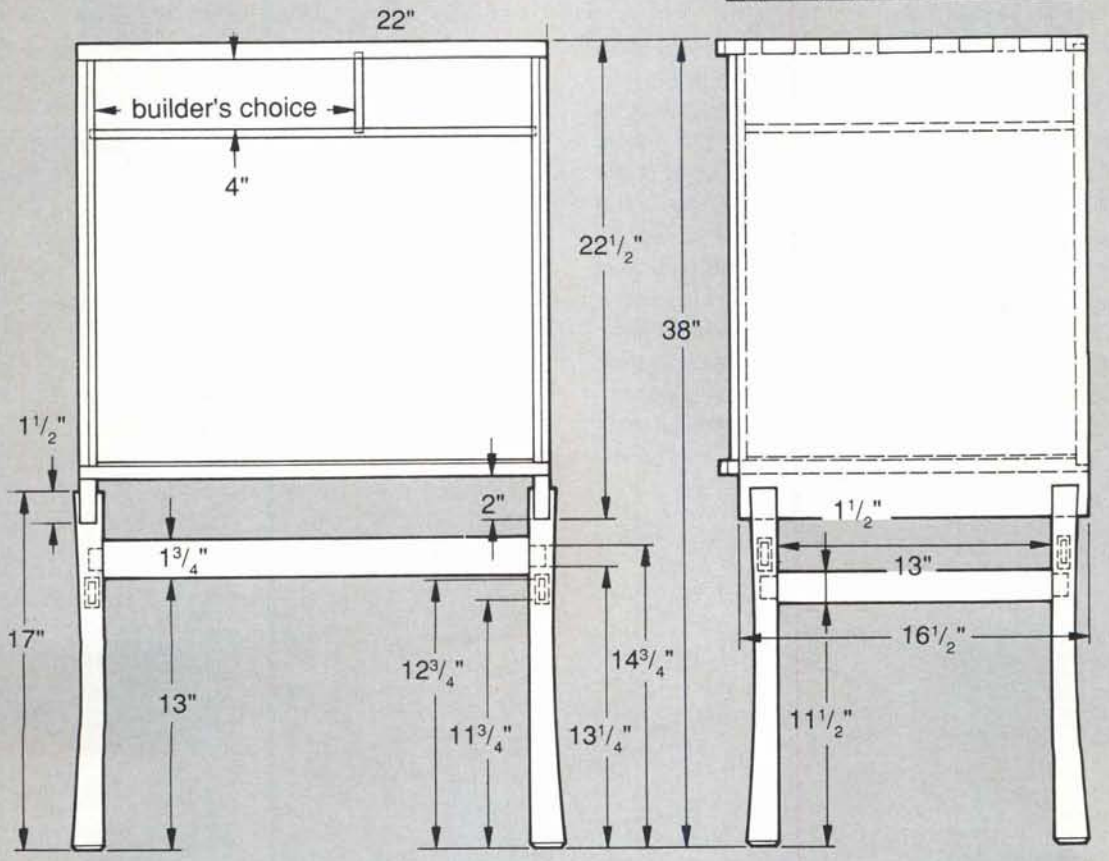


Figure 2. Orthographic Views of the Cabinet



(see the top view in Figure 2). Lay out the slopes of the tails first (with a pencil). Then, with a marking gauge set at the exact thickness of the side panels (A), lightly mark the back edges of the pin sockets. Do this marking on both faces of the panel and at each end. Using a straight edge as a guide and a sharp knife, cut those light markings as deep as you can with one or two strokes. Now go ahead and saw the tails on both ends of the top panel precisely following the knife marks. *[Editor's note: Feel free to use a router and dovetail jig if you have one. Otherwise, for more detailed information about hand–cutting dovetails, see the series of articles on pages 20—26 in Popular Woodworking #38, August/ September 1987.]*

Now finish the dovetail joints by cutting the pins in the sides. As you mark out the pins from the tails, be sure the back edges of the top and sides are flush. On a long joint like this it's essential to be accurate. The best way to be sure is to clamp the pieces in position on the workbench and do the marking with a sharp knife. When you've made the joints fit properly, assemble the top and sides, and mark the limits of the rabbet for the back in the rear edge of the top. Make this cut with a router.

The next step on the top panel is to rout the blind dado for the drawer divider (D). It's 3/8" wide X 1/4" deep and the same length as the drawer shelf dado in the side panels. You will note in Figure 2 that its lateral position is not dimensioned. This is for you to determine. If you want both drawers the same size, make them so. If you want one bigger than the other, do that. This same design flexibility is the reason you won't find finished lengths given for the drawer parts in the cutting list.

It's time to work on the bottom panel. Mark the back edge and the face that will be up. Now cut the 3/8" X 1/2" rabbet for the back frame as shown in Figure 4. Next cut the rabbets on the side and front edges. The easiest way to make these three cuts is on the table saw. Attach a high auxiliary fence to your rip fence and use a sharp planer blade. Set the fence at 5/8" between the fence and blade, and set the blade height equal to the thickness of the side panels. Now run the side edges of the panel through with the bottom (unmarked) surface against the fence (see the photo at right). Without changing the fence position, raise the blade to 1-3/8" and run the front edge through, again making the cut on the top surface of the panel. The next step is to cut notches in the edges that allow the front edge of the bottom to wrap around the side panel (see the second drawing in Figure 4). The length of the notch, back to front, should equal the width of the side panels. The width of the notch should be such that the width of the remaining rabbet is equal to the depth of the dado in the side panels. This sounds complex, but if you study Figure 4 carefully, you won't have any trouble. The last operation on both the top and bottom is to lay out and cut the curve on the front edge. Once you've done this, dry assemble the basic case and set it aside.

The doors (E) come next. Lightly joint the edges you have designated to be the meeting edges. Rip the panels to equal widths so that the overall width of the two pieces fits into the door rabbet on the case. Cut them to a length that is 3/64" shorter than the height of the door opening. Be sure the case is absolutely square when you do this. Cut a 3/8" X 3/8" rabbet on the inner meeting corner of the right–hand door as shown in Figure 5. Now cut a 3/8" X 3/8" strip and glue it to the inner meeting corner of the left–hand door so that it fits into the rabbet you have just cut in the right–hand door. The reason for doing it this way instead of

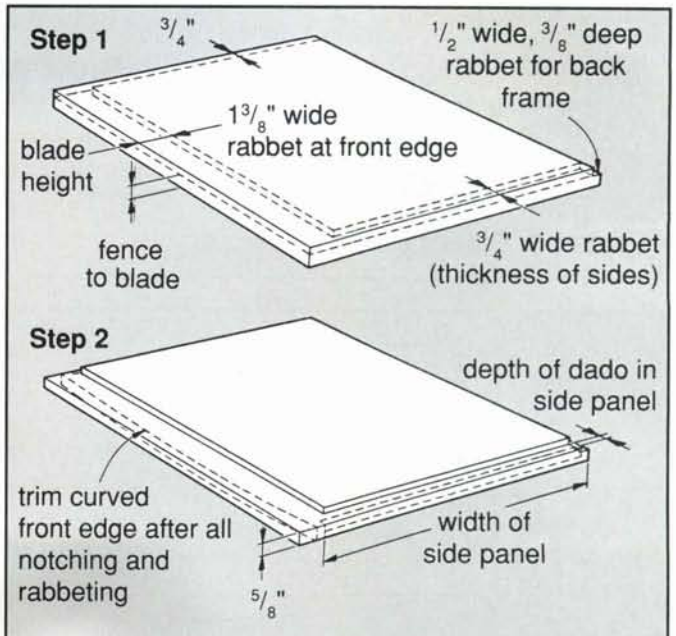
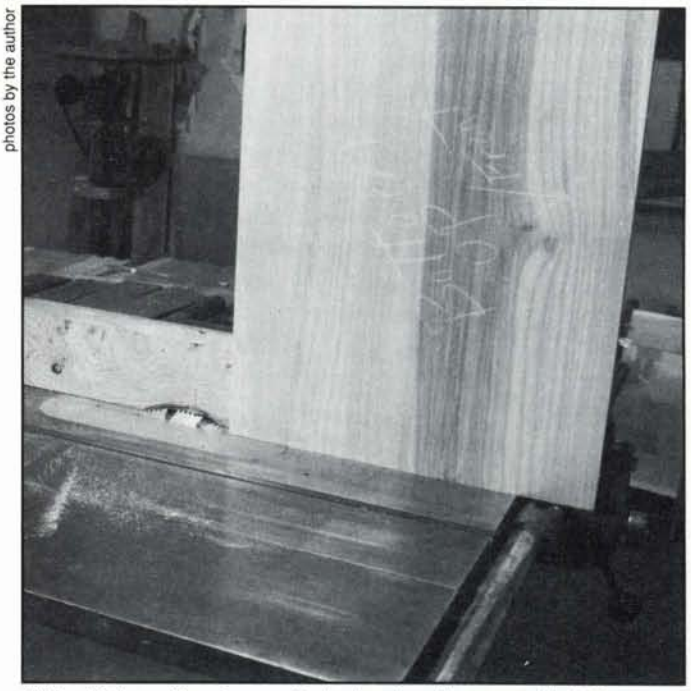


Figure 4. Preparing the Bottom

photos by the author



With a high auxiliary fence attached, set up the saw with 5/8" between the fence and blade; set the blade height to equal the width of the desired rabbet, and run the panel through on edge.

cutting an opposing rabbet in the left door is so you won't spoil the matching grain pattern you have created on the doors.

Time to hang the doors. As you can see from the material list, we are using L–shaped knife hinges. These are necessary because of the half-recessed doors. Mark with a knife the position of the hinges as shown in Figure 6 while the case is still assembled (use the hinge as a template), then disassemble the case and use a small chisel to mortise one blade flush with the surface of the bottom panel. Position them on the doors, mark and then mortise one blade flush. A tip: when the mortises have been cut, screw the hinges in place in each mortise, then remove them. Doing this with all pieces disassembled "sets" the holes

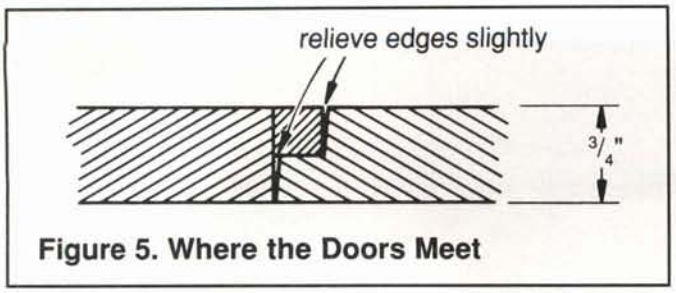


Figure 5. Where the Doors Meet

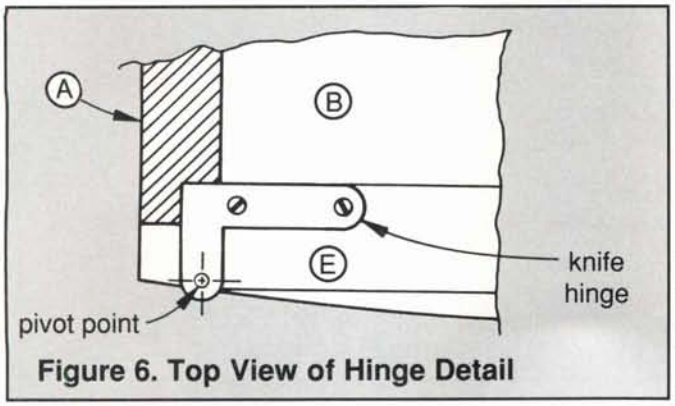
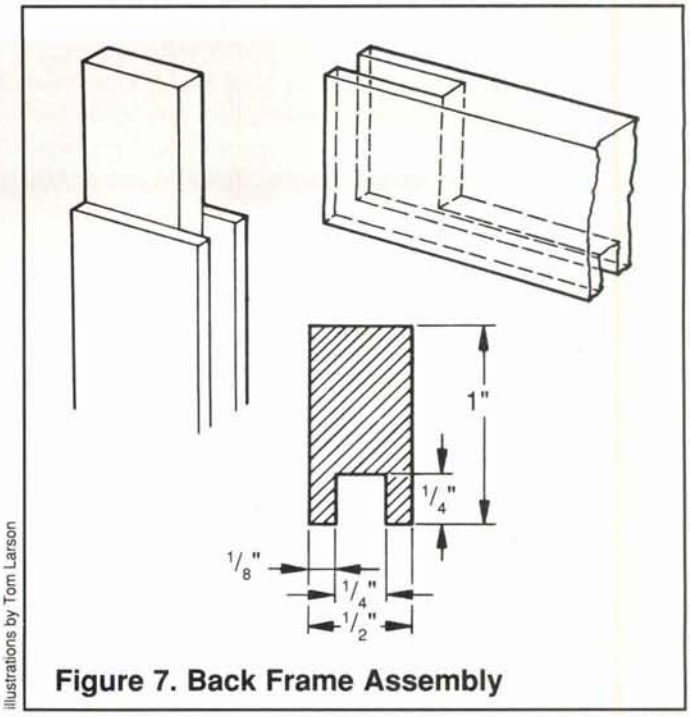


Figure 6. Top View of Hinge Detail



illustrations by Tom Larson

Figure 7. Back Frame Assembly

where they "ought" to be. This will make it much easier to put everything together later on.

The drawer shelf (C) and divider (D) come next. Resaw the necessary pieces to finish 3/8" thick. Glue them up as one panel long enough for both pieces. The grain should run across the cabinet. A thin panel like this will require extra sets of clamps and supports. I put wax paper between the supports and the panel. Just tighten the support clamps lightly. When the glue has dried, clean and smooth the joints, and cut the shelf to size. The shelf should have a sliding fit in its dado. Notch the front corners (3/8" X 1/2") so that the shelf will come forward flush with the door rabbet (see Figure 1). With the case dry assembled (and squared up), and the shelf in place, transfer the position of one edge of the divider dado in the top (B) to the shelf using a try square. Rout this 3/8" dado the same length as the one in the top, but only 1/8" deep. With the shelf in place, measure the width and length of the divider (D), cut it to size, and notch its front corners so that it will come flush with the front edge of the shelf.

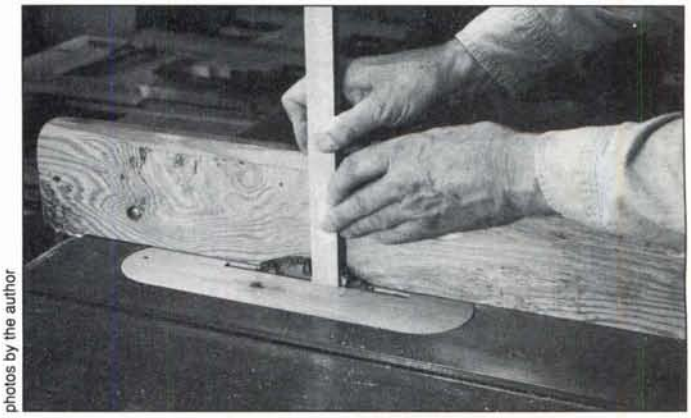
At this point, you should finish sand all of the parts you have built so far. Lightly round all exposed corners. If you have been careful with your planing and jointing, you can start with 80-grit paper and finish with 150-grit. You can now glue the basic case together. Be sure it's absolutely square by measuring corner to corner inside the case. If the two measurements are dissimilar, run a long bar clamp across the longer diagonal to pull it square.

Now that the basic case is in finished form you can rehang the doors and fit them properly. Screw the bottom hinge to the door and the top hinge to the case. Now with the hinges open ninety degrees, tilt the bottom hinge into its mortise on the case and slide the top hinge into its mortise on the door. Run the screws into the top hinge; then screw the bottom hinge to the case. You should slightly relieve the meeting edges of the right–hand door as shown in Figure 5. Take off the left–hand door to cut the finger recess as shown on the drawing. You will also want to install a 1/4" bullet catch under the right–hand door. Place it about 1" from the meeting edge.

The Back Assembly

As the final part of the case, we'll build the back frame–and–panel assembly. The four frame members (F) are finish–milled at 1/2" X 1". Cut them to exact length by measuring from the case—forget about the drawing and the cutting list. As you prepare the stock, make an extra length and cut it into at least three pieces. You will use these scraps to test the setups that follow. Put the high auxiliary fence on the rip fence and put a 1/4" dado blade on the saw. Set the dado blade at 1/4" height and the fence so that you cut the groove in the exact center of the edge of the frame members as shown in Figure 7. After ploughing the groove in all four pieces, do not change the saw setup except to raise the blade to 3/4". Decide which pair of frame members will have the open mortises and, running the piece vertically through the setup, cut these mortises on each end of the two members. *[Editor's note: The author, a craftsman with many years' experience, feels comfortable making these cuts as shown in the photos. Making a wooden throat plate that fits snugly around the blade is essential. We also recommend using a tenoning jig as*

Cut a 1/4" groove down the middle of the frame members; then using the same setup, raise the blade to cut the open mortises on the ends of two of them.



photos by the author

Jig Journal

Tenoning Jig

by David M. Camp

I made this simple jig out of scrap wood in about 20 minutes. It's basically a wood sandwich that straddles the fence. The vertical base is a piece of 3/8" plywood approximately 11" X 14". (Adjust yours to suit your needs, as well as to whatever scrap you have on hand.) Another piece of plywood attached to a filler piece that's just a tad thicker than the fence holds the base snug to the fence.

Glue the jig together in place over the fence, then attach a 1 X 2 backup block to the vertical base,and check to make sure that it's square to the tabletop.

To use the jig, lock the fence into position while measuring from the blade to the base. Hold the workpiece against the backup block, and push the jig along the fence to make the cut.

David M. Camp *is the Editor of* Popular Woodworking.

described in "Jig Journal" above). Now raise the blade to 1" and set the fence for 3/8" between fence and blade to cut the tenon cheeks. It will take two cuts on each end. If you have made test cuts in the scrap as you went along, your joints should fit snugly without much adjustment. If they're too tight, use a chisel to shave some off the tenon rather than the mortise; it's easier. Dry assemble the frame, and see that it fits into the rabbet on the case. If it's a little tight, don't worry about it now, you can clean it up later after the frame is glued up.

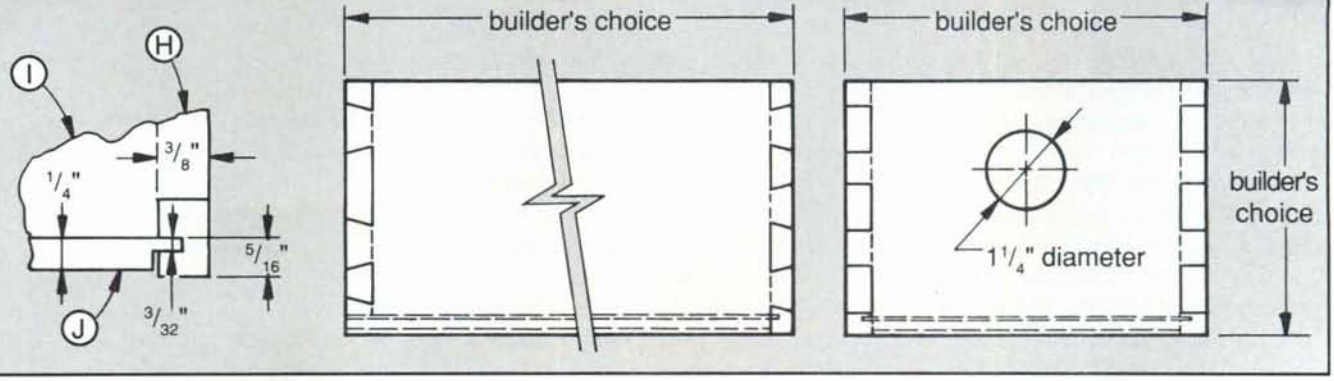
The back panel (G) is made the same way as the other panels in the project. Resaw the necessary number of pieces and dress them to 5/16" thickness. When the glue has dried, clean and smooth the joints, and cut the panel to be 1/16" narrower and shorter than the space in the frame as measured from bottom of groove to bottom of groove. Fitting the panel to the groove is done by setting the saw blade at 5/16" high and the fence a shy 1/4" from the blade. Now run all four edges through with the inside face of the panel against the fence. Be sure and test this setup before cutting the panel. You want an easy fit in the groove but not sloppy. Dry assemble the frame and panel, and make sure everything fits and is square. Take it apart and apply glue to the frame joints. Do not put any glue between the panel and the frame; it must "float" in the frame. When dry, clean up the back assembly, and fit it into its rabbet in the case. It should be fastened with #5 X 3/4" brass flat head screws, say, three to a side. If you're going to use the cabinet for TV or stereo, drill a 1-1/2" hole for the plug in one of the bottom corners of the panel—not the frame.

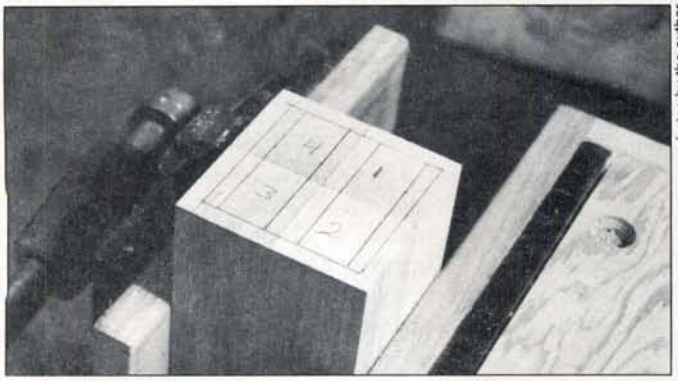
Making the Drawers

As previously mentioned, I used walnut for the drawers in my cabinet. Whatever wood you use, dress the pieces to 3/8" thick. The length and width of the drawer sides (H) and ends (I) will be determined by the size of the drawer pockets you have created. Note that we are using through dovetails here, as in the case, so cut these pieces accordingly and fit them to the pockets. It should be an easy fit, but not sloppy. As for the joints, cut the tails on the sides and the pins on the fronts and backs (see Figure 8). In laying out the tails, note that they are not the same front and back. This is important; be sure and do it as shown. As before, cut the tails first, and mark the pins from them. When the joints have been cut and fitted, cut the groove for the bottom. It should be 1/8" wide X 3/16" deep and located with its upper edge 5/16" from the bottom edge of the drawer (see Figure 8). Please note that while on the drawer sides and back the groove goes all the way through, on the front it must be stopped, or it will show on the outside. When the grooves have been cut, rip off the bottom edge of the drawer backs to the top of the groove. This is the time to drill the 1-1/4" finger pull hole in the drawer fronts. Then finish sand the drawer parts, assemble them and try them in the drawer pockets. When you have an easy fit, glue the pieces together. Again, be sure they are square. After assembly, lightly round all exposed edges including both edges of the finger pull holes.

Now make the drawer bottoms (J) from 1/4" thick stock. Glue up the necessary panels and size them to fit your drawers. Rabbet the two side edges and the front edge to fit the grooves. (Use the same method as with the cabinet back panel). Slide the bottoms into place and fasten them at the center of the drawer back with a #3 X 1/2" brass flat head wood screw.

Figure 8. Drawer Construction





photos by the author

Put the legs together with their jointed faces touching to mark them for orientation.

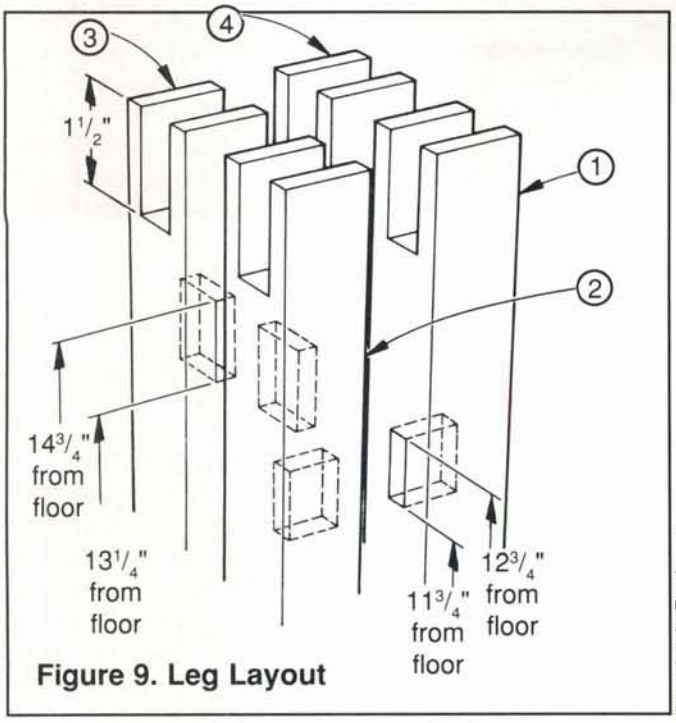
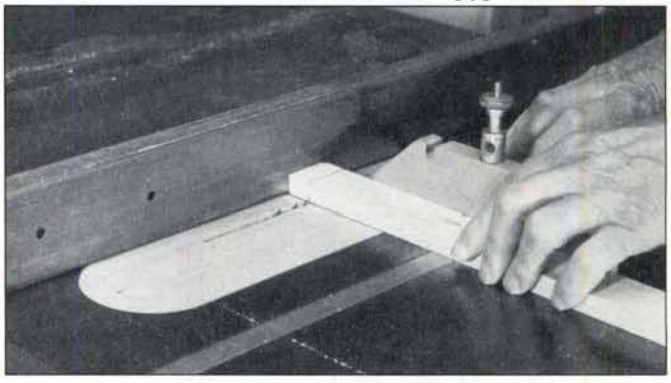


Figure 9. Leg Layout

illustrations by Tom Larson

Cut the open mortises slightly thinner than the thickness of the side panels, and pare them with a chisel for a snug fit.

Cut the shoulders of the tenons; then use a tenoning jig to cut the cheeks.



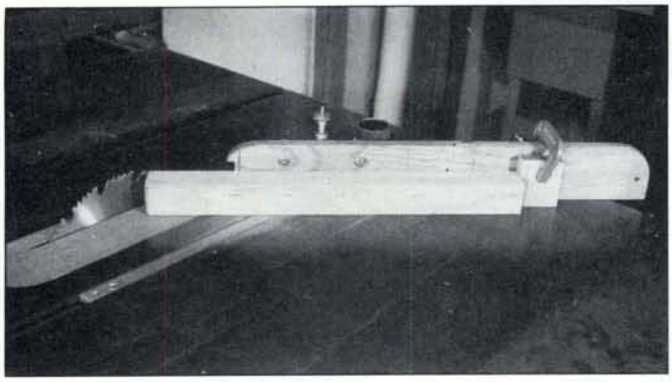
The case is complete except for finishing and can be set aside while you build the base. If you are going to use shelves with the cabinet, now is the time to make them. They can be anywhere from 1/2" to 3/4" thick depending on what you plan to put on them. Glue them up as you did the panels and cut them to size so that they fit easily. I prefer the spoon-shaped shelf supports over the L-shaped. However, use what you can get.

The Base

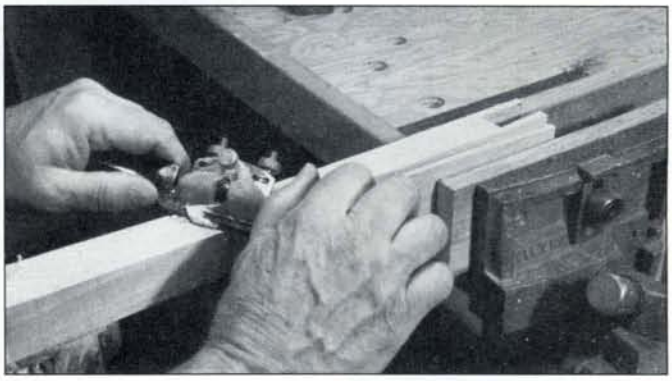
The first operation on the base is to cut all parts to finished size. Start with the legs (K). Joint two adjacent faces of each and be sure that these faces are square with each other. With the jointed faces against the fence, rip each leg to 1-1/2" square and cut them all to correct length. Decide which end will be the top; standing the legs upright with this end up, form them into a square with all jointed faces touching each other (see the photo above). Now, number the legs, starting with the right rear one, in a clockwise direction. Also mark legs 1 and 2 to indicate the mating faces, and do the same with 3 and 4. Legs 1 and 2 will be the rear and front legs on the right side and 3 and 4 will be the front and rear legs on the left side. This is very important because you will cut three mortises in each leg, and if they are not properly placed, you will have ruined them (see Figure 9 and Figure 2). Cut the large through-mortise in the top of each leg that fits over the side panel of the case (A). Measure the thickness of your panel and if it's 3/4" or more, use 3/4" width in the dado blade. If it's less than 3/4" use 11/16" width in the blade. The panel must fit snugly over this mortise, and you will want the cut to be a little undersize so that you can create the proper fit. Set the dado blade at a height of 1-1/2". With the high auxiliary fence in place, set the fence 1/4" from the blade and feed the legs through in a vertical position. *[Editor's note: Again, we recommend using a tenoning jig.]* This is a rather heavy cut, so feed slowly, and don't forget to check your markings so that you get the cuts in the right position. Do not do any shaping of the legs at this time.

Finish the side stretchers (L) at 14-1/2" long, but do not cut the front and rear stretchers (M) to length yet. Position the two front leg blanks (2 and 3) on the case. Measure the distance between them where they fit over the sides. This is the distance between shoulders on the front and rear stretchers. Add on 3/4" at each end for the tenons, and cut them to that length.

Now you can cut the tenons. The easiest way is the method we used to cut them on the back frame members. But first set your table saw blade height at 1/8" and your rip fence at 3/4" to the outside of the blade, and using your miter gauge for squareness,



Use a stop block with the miter gauge set at 45° to chamfer the ends of the legs.



Smooth the curved outer surfaces of the legs with a spokeshave.

run the flat sides of both ends of all stretchers through this setup (see the photo below left). Now, raise the blade to 1/4" height and run the pieces through on their edges. This will assure square shoulders on the tenons. Now cut the cheeks of the tenons as before. In this kind of a cut, always have the waste wood on the outside of the blade, never between the blade and the fence. It is best to make the face cuts first, then the side cuts.

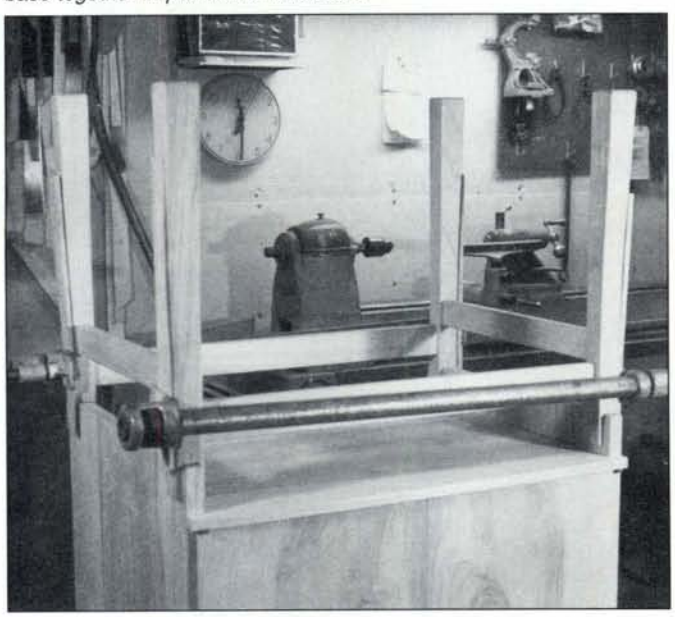
Using the tenons you have just cut as templates, lay out the mortises on all four leg blanks, marking them with a sharp knife. Remember, there is only one straight corner on each leg; all the stretcher mortises—whatever their position vertically—should be 3/8" from this corner.

I have found that the easiest way to cut blind mortises is to drill out most of the waste and then pare the sides to the line by hand with a sharp chisel. I also cut my mortise slightly deeper than the length of the tenon. This makes for a better fit and allows the shoulder to seat firmly.

Finally, cut the small bevels at the bottom of the legs as shown in the photo above. Set this up with the miter gage at 45° and a stop to position the leg correctly. At this point, dry assemble the base, and see that it fits properly on the case.

At last it's time to shape the legs. Make a full–size template from the pattern in the PullOut™ Plans section in the center of this magazine. Trace the pattern on one of the rough faces of the leg with the curve facing away from any mortises. Bandsaw to the curve. Now trace the template onto the newly sawn surface, and saw to this curve. Save several of the waste pieces; they will be very helpful for holding the legs in the vise while working on them. Smooth the sawn surfaces with a spokeshave. If you don't have this tool you'll have to use a file followed by 50–, then 80–grit sandpaper. My advice is to get yourself a spokeshave. They're not expensive and they're very handy tools. The next step is to slightly round all the edges. This will proceed much faster with a spokeshave. As a last step, sand all over with 150-grit paper. Be careful around the stretcher mortises not to alter the flatness of the surface.

Use the scrap from bandsawing the legs as clamp pads, and put the base together in position on the case.



Again, assemble the base dry and then put it on the case, just to be sure everything fits properly. Glue the side stretchers first. When they are dry, apply glue to the front and rear stretchers and place the assembly in position on the case. Then clamp across the front and rear stretchers. The waste pieces from the legs work well as pads under the clamps. When this has dried, you can glue the base to the case. Glue only the front legs to the cabinet sides. With changes in climate conditions, the case sides will expand and contract across the grain; if the back legs are not glued, then the side panels are free to move. In order to compensate for the lack of glue, the fit between the legs and the side panels has to be very snug.

Finishing the Job

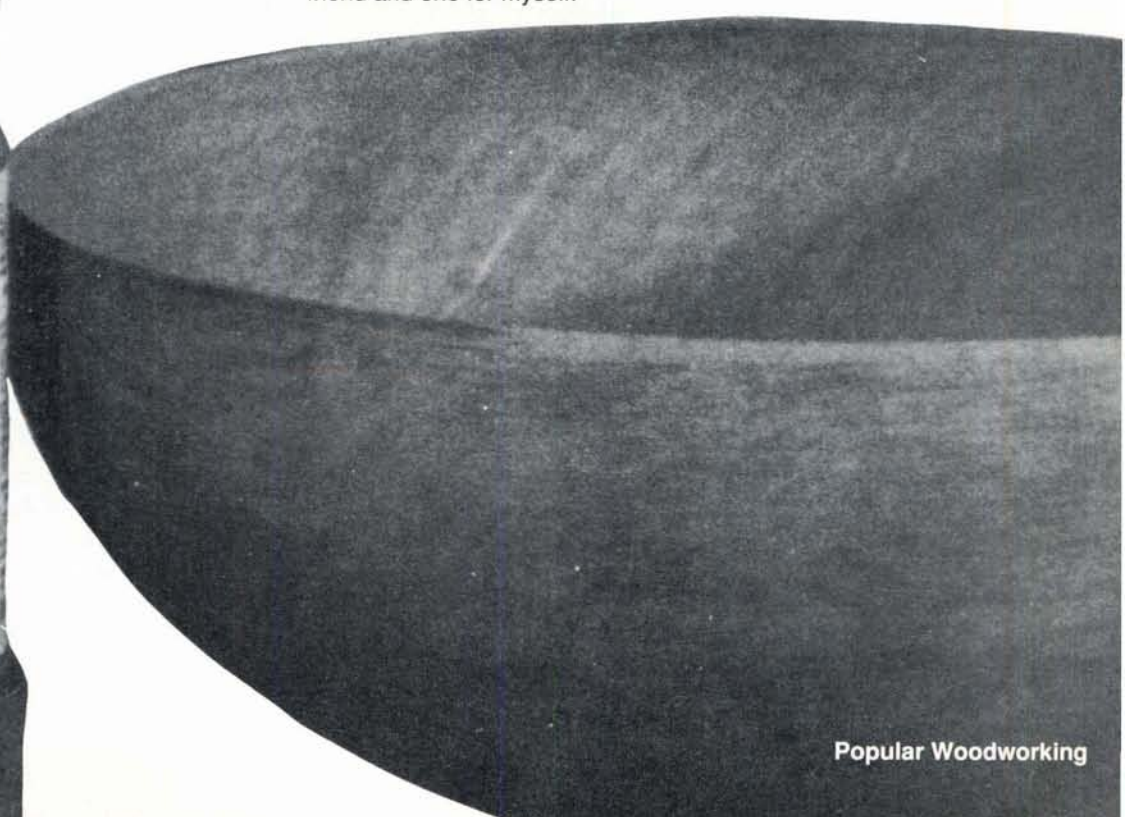
Everybody has their own ideas about finishing. I'll give you the finish I've developed over ten years as a professional furniture-maker. First, I never use any kind of stain. It will muddy the grain patterns you have gone to so much trouble to create. As far as I'm concerned, the beauty of the wood lies in the grain patterns and its natural color. The schedule with which I have been most successful is very simple. It consists of numerous coats of Tung Oil Finish, hand rubbed into the wood. Allow 24 hours for each coat to dry and if you feel any roughness, rub gently with very fine steel wool till it's gone. (Always rub the entire panel, otherwise you may wear in a light spot which will be very difficult to get rid of.) The reason I say "numerous" coats is that different woods absorb at different rates. Put on however many coats you need to get the amount of gloss you want. (Tung Oil Finish is different from plain tung oil. Be sure you get the Finish). Lastly, soak some cheesecloth with Old English Lemon Oil Polish and rub the entire cabinet with it. Keep this cloth in a plastic bag and, from time to time, rub not only the new cabinet, but all your wood furniture with it. It works wonders. PW

Household

by Harold W. James

I was sitting in my workshop one day with my hands sticky from the tung oil wood finish I had been applying with my bare hands and a rag. I wasn't happy about bathing my hands in solvent, but I had run out of plastic gloves and was too impatient to wait for more. I remembered reading a short article in a magazine on using pure vegetable oil as a wood finish (this article is available in the collection *Fine Woodworking on Faceplate Turning,* Taunton Press). It seemed like an idea worth trying—a natural, workable, garden–derived finish for wood. I sorted through piles of paperwork but couldn't find the article. So I decided to work with what I remembered.

With my curiousity heating up, I bought some Hain expeller–pressed walnut oil from the local health food store. The clerk sure raised an eyebrow when I told her what it was for. I took it home, heated it in a pan until it smoked, and brushed it on three cherry cereal bowls I had fashioned on my lathe—two to fill an order from a friend and one for myself.

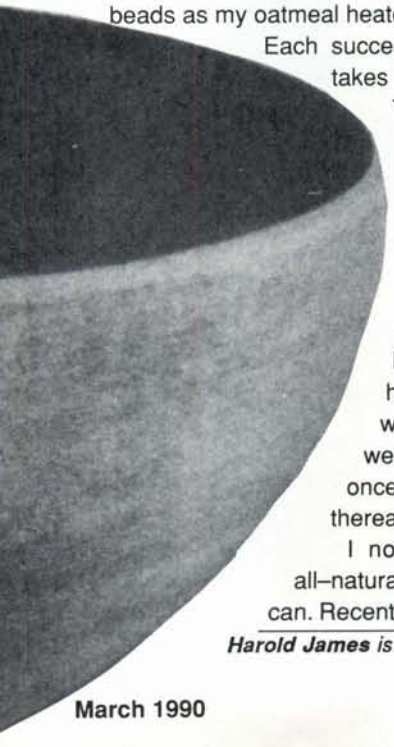


Cooking Oils as Wood Finishes

It fizzed on the wood as the hot oil boiled some of the water still in the kiln–dried wood. The high temperature oil penetrated well despite its thickness. (Commercial oil finish primer coats are usually thinned to about 20% oil content to help penetration.) The oil brought out the wood's color beautifully. After a few minutes I wiped off the excess.

Later, as I used the bowl, I discovered a few important facts about the use of cooking oil as a final finish. So that it will dry relatively hard, pure vegetable oil needs to be heat–treated. Walnut oil is said to respond best. After heating the oil to smoking temperature the first time, I applied left over, room temperature "cooked" oil to several pieces and got results that were as good as hot applications of "cooked" oil. I now cook larger quantities of oil and store it—air tight so it won't congeal—for later use. Getting the oil to dry relatively hard is also a problem for commercial manufacturers. In many cases, they use chemical agents in the mix to facilitate drying in spite of the natural tendency of the particular oil. Oil finishes described as "polymerized" are also heat–treated for increased hardness.

Pure oils can be used without heat–treating but only if the wooden item will be used with cold foods. When I recoated my cereal bowl after the first coat wore off, I tried using uncooked oil. It worked well until I subjected it to the hot cereal test. While holding the bowl in my hands and eating, I was surprised to notice that the bottom of the bowl felt warm and slippery. The oil that had soaked into the bowl when I recoated it was now oozing out in little beads as my oatmeal heated up the bowl.



Each successive coat of heat–treated oil takes longer to dry than the previous. The first coat dries in days, the second in weeks, and the third in months. Even with heat–treating, the oil does wear off during use. With daily use and washing, I noticed that mine wore off in about a month. On a bottle of Adams linseed oil I read an oil finishing adage, but have yet to try it—coat your wooden items "once a day for a week, once a week for a month, once a month for a year, and yearly thereafter."

I now use walnut oil and other all–natural finishes whenever I possibly can. Recently I finished my first non–kitchen item, a tulip poplar footstool, in walnut oil. The reasons for my finish choice are both aesthetic and ecological. First, to me wood has many of the qualities of human skin. Its color, shape and smoothness look good to the eye and feel good in the hand. Unlike ceramics or metal, wood quickly returns heat to the hand that touches it. It has never seemed right to me to cover wood with what would be poisonous to human skin. Of course, 2 X 4's do not usually evoke this sort of passion.

Second, it bothers me to use a finish that pollutes the air, not to mention my lungs, when the solvents evaporate. I feel good about being able to lessen my contribution to pollution, even when it's to a small extent. In the same ecological vein, it is no small thing that my money is now going to encourage someone to nurture walnut trees.

An essay about the well–known woodturner Richard Raffan in *Master Woodturners* by Dale Nish (Artisan Press) noted that he also uses household cooking oils to finish his work. He gave two reasons for preferring this as his main finish. It encourages people to *use* the wooden product, rather than just look at it. And it allows the wood to have some contact with the air, food and cleaning substances. This contact results in deepening color in the wood. With age it will attain a unique character. It is good to design with useful, venerable aging as a goal. Nicks and stains from the hands of a loved one are what make an heirloom more valuable than the best new item.

Another interesting benefit of using a finish that leaves the wood grain open is the possibility of introducing herbal oils into the wood's surface. I know of two specific examples of this practice. American colonists used to rub their kitchen tabletops with Tansy leaves to leave the piney Tansy scent as a fly repellant during mealtime. Also, some cooks rub individual salad bowls with garlic cloves and oregano leaves to impart a subtle flavor to a salad topped with oil and vinegar.

These days I feel better about my sylvan craft. It seems more in harmony with the rest of my life; I can take my careful attitude toward the environment with me into my workshop and come out with some deeply satisfying woodwork. Using this pure finish seems to tie everything together—the garden, the forest, the kitchen and the woodshop.

Here's one final suggestion—if you don't find such a primitive method as I have described here appropriate for your needs, but you still want a more natural way to finish your woodwork or refinish an antique, you might order a catalog from Livos and try one of their products. They're all–natural and are claimed to produce a refined, usable finish. I cannot vouch for them, but they sound serious, and they are rather expensive (Livos Plant Chemistry, 614 Agua Fria St., Santa Fe, NM 87501). PW

***Harold James** is a woodworker in Somerville, N. J.*

The Third Dimension of Two–Point Perspective

horizon

by William H. McMaster

In the last issue we developed a pattern for the carving of a California fishing boat in two–point perspective. This pattern is now given in its full size below. However, the pattern only represents a two–dimensional rendition; and since our carving is three–dimensional, we still must plan for the extra dimension. In this article we continue the project and discuss techniques of foreshortening and three–dimensional depth perspective that create the illusion of reality in a carving plaque that is only three quarters of an inch thick.

Foreshortening

The dictionary definition of foreshortening is "to shorten by proportionately contracting in the direction of depth so that an illusion of extension in space is obtained." This definition outlines the initial steps for proceeding from the two–dimensional representation of the pattern to the foreshortened pattern in the third dimension.

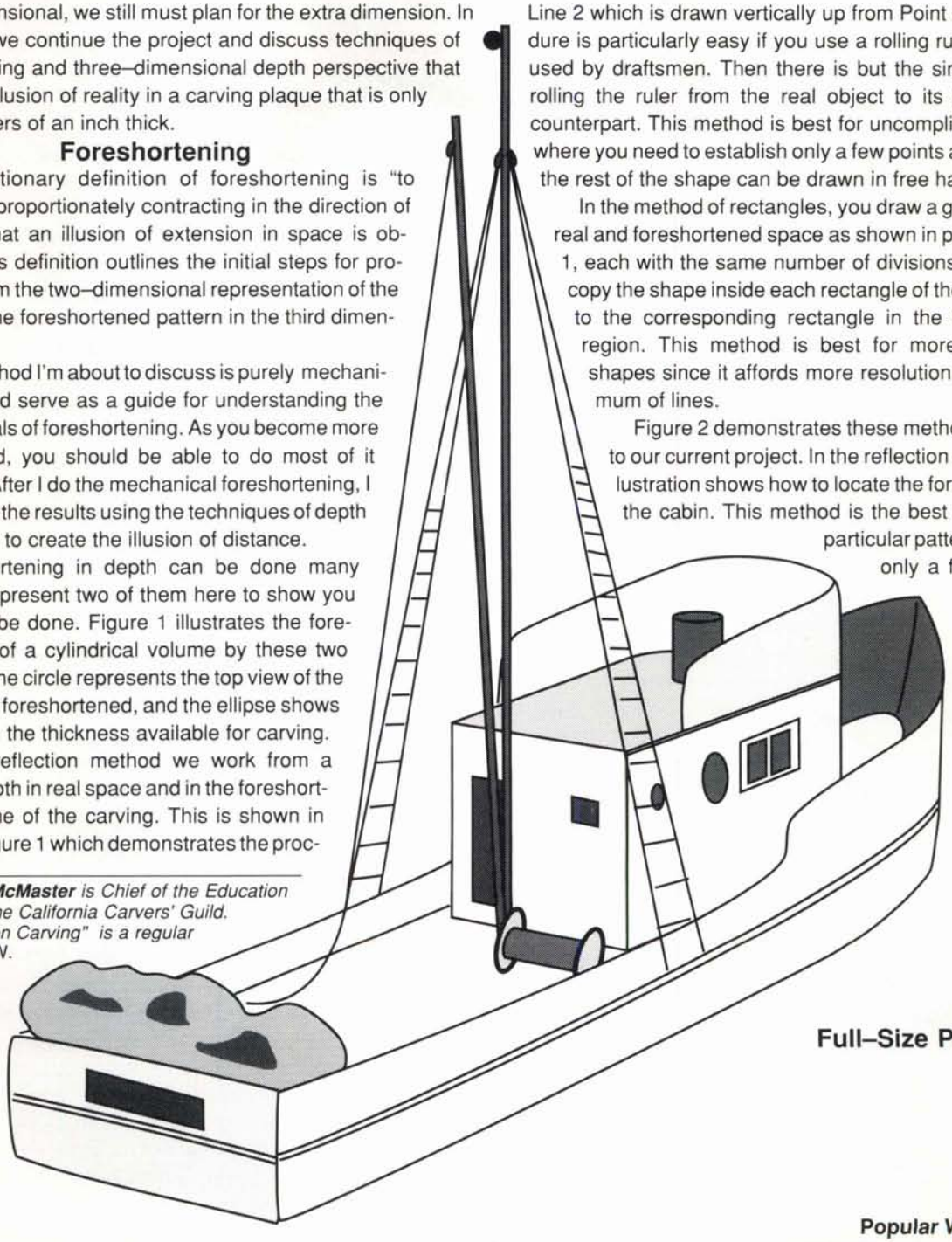
The method I'm about to discuss is purely mechanical. It should serve as a guide for understanding the fundamentals of foreshortening. As you become more experienced, you should be able to do most of it intuitively. After I do the mechanical foreshortening, I then modify the results using the techniques of depth perspective to create the illusion of distance.

Foreshortening in depth can be done many ways; I will present two of them here to show you how it can be done. Figure 1 illustrates the foreshortening of a cylindrical volume by these two methods. The circle represents the top view of the object to be foreshortened, and the ellipse shows the result in the thickness available for carving.

In the reflection method we work from a diagonal, both in real space and in the foreshortened volume of the carving. This is shown in Part A of Figure 1 which demonstrates the process of finding the location of point A on the circle, on the ellipse of the foreshortened object. You do this by finding the intersection of two lines drawn from Point A. Draw line 1 horizontally to the diagonal, reflect it vertically up to the diagonal of the carving volume, and from there reflect it horizontally to where it intersects Line 2 which is drawn vertically up from Point A. This procedure is particularly easy if you use a rolling ruler of the type used by draftsmen. Then there is but the single motion of rolling the ruler from the real object to its foreshortened counterpart. This method is best for uncomplicated designs where you need to establish only a few points accurately and the rest of the shape can be drawn in free hand.

In the method of rectangles, you draw a grid on both the real and foreshortened space as shown in part B of Figure 1, each with the same number of divisions. Then simply copy the shape inside each rectangle of the actual space to the corresponding rectangle in the foreshortened region. This method is best for more complicated shapes since it affords more resolution with the minimum of lines.

Figure 2 demonstrates these methods as applied to our current project. In the reflection method, the illustration shows how to locate the forward corner of the cabin. This method is the best suited for this particular pattern since it has only a few prominent

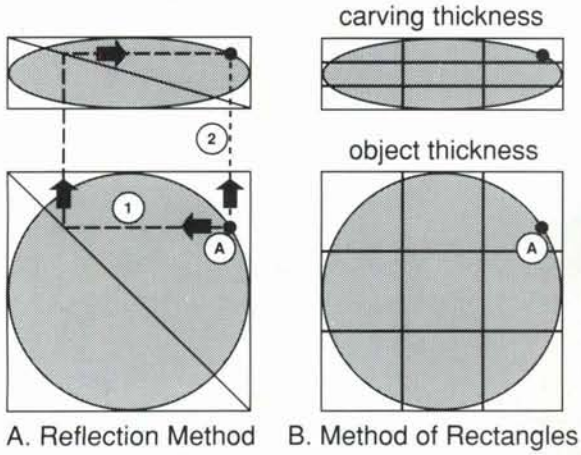


Full–Size Pattern

William H. McMaster *is Chief of the Education Division of the California Carvers' Guild. His "Focus on Carving" is a regular feature in* PW.

points to locate, however, either method may be used.

Once you have the top view foreshortened, you then need to do the side view. The method for doing this is shown in the orthographic projection of the carving surface in Figure 3. Here we have used a diagonal reflection line to determine the location of critical points by the intersection of lines from the foreshortened top and front views. When these intersections have been found, we can then sketch in the shape of the foreshortened boat as it would be seen from the side edge of the carving. These three views, shown in Figure 3, are now the basis for the carving; however, there are still some problems. The stern sticks way out in front of the background. How do we phase in the water? These problems will be solved using the principles of depth perspective.



A. Reflection Method B. Method of Rectangles

Figure 1. Methods of Depth Foreshortening

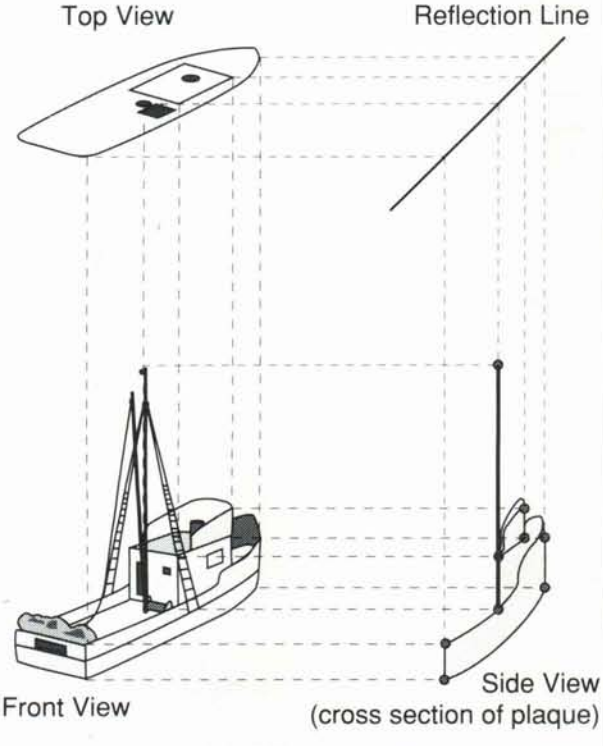
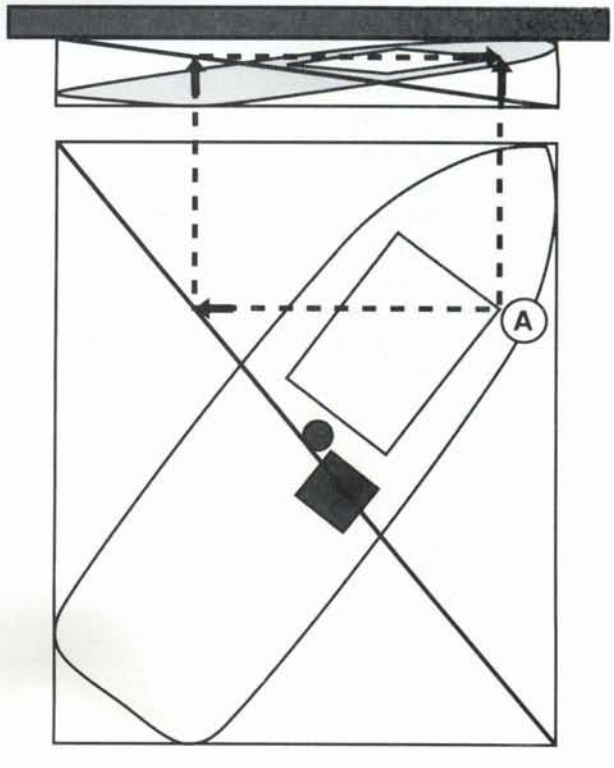
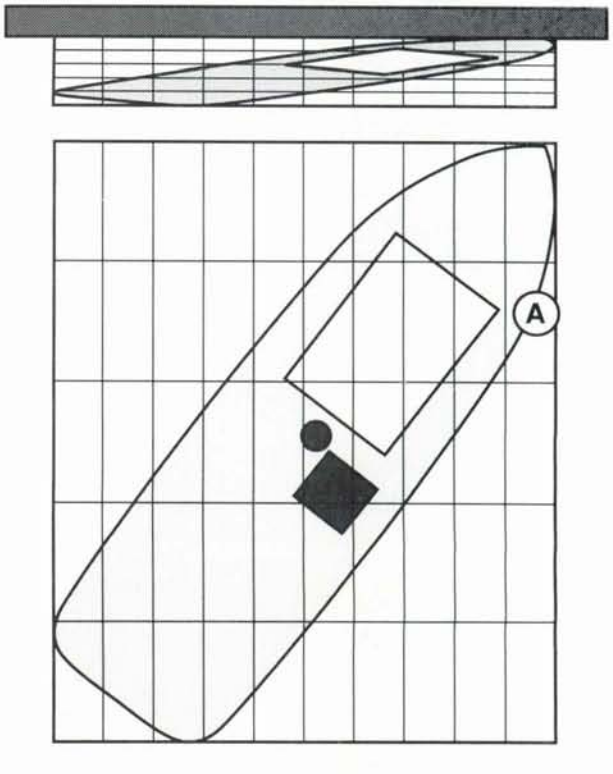


Figure 3. Orthographic Projection

illustrations by the author



Reflection Method



Method of Rectangles

Figure 2.
Methods of Foreshortening the Pattern

Depth Perspective

Perspective involves representing the spatial relationships of objects as they might appear to the eye. In the previous article we *discussed* how this was done in two–point perspective on a two–dimensional surface. This is known as linear perspective. Now we will extend this process to the third dimension of depth in the wood in a way that I call depth perspective.

Perspective involves the process of reproducing the retinal *image*—what the eye sees. This means that in your carving, the object must lie on the same line of sight as it does in nature. This locates the object on a two–dimensional plane, but not in the third dimension of depth. In Figure 4 you can see that points on an object can be carved at any depth along the lines of sight as they pass through the thickness of the wood and still reproduce the retinal image. However, only a few relationships will provide the correct illusion of depth. The two basic methods for determining the location of points in the third dimension are called direct depth perspective and inverse depth perspective.

Direct depth perspective simply means that the objects that are farther away are carved deeper in the wood. This is the natural approach that we *would ordinarily* think of, because it involves a direct relationship between depth and distance. If this relationship is "linear," then equal depths in the wood correspond to equal distances in the scene. A "non–linear" interpolation would allow the carver to represent equal distances using unequal depths in the wood (more on this in a moment).

Figure 5 shows the relationships using linear direct depth perspective. In the upper view we have divided both the wood

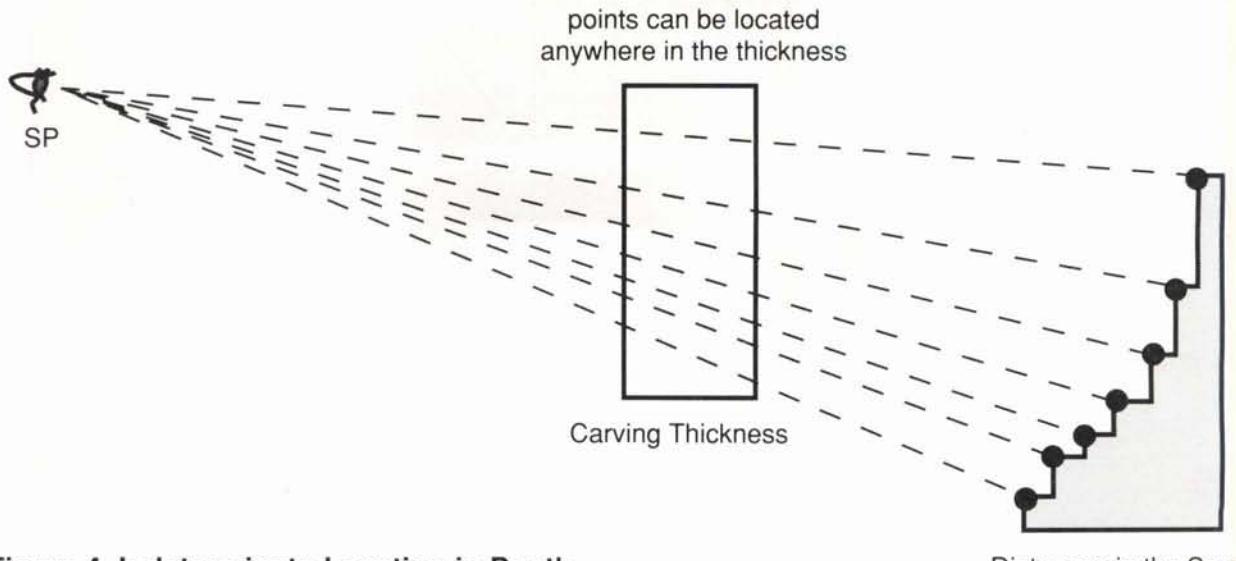


Figure 4. Indeterminate Location in Depth

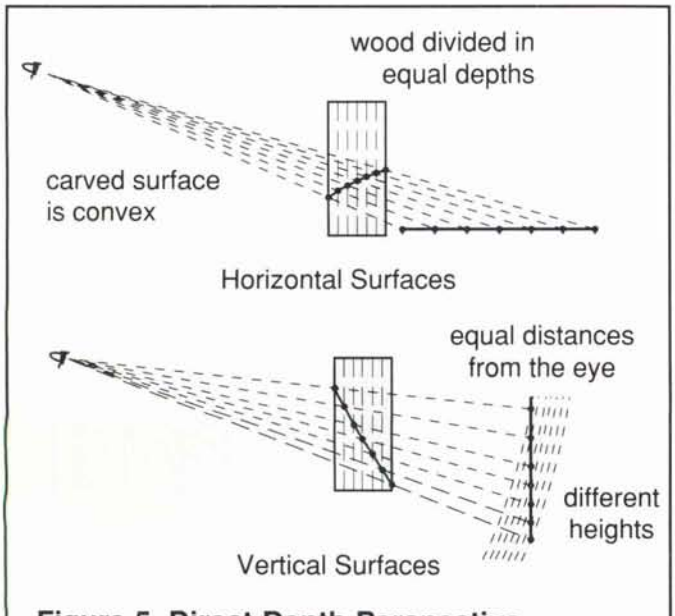


Figure 5. Direct Depth Perspective

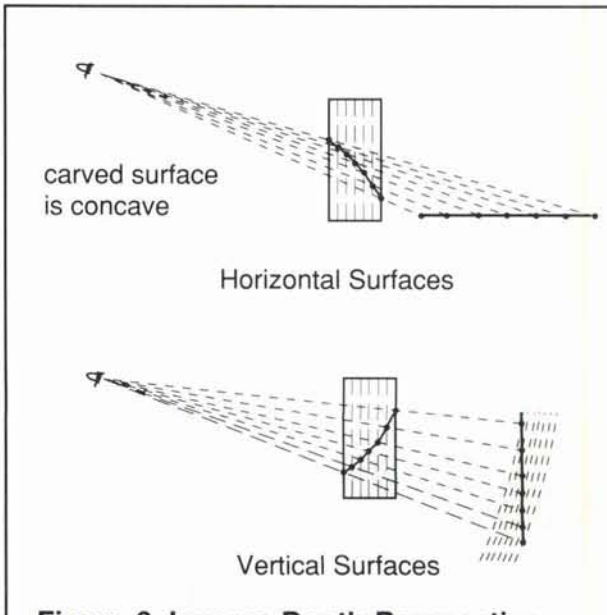


Figure 6. Inverse Depth Perspective

illustrations by the author

and the horizontal portion of the scene into six equal spaces. The intersections of the lines of sight and the depth divisions in the wood determine the shape of the flat horizontal surface of the scene. For the vertical surface in the lower view, I have drawn the lines of sight so that the points intersecting on the vertical plane differ in length by equal segments. These equal increments are then mapped into the depth of the wood. From these two mappings we see that our method leads to an unexpected result—flat surfaces in nature are curved in the carving. For direct depth perspective, the surface is convex.

Inverse depth perspective is a novel approach to providing the illusion of distance in a carving. Farther objects don't necessarily have to be located deeper in the wood. It is possible to carve the more distant objects at the front of the carving and still retain the retinal image. This is shown in Figure 6 where the farthest object is located at the front of the carving. Again, a flat surface in nature is rendered as a curved surface in the carving, but for inverse depth perspective, the surface is concave.

The technique of inverse depth perspective works best when the scene depicts vast expanses of land or water, and when its use is combined with the technique of direct depth perspective. This combination makes a relief carving more effective and interesting, and we will use this combination in our carving of the California fishing boat.

The methods discussed so far use a linear interpolation in the wood. The use of some non–linear interpolation can increase the effectiveness of the illusion. For example, we know that more distant objects appear darker to the eye. We can approximate this effect by increasing the curvature since a more oblique surface will reflect less light and thus appear darker. In order to increase the curvature, use unequal depths in the wood to represent equal distances in the scene, as shown in Figure 7.

Planning the Carving

Figure 8 shows an edge view of the carving using the two different approaches in the same thickness of wood (I'm using more than 3/4" in this example). Part A is based on direct depth perspective, and Part B uses a combination of both direct and inverse depth perspective. By combining direct and inverse depth perspective, the carver has more wood to work with for the carving of the boat. You get the same visual effect as if you had a thicker piece of wood to work with. I've found that the viewer cannot detect this reversal and thus experiences a greater illusion of depth than can be attained by using direct depth perspective alone.

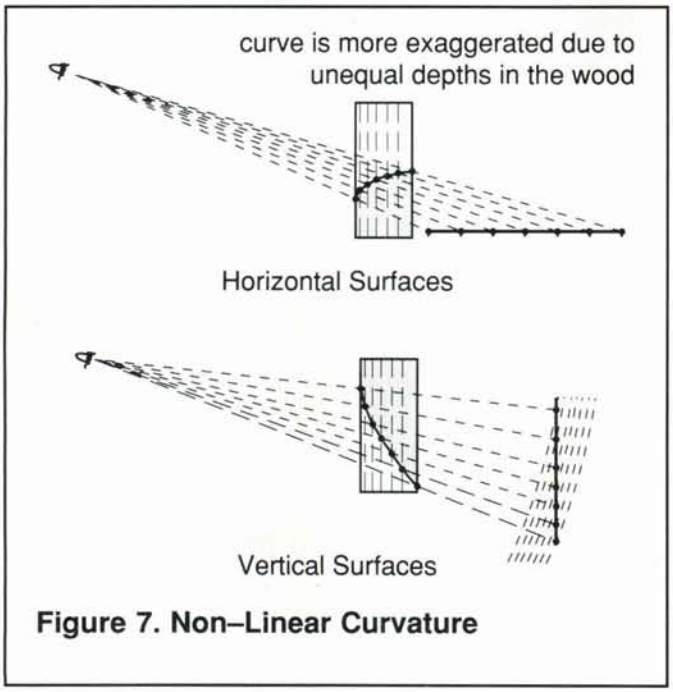


Figure 7. Non–Linear Curvature

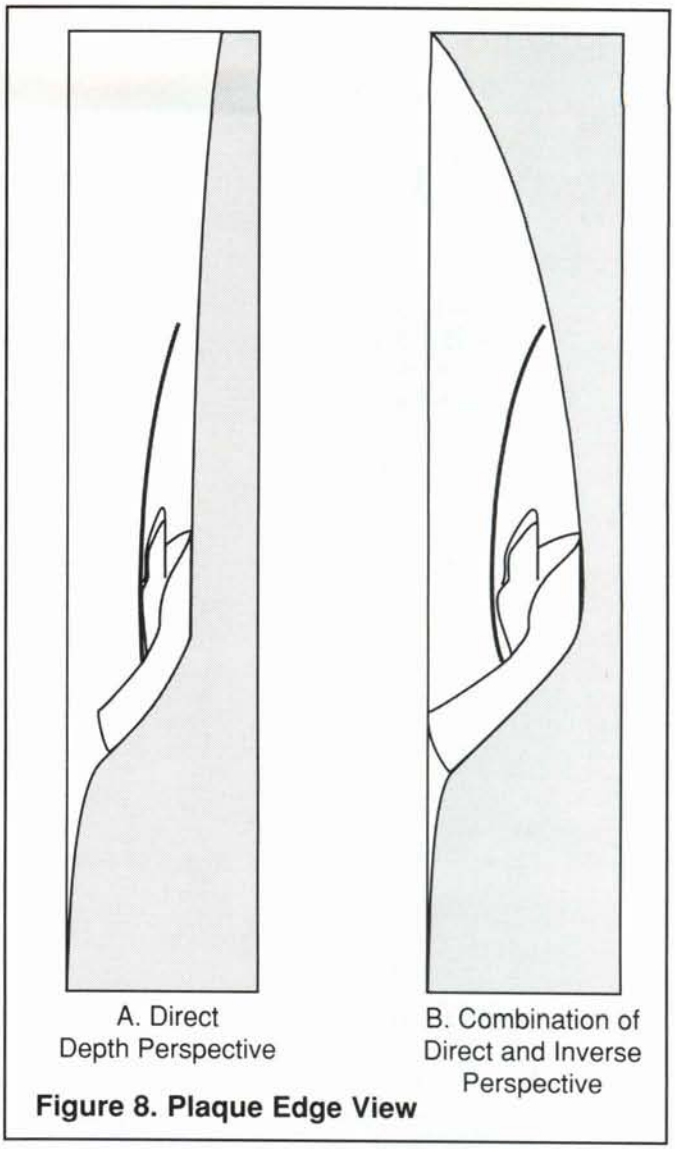


Figure 8. Plaque Edge View

So now that you understand these mechanical means of foreshortening and depth perspective, you're ready to start carving the fishing boat, right? Wrong. This mechanical approach isn't enough. The illusion of depth depends upon the interpretation of the eye. To be able to achieve this, you should now make a clay model to visualize the necessary adjustments required by the eye. If you go directly to the wood, you may not be able to make these adjustments.

In the final article of this series I'll tell you about the changes I made as a result of my clay model. As I worked with it, I made some unexpected changes that greatly increased the illusion of depth. In the meantime, why don't you make such a clay model yourself, and see what you can discover on your own? PW

A Spanish–Style Casua

by Branley Allan Branson and Mary Louise Branson

The entryway of our stucco home needed furnishing, but we didn't want to pay the high price of the pieces we saw. We decided, instead, to work together as a husband and wife team and make this Spanish–style bench. Because we wanted the piece to look authentic, we used 3/4" pegs with rounded ends instead of hardware, and since the piece would sit outdoors, we chose to use epoxy for the adhesive. In the time since we made the bench pictured above, we've decided it would look nicer with a 4" gap between the seat and the back, so that's what we'll describe here.

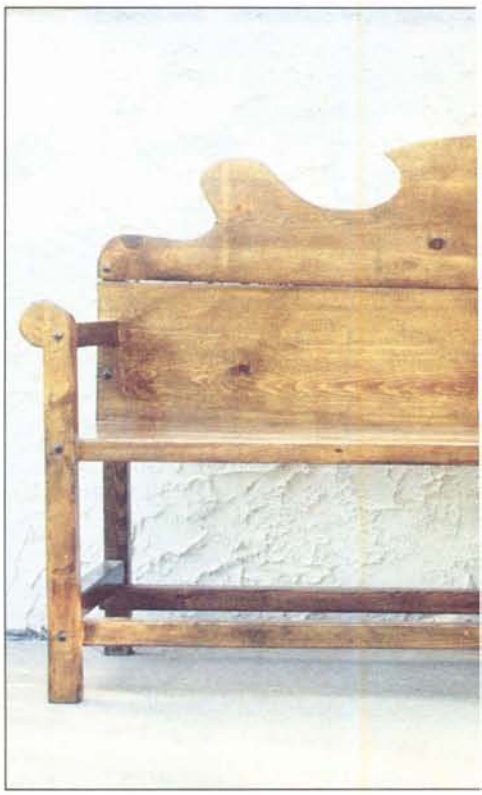
The wood we used was kiln–dried hemlock, except for the peg material which we cut from 3/4" oak doweling, but other species would have worked just as well. In fact, the piece would look great made from fir or pine two–by material.

Branley Allan and Mary Louise Branson *make their own furniture in Richmond, Kentucky.*

Start by making the panels for the seat (A) and back (B). We glued up two 60" 2 X 8's for the seat and two 60" 2 X 12's for the back. We used five 4" long dowels in each joint and glued the boards together with epoxy.

In the PullOut™ Plans section in the center of the magazine you'll find a full–size half pattern for the back. Transfer this pattern to the right half of the panel; then flip it over and draw it on the left half. Cut out the shape with a sabre saw, file out any irregularities, then rout the edges on both sides of the panel with a 3/8" round over bit. Use the sabre saw to cut a 1-1/2" notch at each end of the back starting 2-1/2" up from the bottom edge. The arm rests will fit into these notches, and you should cut similar notches in the front corners of the seat to fit around the front legs (C).

To shape the front legs, cut your 2 X 4 stock to length; then transfer the pattern from the PullOut™ Plans section onto one



Spanish–Style Casual Bench

Cutting List

Qty	Part	Finished Size T	W	L	Piece
1	A	1 1/2"	14 1/2"	60"	seat
1	B	1 1/2"	*22 1/2"	60"	back
2	C	1 1/2"	*3 1/2"	27"	front legs
5	D	1 1/2"	1 1/2"	13"	cross pieces
2	E	1 1/2"	2"	30"	rear legs
1	F	1 1/2"	1 1/2"	43"	rear center leg
1	G	1 1/2"	1 1/2"	16"	front center leg
2	H	1 1/2"	1 1/2"	60"	long stretchers

Supplies

10' of 3/4" dowel stock

*rough size

illustrations by Tom Larson

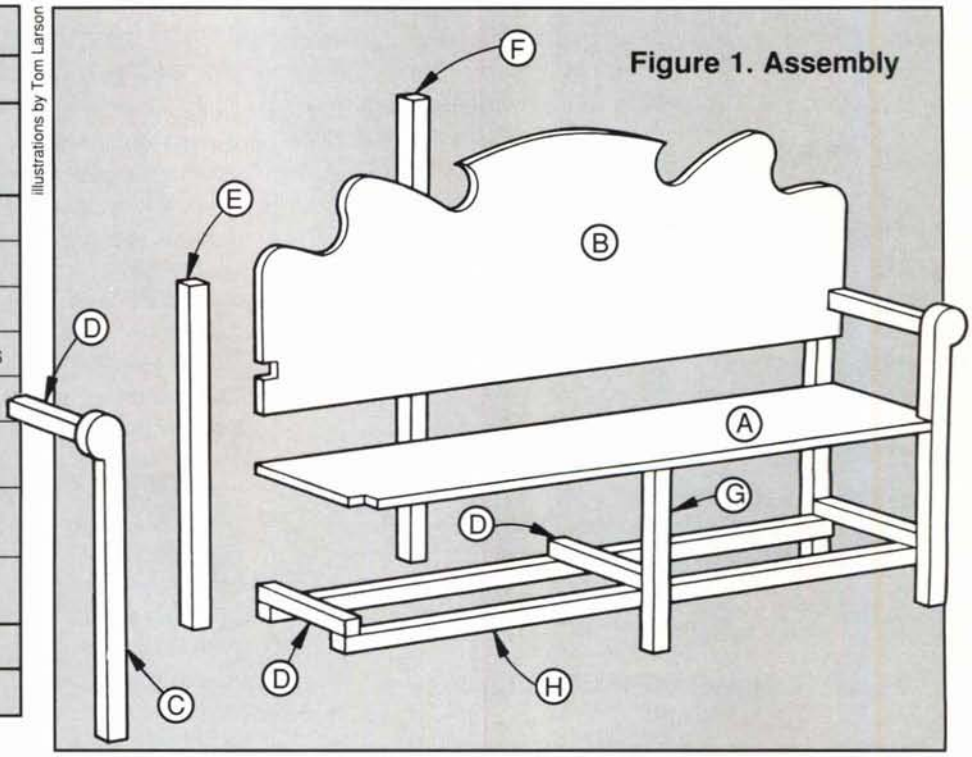


Figure 1. Assembly

Bench

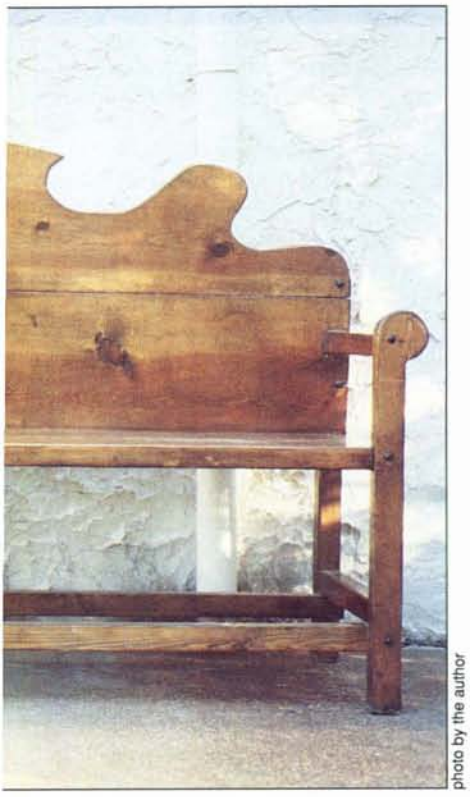


photo by the author

end of each. Set up the table saw to rip the 2" wide straight section of the legs, and stop the cut before entering the rounded portion on the ends. Finish cutting out this portion with your sabre saw.

Cut the cross pieces (D) to length from 2 X 2 stock. Two of these pieces will serve as the arm rests; the other three will be stretchers (see Figure 1). While you're at it, cut the back legs (E), the rear center leg (F), and the front center leg (G) to length, and the two long stretchers (H) as well.

Cut the rest of your 3/4" dowel stock into 2-1/2" lengths; you'll need about 30 pieces. Round the ends of them with a file or at a disk sander. At this point, you're ready to assemble.

Start by putting together two end assemblies, each consisting of a back leg (E), a front leg (C) and two cross pieces (D). Lay out the positions of the cross pieces on the legs as shown in Figure 2. Measuring from the bottom ends of the legs, the first cross piece is 3-1/2" from the floor, and the cross piece that serves as an arm rest is 24" from the floor. Dry clamp these pieces in position, and drill a 3/4" hole through the legs and into the stretchers to a depth of 2-1/4" (use a piece of masking tape on the drill bit to mark the depth). Glue these assemblies together and drive the pegs into the holes leaving the rounded ends slightly proud of the surface.

When these end assemblies are dry, fit the notches in the back around the arm rests, and drill, glue and peg it in place so that the back legs are flush with the ends. Lay one of the long stretchers (H) across the back legs with its ends positioned under the short stretchers and drill it, glue it, and peg it.

To locate the rear center leg (F), cut two 27-1/4" spacer strips from scrap wood. Butt the ends of these against one of the fixed legs, and butt the center leg against the end of the spacers. Drill five holes through the back and into the leg; then glue it and peg it in place, and secure it to the long stretcher at the bottom.

Fix the seat in place 16" from the bottoms of the legs (see Figure 2), and drill through the legs for the dowels that secure it. Use your spacer strips to position the front center leg (G) and drill into it through the top of the seat. When this joint is dry, belt sand the peg flush. Fit a cross piece between the two center legs and peg it in place; then attach the remaining long stretcher to the front legs.

When the glue has completely set up, use a wood rasp to slightly round the front upper edge of the seat. Carefully sand the whole bench and apply your finish. We used a dark oak stain followed by three coats of low–gloss polyurethane varnish. PW

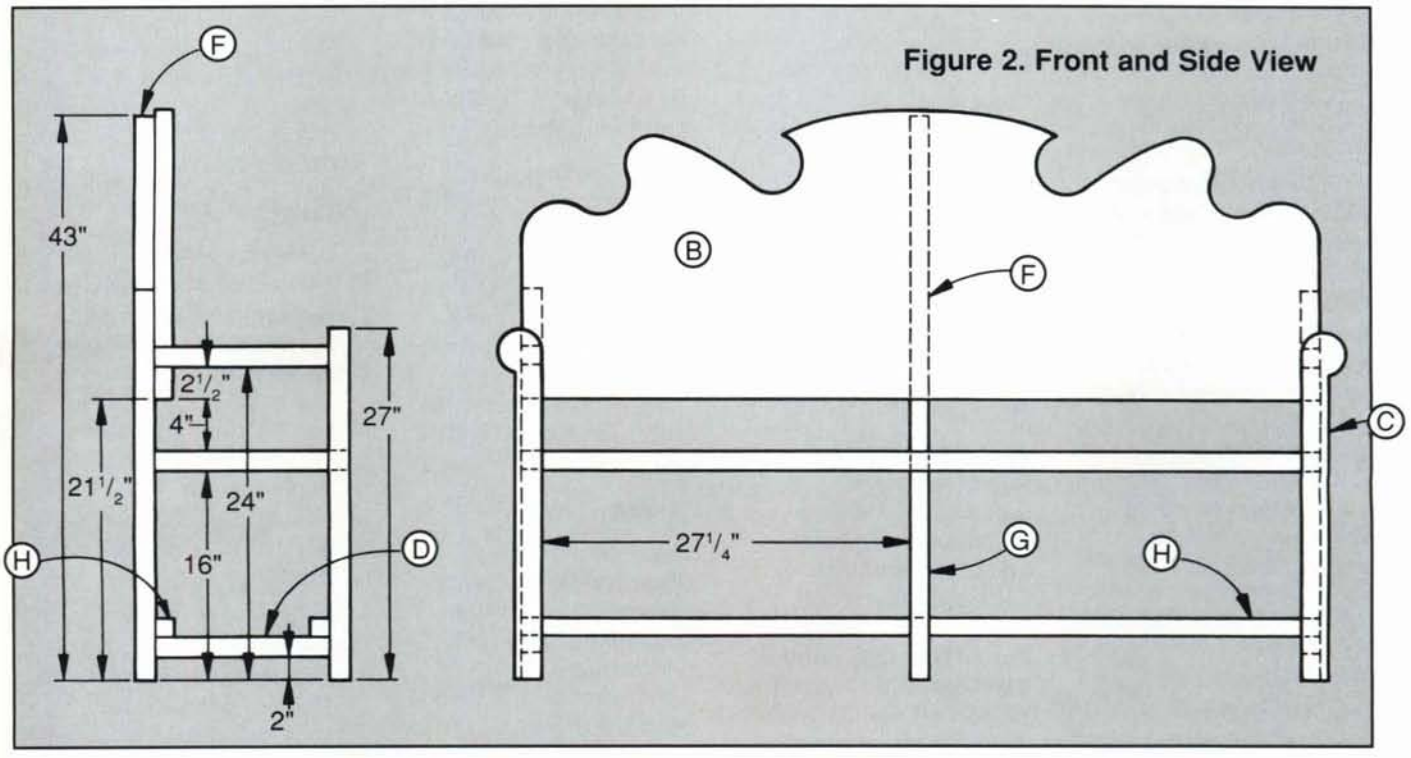


Figure 2. Front and Side View

Calendar

Events of Interest to Woodworkers

If your group is having an event you would like other woodworkers to hear about, please send us all pertinent information at least three months before the opening date. We will publish it for you in Calendar free of charge.

California

Date: February 18-25
Event: Boatbuilding Class
Location: Newport, CA.
For information, contact: Russel Behrens, 22 Balboa Coves, Newport Beach, CA 92663.

Florida

Date: February 23-25
Event: 1st Annual Jacksonville Woodworking World Show
Location: Jacksonville Memorial Hall, Jacksonville, FL.
For information, contact: Woodworking Association of North America, Box 706, Plymouth, NH 03264. Tel. (800) 521-7623 or (603) 536-3768.

Illinois

Date: March 11-13
Event: National Home Center Show
Location: McCormick Place Complex, Chicago.

World's largest home improvement products exposition.
For information, contact: National Home Center Show Hotline (800) 642-7469.

Louisiana

Date: March 16-18
Event: 1st Annual Baton Rouge Woodworking World Show
Location: Riverside Centroplex, Baton Rouge.
For information, contact: Woodworking Association of North America, Box 706, Plymouth, NH 03264. Tel. (800) 521-7623 or (603) 536-3768.

Maryland

Date: March 2-4
Event: ACC Craft Fair Baltimore
Location: Baltimore Convention Center, Baltimore, MD.
For information, contact: American Craft Enterprises, Box 10, New Paltz, NY 12561. Tel.1-800-836-3470

Massachusetts

Date: April 7 & 8
Event: Design & Construction with Bent Wood/Wood Forming, Michael Fortune
Location: Worcester Craft Center, 25 Sagamore Rd., Worcester, MA.
For information, contact: Worcester Craft Center, 25 Sagamore Rd., Worcester, MA 01605. Tel. (508) 753-8183.

Michigan

Date: March 9-May 13
Event: Furniture by Wendell Castle
Location: Detroit Institute of Arts.

Exhibition of Castle's non–traditional furniture.
For information, contact: Detroit Institute of Arts, 5200 Woodward Ave., Detroit, MI 48202.

Minnesota

Date: April 6-8
Event: ACC Craft Fair Minneapolis
Location: Minneapolis Convention Center, Minneapolis, MN.
For information, contact: American Craft Enterprises, Box 10, New Paltz, NY 12561. Tel.1-800-836-3470

Montana

Date: March 16-18
Event: 1st Annual Good Wood Show, Montana Woodcarvers Association
Location: Montana Outdoor Recreation Exposition, Metra, Fair Grounds, Billings.
For information, contact: Bob Lund, 2039 Walter Rd., Billings, MT 59105. Tel. (406) 248-5373 for information & entry forms.

New Jersey

Date: February 7-9
Event: Buyers Market of American Crafts
Location: Atlantic City COnvention Center, Atlantic City.
For information, contact: Buyers Market of American Crafts, 300 Chestnut Ave., suite 300, Baltimore, MD 21211. Tel. (301) 889-2933.

New York

Date: April 6-8
Event: 2nd Annual Buffalo Woodworking World Show
Location: Erie County Fairgrounds, Hamburg, NY.
For information, contact: Woodworking Association of North America, Box 706, Plymouth, NH 03264. Tel. (800) 521-7623 or (603) 536-3768.

Oklahoma

Date: March 9-11
Event: 1st Annual Oklahoma Woodworking World Show
Location: Myriad Exhibition Hall, Oklahoma City.
For information, contact: Woodworking Association of North America, Box 706, Plymouth, NH 03264. Tel. (800) 521-7623 or (603) 536-3768.

Ontario, Canada

Date: February 23-25
Event: The Canadian Workshop Show
Location: International Centre, Airport Rd., Toronto (Mississauga, Ontario).
For information, contact: EAS Exhibition Services, 41 Leeswood Crescent, Agincourt, Ontario, M1S 2P4. Tel. (416) 292-2784.

Pennsylvania

Date: March 17 & 18
Event: 1990 Craft Workshops
Location: 875 Studio, Perkasie, PA.

Understanding Wood Finishing with Michael Dresdner. For information, contact: Pennsylvania Guild of Craftsmen, Box 820, Richboro, PA 18954. Tel. (215) 860-0731.

Tennessee

Date: February 24-May 19
Event: "From Here to There: Vehicles for New Forms/New Functions."
Location: Arrowmont School of Arts & Crafts, P. O. Box 567, Gatlinburg, TN 37738.

A competitive exhibition of contemporary arts & crafts.
For information, contact: Arrowmont School of Arts & Crafts, P. O. Box 567, Gatlinburg, TN 37738. Tel. (615) 436-5860.

Date: through March
Event: 1990 Spring Workshop Program
Location: Arrowmont School of Arts & Crafts, Gatlinburg, TN 37738. March 5-9/ Woodturning & Design, Leo Doyle; Coopering—Tools & Techniques, Rick Stewart; March 12-16/Bowl & Plate Turning & Carving, Alan Stirt; March 19-23, 26-30/ Woodturning—Artistic & Functional, Ray Key.
For information, contact: Arrowmont School of Arts & Crafts, P. O. Box 567, Gatlinburg, TN 37738. Tel. (615) 436-5860.

Texas

Date: March 2-4
Event: 2nd Annual Houston Woodworking World Show
Location: Pasadena Convention Center, Pasadena, Texas.
For information, contact: Woodworking Association of North America, Box 706, Plymouth, NH 03264. Tel. (800) 521-7623 or (603) 536-3768.

Washington

Date: March 17-25
Event: Boatbuilding Class
Location: The Center for Wooden Boats, Seattle.

continued on page 84

Calendar

continued from page 82

Build a 15 ft. lapstrake canoe.

For information, contact: Center for Wooden Boats, 1010 Valley St., Seattle, WA 98109. Tel (206) 382-2628.

Washington, DC

Date: February 16-18

Event: 7th Annual Washington, DC Woodworking World Show

Location: DC Armory, Washington, DC.

For information, contact: Woodworking Association of North America, Box 706, Plymouth, NH 03264. Tel. (800) 521-7623 or (603) 536-3768

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I certify that the statements made by me above are correct and complete. Wayne Lin, President 10/2/89.

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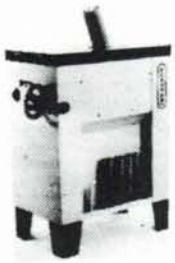
order form on page 87



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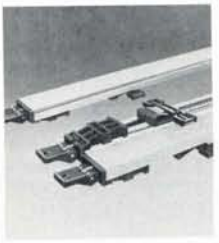

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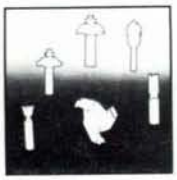

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- a. Small Time Wheelbarrow
- b. Dust Collector
- c. Oriental Tray
- d. Typing Table
- e. Top
- f. Spanish Bench
- g. Handsome Cabinet

II. My second favorite project in this issue is the:
- a. Small Time Wheelbarrow
- b. Dust Collector
- c. Oriental Tray
- d. Typing Table
- e. Top
- f. Spanish Bench
- g. Handsome Cabinet

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- b. Dust Collector
- c. Oriental Tray
- d. Typing Table
- e. Top
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- b. Wood Types: Cedar
- c. The Blue Ox
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- f. Focus on Carving

V. What is your age?
a. Under 24 b. 25-35 c. 36-45 d. 46-60 e. Over 60

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Index to Advertisers

by Jeff Taylor

Why I Still Need a Router

My new router, an off–brand, is temporarily out of commission. Naturally, jobs requiring a router have multiplied beyond count from the moment it took sick. It only needs one little part, but apparently they first have to mine the ore, forge the steel, ship it to Chingadaville, Venezuela, where they keep the template, make one part, let it cool for a month, and pack it on a mule headed to my house. The smart tool user always buys name brands.

Right now I have to put an ogee on a small oak top for a dictionary stand. Putting the ogee bit in my drill won't work; long ago, when I was young and stupid, I tried it. Almost gave myself another oversize nostril. So, reluctantly, I pull down my old, old router from the shelf marked "Fix Someday," and examine its rusty casing, its floppy shoe with the missing screw, its cracked plastic trigger. The resourceful woodworker always has a backup tool.

Step one: remove the old dull bit from the collet. But it seems to be corroded into the socket. I jiggle and jerk the stubborn little honeymooner, but it won't budge. For the next fifteen minutes, I pry and twist and pull it with pliers, trying to gain a purchase on the son of a gun. Nothing. I hose the collet down with about a pint of rust melter, and pry and twist and pull it with pliers again. No progress.

Losing patience, I clamp the bit in my vise and stick a flatbar under the shoe, levering upwards. Immovable object of stuck crud, meet irresistible force of good right arm. Grunt, strain, heave—POP! The router goes up like a champagne cork and crashes to the concrete floor.

It doesn't rattle too much when I pick it up. After cleaning out the bit grabber with emery cloth, I'm satisfied it won't pull the same trick with my new ogee bit, which I insert and tighten down. Even with eye protection, however, I want to test it first. I plug it in and put on my goggles. Holding the router low, I pull the trigger. Remember the cracked trigger? Too bad I didn't notice the bare wire, hungry to shove 110 volts at a goodly amperage into my sweaty finger. My poor digit rides the lightning; once more the router slams to the floor. The safety–conscious power tool operator always unplugs such tools—which throwing them down will also accomplish.

For a second, I consider using a sharp knife to whittle the ogee, or filing my incisors to the right shape and gnawing on the oak. I also consider driving into town with my other, made in Chad, dud router and forcing the salesman to fix it right now, at gunpoint if necessary.

But instead I put on a rubberized glove, determined to willpower this thing to work. The persevering wood artist always finds a way. My oak panel is clamped down, face–sanded and ready to go. Insulated from the machine's many treacheries, I start routing. The motor only smokes and sparks a little, but it makes a wobbly hooting sound, like an owl in a centrifuge. Oddly enough, the ogee turns out pretty well on the first pass. I'm not unhappy with it, not until I blow away the shavings and a deep parallel scratch appears like magic.

I unplug the router and examine the shoe; there it is, a tiny little pimple of rock embedded in the plastic. Now I've got to sand the panel all over again.

It's unwise, even dangerous to use slightly broken or very worn power tools, especially when you're in the grip of powerful emotions like rage. It is not enough to put them aside, or even to throw them away. The wise craftsman first ascertains that the tool is indeed unuseable, as I've done, before he puts it on the floor and strikes it repeatedly with a sledgehammer, so that no one will ever again mistake it for a tool. The careful workman then gathers up the fragments and throws them in the garbage pail with all his might, muttering loudly to himself. And then the careful, thorough, resourceful, bad–router–terminator remembers his new ogee bit. PW

***Jeff Taylor** is a woodworker and writer in Burnt Woods, Oregon.*

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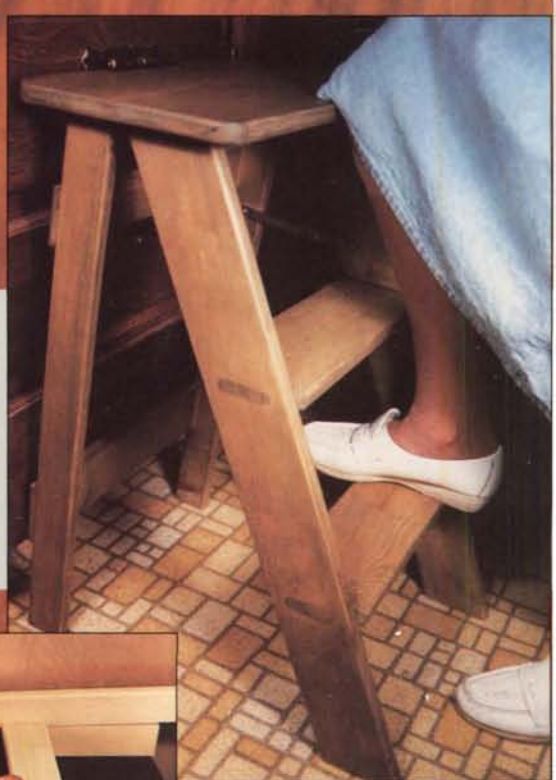

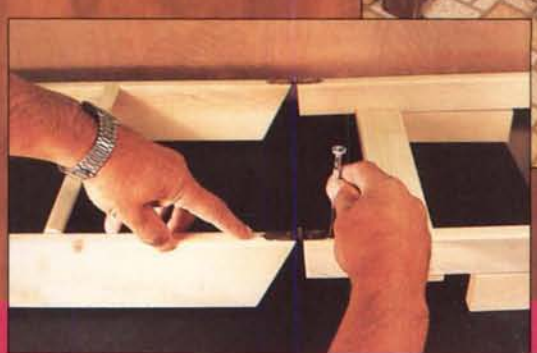

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