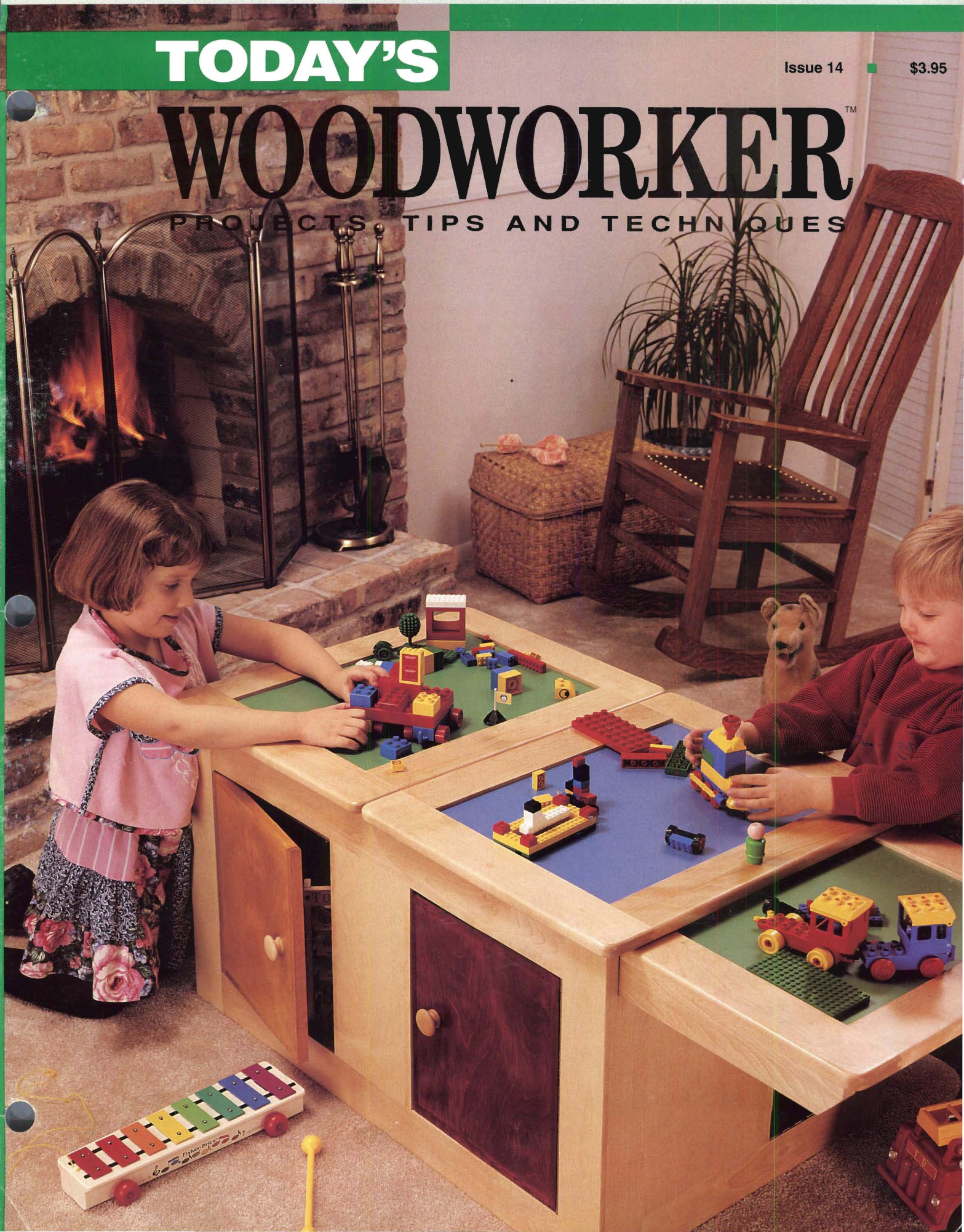
Laminated Napkin Holder ■ Compact Disc Tray ■ How To Veneer Wide Panels

# TODAY'S WOODWORKER™

PROJECTS, TIPS AND TECHNIQUES

Issue 14 ■ $3.95



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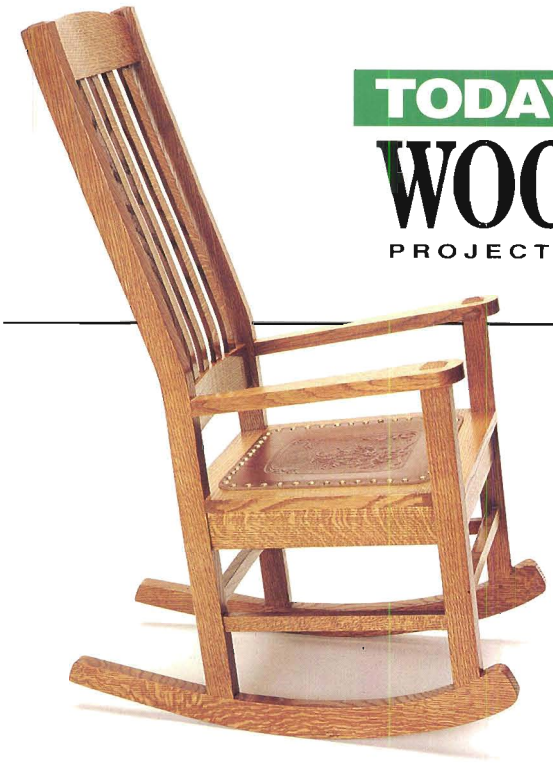



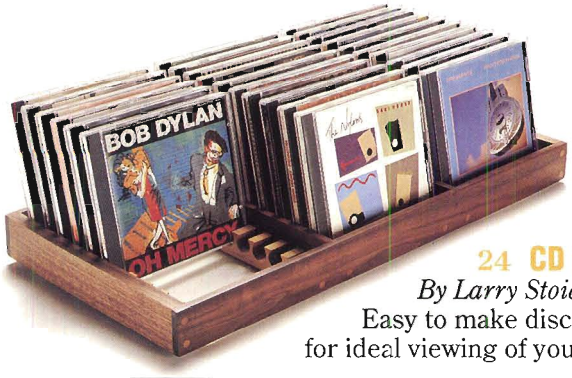


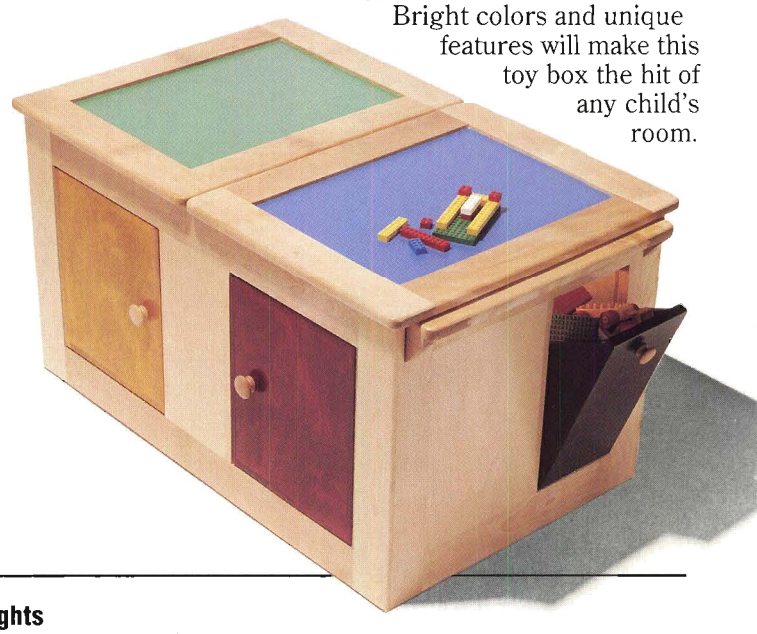




*Page 26*

*(photo by Jon Meyer)*

**Safety First**
Learning how to properly operate power and hand tools is essential for developing safe woodworking practices. For purposes of clarity, necessary safety guards have been removed from the equipment shown in some of the photos and illustrations in Today's Woodworker. We in no way recommend using this equipment without safety guards and urge readers to strickly follow manufacturer's instructions and safety precautions

**MARCH/APRIL 1991**
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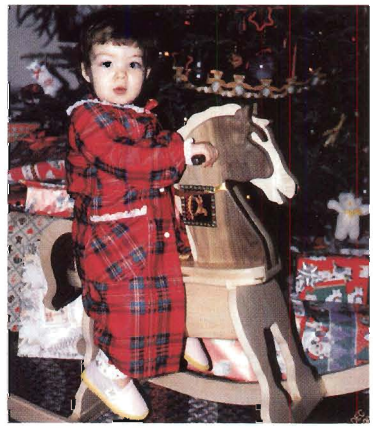
# Rewards for Involvement

We appreciate all the letters that have come into the office congratulating us on our recent growth. The idea of running at least one short weekend project in each issue definitely received broad-based support, so I decided to take a stab at the first one myself. Dan Jacobson's design for the compact disc tray on page 24 will take you a weekend in the shop to complete and features some nice techniques you'll find useful on other projects.

I like what I'm seeing below in regards to the router table featured in our last issue. Woodworkers taking our basic ideas and making little changes here and there to suit their style or space limitations. That's really what woodworking is all about; getting a good idea and customizing it to fit your needs.

We've once again upped the ante for Tricks of the Trade and Reader's Gallery. To help motivate you to action, we'll be giving away a special prize for the best trick in each issue. See page 7 for the details. And we'll also be giving away a special gift to readers whose work shows up in the Reader's Gallery. See page 27 for more on that!



*Thanks for the Rocking Horse project featured on page 14 in Issue 6. Enclosed is a picture of a very happy little girl on Christmas morning (my daughter).*

*The horse was very easy to build and everyone noticed it. I look forward to making other projects from Today's Woodworker (my wife wants the corner cabinet in Issue 10). Keep up the good work.*

John Bathelt
Westford, Massachusetts

***TW responds:*** *Beautiful work John (the rocking horse and your daughter). That's one Christmas she won't soon forget!*

*Your publication is always looked forward to and Issue 13 provided me with a needed project.*

*I have been looking for a better router table design, but haven't the space to accommodate your full cabinet. As a space saving measure I am making only the top with its features and have added two cleats on the back so I can use it on my Black & Decker Workmate. I also found that by using oval headed toilet hold-down bolts I did not have to file and work to make the carriage bolts fit.*

*May your growth and prosperity continue in the years ahead.*

Orville C. Helgren
Lincoln, Nebraska

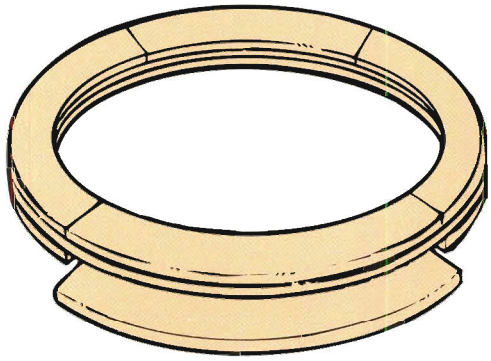
***TW responds:*** *Great idea Orville. It's very gratifying when one of our readers takes a project idea and "runs with it." We also tried the toilet hold down bolts, but builder Rick White wasn't happy with the sliding action.*

*I have built and used at least five router tables from various plans over the past 20 years. Your Router Table for Today's Woodworker (See pg. 8, Issue 13) is excellent, but I question the table insert. Today's routers are big and powerful and have many different mounting hole patterns. The size of bits are so varied that you may need two or three insert plates to shift between guide bushings, small bits and raised panel cutters for the same router. The base plates must be easy to make and reasonably priced. My recommendation is to use a 1/4" nylon reinforced plastic insert that does not bend and is slick so materials slide over it easily. This thickness allows the bit to be chucked full depth, which is safer and reduces vibration due to bit run-out. Some routers, especially the ELU, become unsafe when a 1/2" thick base plate is used. I also recommend an insert that is about 11" by 11" so you can unplug the router, change bits on top of the table and adjust the depth before dropping it back in. Finally, I don't screw the base plate to the table since my fence holds the router in the recess.*

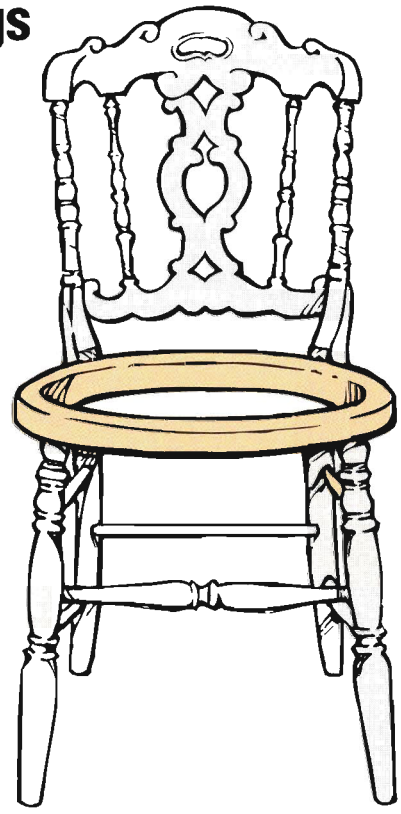
John Swanson
Renton, Washington

***TW responds:*** *We'll meet you halfway John. The Woodworkers' Store (21801 Industrial Blvd., Rogers, MN 55374) offers a 3/8" thick polycarbonate base that's 12" square. We'd shy away from 1/4" material, even though you make a good point about reducing vibration. We don't like your idea of depending on the fence to hold the insert down. Our two screws come out quickly and add a measure of safety.*

# Tips and Jigs



*When rebuilding a seat, try staggering the joints for greater strength.*



## Repairing Caned Chairs

I've found a simple way to repair old caned straight chairs having seats that are too weak to save. These seats are generally made from four pieces of solid wood that have been joined end to end and then drilled for caning holes, leg holes, and dowels. All of these holes weaken the seat, and the doweled butt joints don't provide much strength. Repairs usually just add more holes, weakening the seat further.

I remove the seat in one piece, or at least save as much of it as I can for a pattern. Then I stack laminate a new seat, much like a stack laminated blank for bowl turning. I use three layers, spreading the joints around the seat, but make the joints in the top layer match the original pattern. This technique doesn't involve any joinery more difficult than a butt joint and makes a stronger seat than the original. Shape the new seat to match the original, and use the same caning hole layout. I don't use this method on valuable antiques, but have saved a number of old favorites and turned a couple of discards into serviceable furniture in a surprisingly short amount of time.

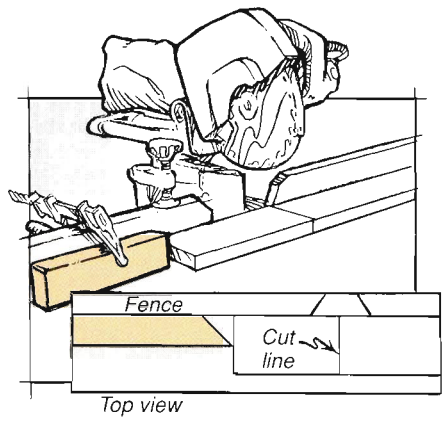
*David S. Palmer*
*Royal Oak, Michigan*

## A New Stop Block Angle

When using a stop block, particularly on a radial arm or panel saw, saw dust builds up between the table, the fence and the stop block, making it necessary to continually clean out this corner in order to maintain accuracy.

To overcome this problem cut an angle on the end of the stop block so that the piece comes to a point. The sawdust will blow past the point of the block and won't affect the accuracy of subsequent cuts.

*R. James Hicks*
*Albany, New York*

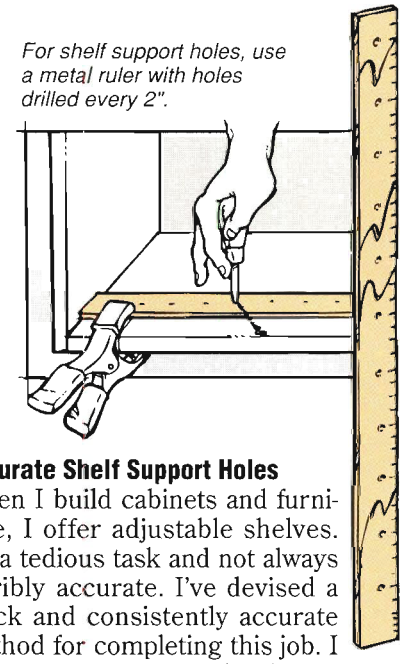



## Tensioning Your Bandsaw Blades

When changing bandsaw blades I use this trick for keeping a specific amount of tension on the blade. I put a dab of white paint on the blade tensioning knob and count off the revolutions as I turn it to loosen the old blade. Then I simply turn the same number of revolutions when installing the new blade.

*Robert O. Wendel*
*Marlboro, New Jersey*

*For shelf support holes, use a metal ruler with holes drilled every 2".*



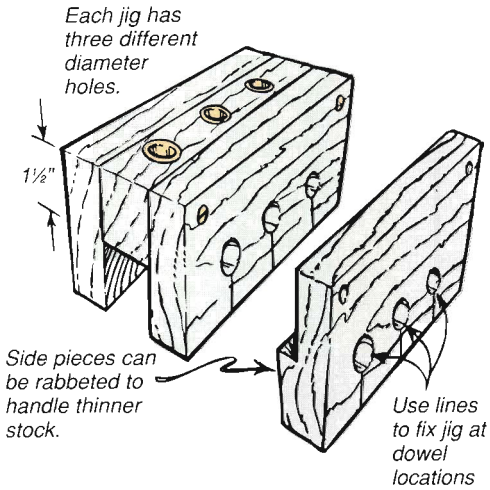
## Accurate Shelf Support Holes

When I build cabinets and furniture, I offer adjustable shelves. It's a tedious task and not always terribly accurate. I've devised a quick and consistently accurate method for completing this job. I use 24" and 36" metal rulers and drill 1/16" holes every 2".

These holes serve as spots to insert my awl and, with a tap of my hammer, create precise drilling locations for the shelf support holes. Besides letting me know where to drill, the marks provide a wander proof divot for my bradpoint drill bits.

*Ed Shaw*
*Riverside, California*

**Today's Woodworker** *pays from $20.00 (for a short tip) to $100.00 (for an elaborate technique) for all Tricks of the Trade published. Send yours to Today's Woodworker, Dept. T/T, Rogers, MN 55374-0044.*




### Making Your Own Doweling Jig

Making your own doweling jig is an inexpensive alternative to commercially made tools and is often a good way for beginners to add another important tool to their new shops. The holes most frequently used in doweling are 1/4", 3/8" and 1/2", which just happen to be the inside diameters of commonly available copper tubing. Use Rock maple for the body of the jig, making it 5" long and the same thickness as the stock you intend to dowel. The centering block should be 1½" deep.

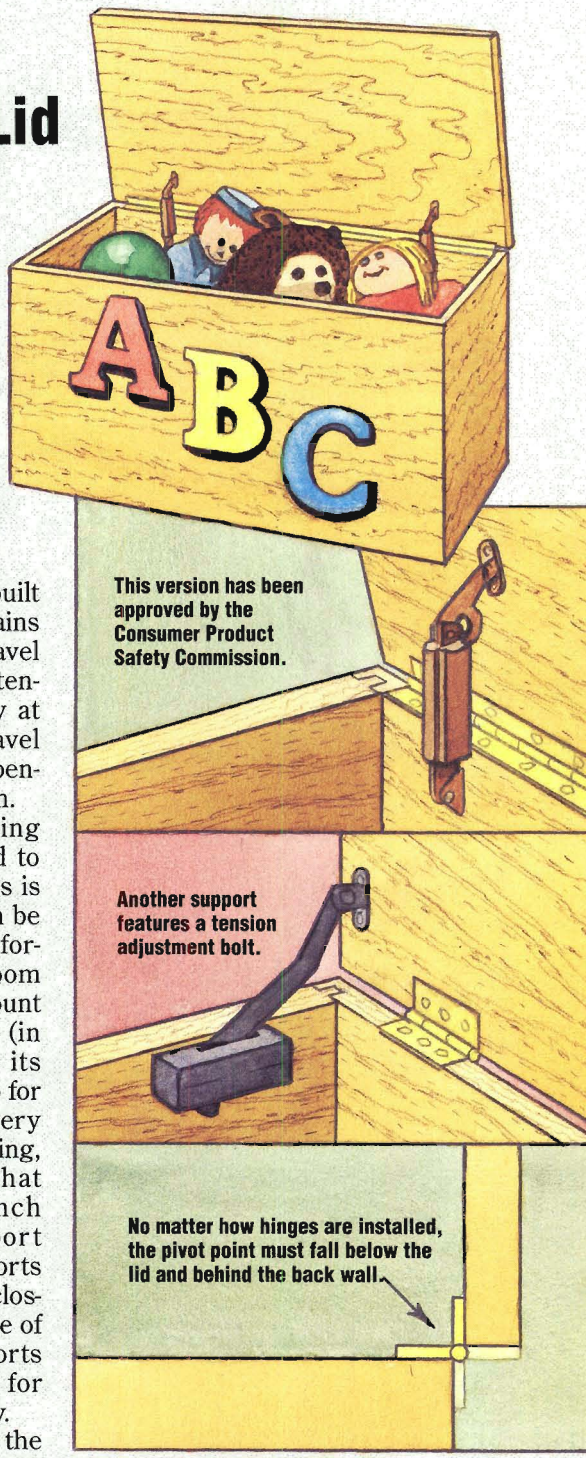
Carefully layout the hole locations with a center punch and then drill the holes on a drill press to fit the outside diameter of the copper tubing. The following hole sizes are standard throughout the plumbing industry: 1/2" inside diameter copper tubing is 5/8" outside, 3/8" inside diameter tubing is 1/2" outside and 1/4" tubing is 3/8" outside. Cut the tubing 1½" in length and epoxy the pieces into the jig's holes. Sandwich the jig body between two side pieces, which can be rabbeted to make a jig for narrower stock. You may want to make a jig for every different thickness of wood you use. Bore three 1/2" diameter holes in one side piece, aligning them exactly with the tube locations. Put a mark across the bottom of each of these holes so you can align the jig with the location marks on the stock you intend to dowel.

*Don Kinnaman*
*Phoenix, Arizona*

**(Please turn to page 7)**

**HARDWARE HINTS**

# Child Safe Lid Supports




Protecting little fingers from slamming lids is a concern of every project builder. Large lids, like those on a toybox, can fall unexpectedly and with considerable force if precautions aren't taken. Luckily, two self balancing supports have been designed that virtually eliminate the hazard chest lids can present.

Self balancing lid supports are built around a heavy spring that maintains tension throughout the entire travel path of the lid. Because of this tension, the lid remains stationary at any given position during its travel —if a child's hand slips while opening a toybox the lid won't fall down.

Choose a support with a spring size that's appropriately matched to the weight of a particular lid. This is figured in inch pounds, which can be determined using the following formula: Weigh the lid on a bathroom scale and then multiply this amount by the measurement of the lid (in inches) from its front edge to its back edge. Divide the sum by two for the final inch pounds figure. Every support comes with a weight rating, so simply choose the model that most closely matches your inch pounds total. If a single support won't match, then use two supports whose total weight rating comes closest to your lid's requirements. One of these commonly available supports comes with an adjustment bolt for altering the spring tension slightly.

To use these supports properly the pivot point of the lid's hinge must always be positioned below the lid and in line with the outside edge of the back wall, as shown in the drawing at right. Any other configuration will not work with these supports. The lid can overhang the back of the box, as long as the hinge barrel remains in line with the back wall.

Install these supports carefully, strictly following the instructions so the support bends in the proper relationship with the lid operation.

Using too heavy a spring will cause the lid to pop open slightly and only a latch will be able to keep the lid closed. Too light a spring will allow the lid to fall down slowly.

Finally, these supports won't work on lids that slope from the back wall to the front, as on potato bin cabinets, because you'll significantly reduce the 85° opening capacity. Although the application of these supports is very specific, building your project to suit their needs will make for a more childsafe toybox.

# Veneering Wide Panels

*By Bruce Kieffer*

Most woodworkers who start experimenting with veneer quickly face a dilemma. They need to cover a surface wider than the capacities of their clamps but they don't want to purchase a costly veneer press. Don't fret; try caul veneering. It's cheap, easy, effective, and adaptable to most of the situations you'll come across.

Caul veneering is a simple idea consisting of two easy to make wood devices known as cauls and crossbearers. Cauls are pieces of 3/4" particle board cut slightly larger than the core that's being veneered. Crossbearers are long pieces of hardwood with a slight arc cut on one side. When used together these devises transfer clamping pressure to the center of the core, across the veneer, and then out to the edges (**See Figure 1**). This technique eliminates the chance of trapping glue pockets between the veneer and its core.

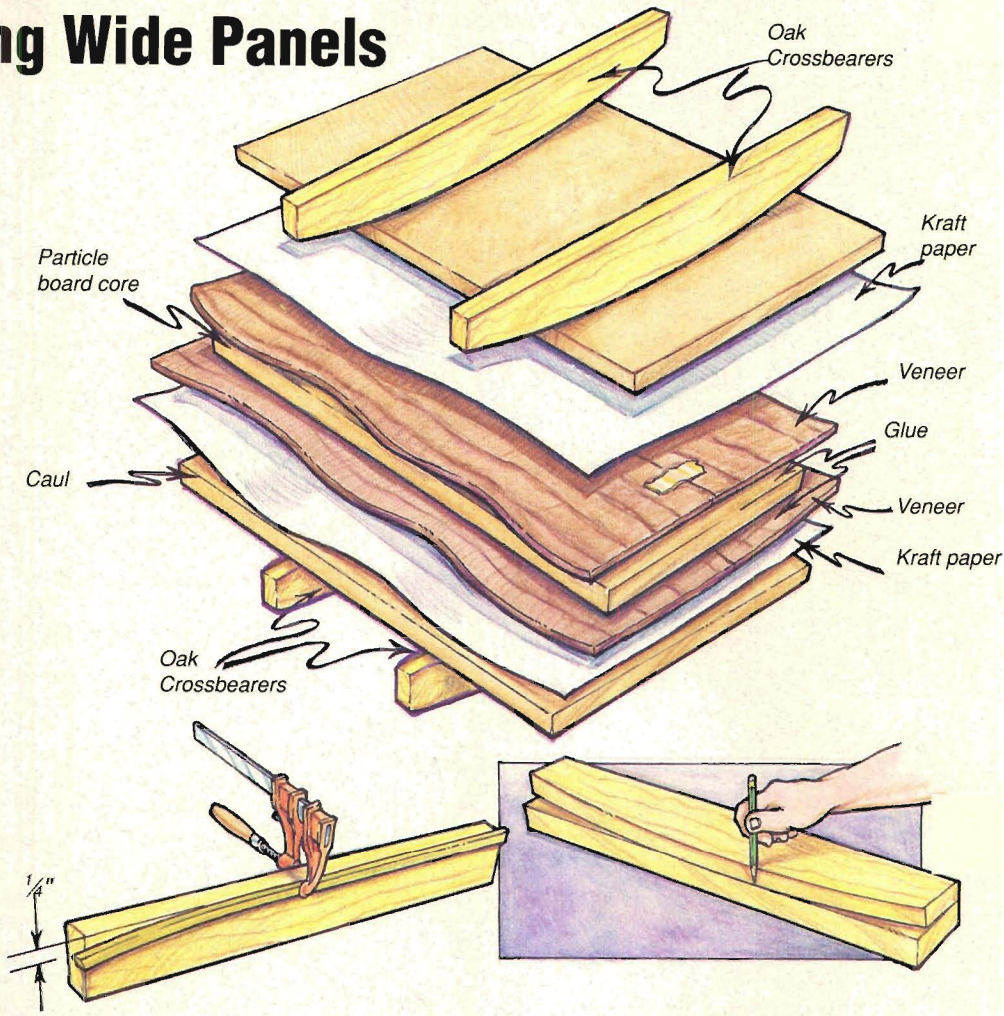



**Figure 1: To form the arc, clamp a thin wood strip to the center of an oak crossbearer and bend the strip so it's 1/4" from the edge at the ends of the board. When the crossbearers are clamped onto the cauls they evenly distribute pressure over the entire width of the veneer.**

### Prepare the Veneer and the Core

Using the techniques described in my previous two veneering articles (Issues 11 and 12), splice and join your veneer sheets together, and cut the particle board core to its finished dimensions. Always remember that when you veneer you need to create balanced panels. This means you must apply veneer to both sides of the core, keeping the grain running in the same direction so that the finished panel won't warp.

### Making the Cauls and Crossbearers

After much experimentation I've come to the conclusion that oak makes the best crossbearers. Cut your crossbearers 1½" thick, 2½" wide, and 36" long (or longer if you anticipate the need to clamp wider veneer). The number of crossbearers needed depends on the length of your veneer. You'll need a set of two crossbearers at each clamping position, and enough to space the sets at 4" intervals along the length of the veneer.

Cutting uniform arcs on the crossbearers is critical so they evenly distribute pressure across the width of the veneer. Draw the large radius of the arc by tracing along a thin flexible strip of wood clamped at the center of the crossbearer and held back 1/4" from the edge at both ends, as shown in **Figure 1**. Cut away the waste and sand the sawn edge smooth. Use this finished crossbearer as a template for cutting out one more crossbearer. Clamp these two crossbearers together at the ends with their arched edges facing each other. Look at the joint between the crossbearers to see that there are no gaps and that pressure is being applied over their entire length. Make any necessary adjustments, then use these first two pieces as templates for laying out the arcs on the rest of your crossbearers. Cut out the remaining crossbearers and sand them to match in pairs.

The two cauls are cut from 3/4" thick particle board, and are made 1" wider and 1" longer than the core being veneered.

### Gluing the Veneer to its Core

When faced with clamping large sheets of veneer I use a slow setting glue, like white glue, to give me more assembly time. On smaller areas I prefer to use yellow glue for its fast drying qualities. Have everything ready before you begin, including tools, glue, newspaper, clamps, cauls and crossbearers, and an extra set of hands if you've got them.

Pour glue onto one side of the core and on one sheet of veneer, and use a 3" or wider paint roller to spread the glue to an even coat. Position the glued veneer on the core so there is

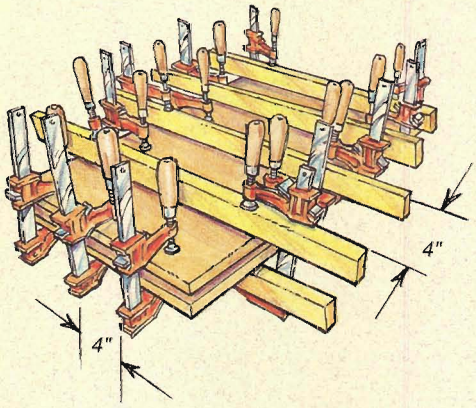



**Figure 2: Clamp the crossbearers at 4" intervals and space additional clamps around the perimeter of the assembly to hold the edges.**

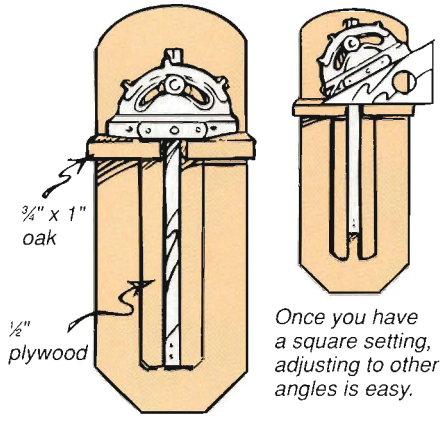
an equal amount overhanging all the edges. Place a piece of kraft paper on the face of the veneer, then set one caul on top of the paper. Flip over this assembly and repeat these steps to glue the remaining veneer to the other side of the core.

Clamp a set of crossbearers across the middle of the cauls and apply clamping pressure until the crossbearer ends touch the cauls on both sides. Check to see that the veneer sheets haven't slipped out of position. Working toward the ends of the veneer, clamp on the remaining crossbearers at 4" intervals. Place additional clamps between the sets of crossbearers near the edges of the cauls and use more clamps across the ends of the cauls at 4" intervals (**See Figure 2**).

Look at the joint between the veneer and the core to see if glue is oozing out its entire length. If there are dry spots, that probably means there's not enough clamping pressure, so add a few more clamps and turn the cranks a little further to bear down on the crossbearers.

After allowing the glue to cure overnight, remove the clamps, crossbearers, and cauls. Next, peel away the kraft paper, trim off the overhanging veneer edges and sand the faces of the veneer smooth. Now you're ready to use your veneered panel for whatever project you've planned.

*Bruce Kieffer, a professional furniture builder, is a contributing editor with Today's Woodworker.*




### Miter Gauge Holder

I have a tablesaw and bandsaw stationed next to each other that use the same miter gauge, so I made a wall rack to hold it when it's not in use. I've also devised a way to square it up quickly or adjust it to commonly used angles. First I set the miter gauge perfectly square and placed it on a piece of 3/4" plywood. I attached two short pieces of hardwood to support the gauge once it's hung on the wall and added strips of 1/2" plywood alongside the bar. This platform now sets the gauge to a perfect 90° every time.

To make a perfect 45° angle, set the head of a combination square above the support strips and then place the miter gauge in the rack. If I have an odd angle that I regularly reset the miter gauge to, then I simply cut a block to this angle and set it above the support strips.

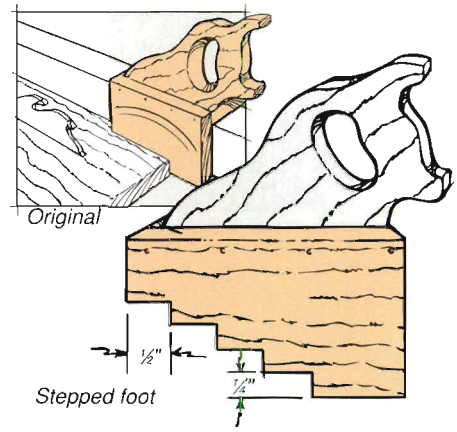
This jig is fast, simple and accurate, and only took an hour to build!

*Randy Carter*
*Eden Prairie, Minnesota*

### Gadgets for Spreading Glue

My favorite gadget for applying glue is made from a cheap plastic spreader for auto body filler. This is simply a flexible, plastic rectangle into which I cut a series of 1/16" x 1/16" notches along one edge with a leather punch. Use the spreader like a putty knife, and the notches will leave perfect beads of glue on the surface. To clean up, just soak the spreader in water until you're done clamping and then scrub lightly.

*Allen Grantham*
*Minneapolis, Minnesota*



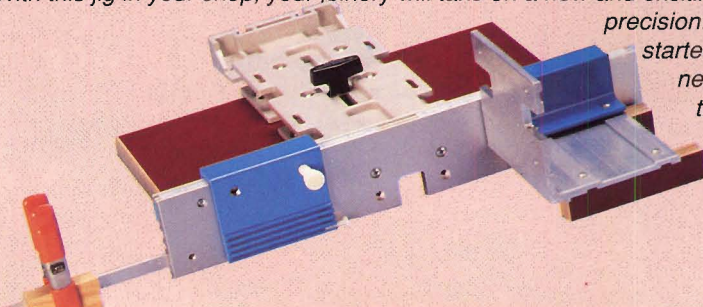

### Push Handle Fine Tuning

I made a push handle from Richard Dorn's design in Issue 10 (see page 4) and agree that it is a good, safe design and very comfortable to use. However, I fine-tuned the design a little, making it much more versatile, by adding a stepped foot that controls a variety of stock thicknesses. The 1/2" contact area between the handle and the stock is sufficient to hold the work piece down.

*C.E. Wardell*
*Circleville, Ohio*

## WIN THE ULTIMATE JIG:

*If your Trick of the Trade for the next issue is our panel of woodworking judges' favorite, you'll be the proud owner of the new Incra System, along with an Incra Jig and Right Angle Fixture, valued at over $100.00. The System includes a patented stop, an 18" fence and a sliding extender bar. With this jig in your shop, your joinery will take on a new and exciting level of precision. So get started...we'll need your trick by April 15th.*



# Craftsman Style Rocking Chair

*Start with a simple design, meld fine machine joinery with a few hand tool operations, and you have a beautiful introduction to chairmaking in a classic American style.*

By Chris Inman

Arts and crafts style furniture developed in the late nineteenth century, beginning in England and migrating to America where it became better known as the Craftsman style. Other names, such as Mission furniture, were also commonly used to market this style of furniture. Craftsman designs were characterized by simple, economical lines, dramatically diverging from the Victorian frilliness of the previous era. By 1900 the arts and crafts movement was a dominant force in American furniture and lighting design, pottery, architecture and the decorative arts.

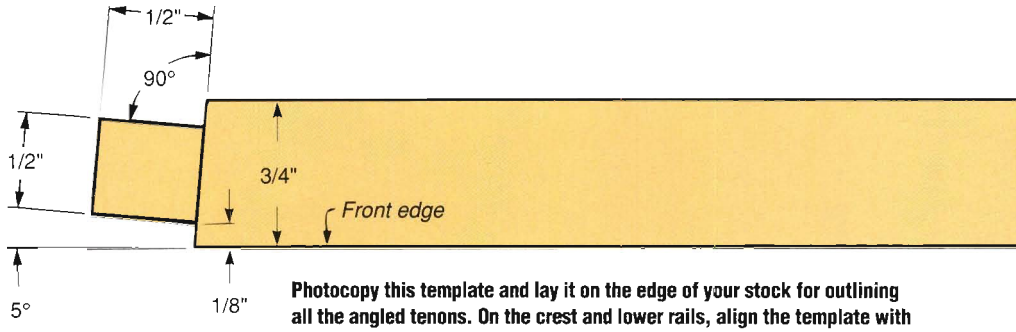
Gustav Stickley became the standard bearer of the arts and crafts movement in the United States, developing a line of furniture that exemplified the ideals of simplicity and quality craftsmanship, while remaining within economic reach of the middle class. Other notable American figures in this movement were architects Frank Lloyd Wright, Louis Sullivan and Charles and Henry Greene and lighting artist Louis C. Tiffany.

The rocking chair detailed in this article is a hybrid of several arts and crafts designs that were popular at the turn of the century. The lines are less severe than the originals, and the various components in the chair aren't as heavy. All these changes make the chair more pleasant to sit in.

### Cutting and Mortising the Legs

Chairs are subject to incredible stress from all the movement a person goes through while sitting. People lean, tip back, swivel and manage other contortions that make designing chairs

**In reaction to the cruel industrial practices of the 1800's, Craftsman artisans strived to maintain the finest elements of creative handwork while selectively using modern machinery to best advantage. Blending the two methods relieved workers of repetitious, unskilled work so they had time for more individualized, expressive woodworking tasks.**




**Photocopy this template and lay it on the edge of your stock for outlining all the angled tenons. On the crest and lower rails, align the template with the front of the stock and cut the tenons prior to bandsawing the curve.**

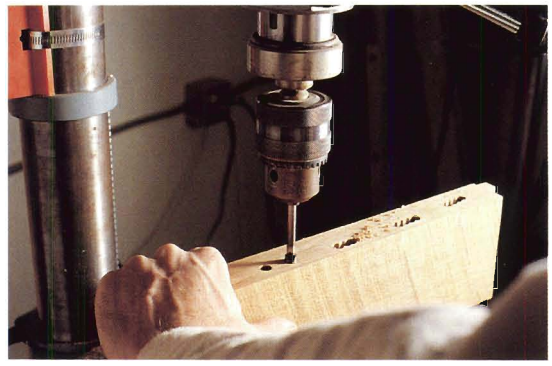


**Figure 2: Use the pattern above to layout all the angled tenons in the project. Hollow out the rail mortises with a 3/8" drill bit, then clean up the mortises with very sharp chisels.**

difficult and risky. All of this makes chair design and construction a very specialized branch of woodworking.

The main structural components of this rocking chair are the back legs. These are the heaviest pieces in the design and support the rest of the chair. All the legs receive a number of mortises which, in this design, are square to the leg profiles. The legs also have tenons on their ends for joining them with the arms and rockers.

Following the scale drawings on the next page, cut the back legs (pieces 1) out of wide 1⅞" thick stock and then clamp them together to belt sand their front edges to a smoothly matching profile. To sand the back edges of the legs, install a 3" diameter drum sander in your drill press and clamp a pivot block 1$\frac{13}{16}$" away from the drum **(See Figure 1)**. Slowly feed the legs into the gap between the sander and the pivot block to reduce the stock to its finished size and to make the two edges of each leg parallel. Make sure you feed the wood against the rotation direction of the drum to maintain control.

Once the back legs are sanded, layout the six mortises in each back leg and the four mortises in the front legs (pieces 11) as shown in the leg elevations on page 10. The mortises include joints for the crest rail (piece 2), the lower rail (piece 3), the seat support rails (pieces 4, 5 and 6) and the stretchers (pieces 8, 9 and 10). Don't layout the mortises for the arms until later, when the front tenons are made and the exact slope of the arms is apparent. The 1/2" deep mortises are cut squarely into the legs with a router, a 1/2" straight bit and an edge guide, and then the rounded ends of the mortises are squared with a 1/2" chisel. With one exception, the mortises for the rails and stretchers are centered on the legs, but be sure to note that the legs are 1¼" by 1¾", requiring two settings of your edge guide to keep the bit centered. The exceptions are the two mortises for the back seat support rail. For these, the center of the router bit is positioned 1/2" in from the back edge of the two back legs.

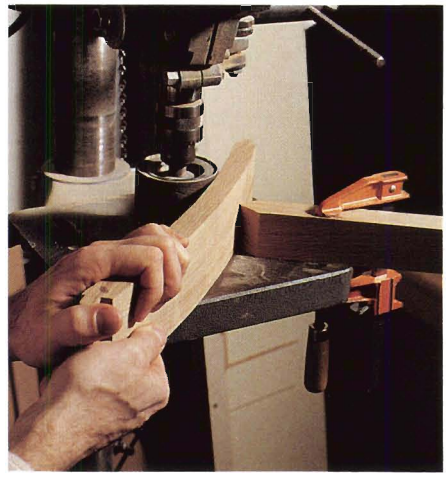
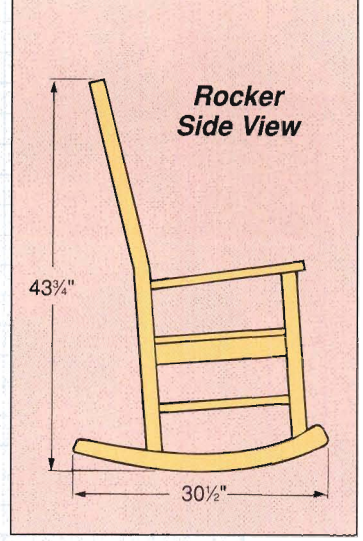
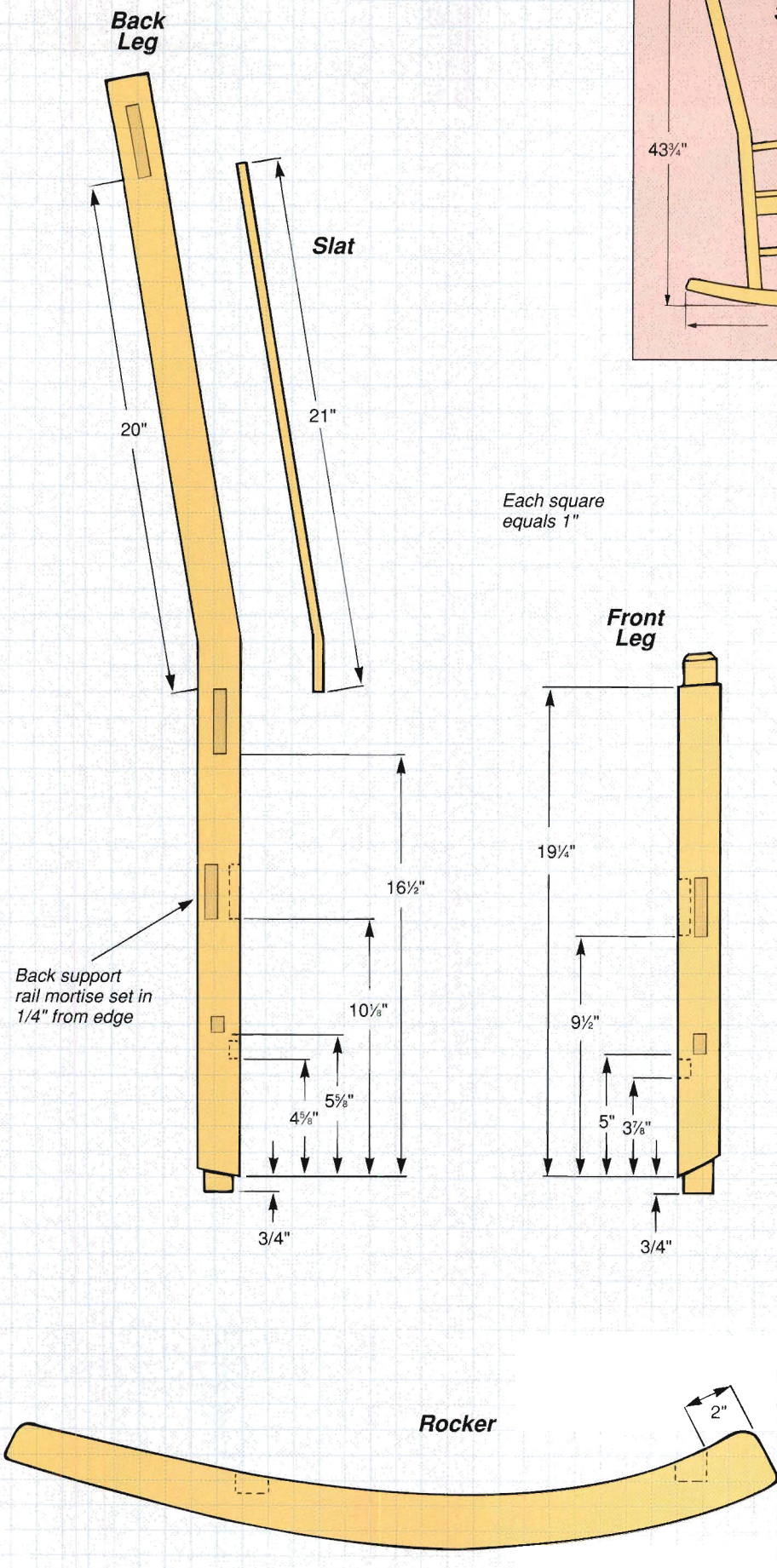


**Figure 1: Uniformly size and smooth curved chair pieces by pushing the stock between a V-block and a sanding drum mounted in a drill press .**

After all the mortises are routed, begin cutting the through tenons on the top of the front legs. The arms slope from the front legs to the back legs at a 5° angle, so the tenon shoulders must be cut to establish this angle. Layout the tenons' side shoulders at a 5° angle and then connect these lines across the front and back faces of the legs.

Pivot your tablesaw's miter gauge to 85° for cutting on the left side of the blade, and raise the blade 1/8" above the table surface. Cut one sloped shoulder on each leg, and follow this with multiple passes over the blade to remove the waste for the tenon. Now swing the miter gauge to its opposite 85° setting and repeat the tenon cutting process on the other side of the stock. To cut the remaining two shoulders on each leg, straighten the miter gauge to 90° and tilt the blade




to 85°. Cut one set of shoulders with the miter gauge on the left side of the blade and the other set on the right side of the blade. In both cases continually pass the stock over the blade to complete the tenon. Clean off the saw marks on the tenons with a 1" chisel.

The front leg tenons pass through the arms and are topped with a pyramid design. This design, intended to highlight the skill of Stickley craftsmen, became a trademark during the arts and crafts era. The pyramid can be cut with a very sharp handsaw and a 1" chisel. Layout a line on all four sides of both front legs 1/4" down from the top and center a line on the top of the legs from the front edge to the back. Use your handsaw to rough in the angled cuts from the line on top of the legs to the line on the long sides. Now begin paring thin shavings off the four sides of the pyramid to get the desired shape.

Forego cutting the bottom tenons on both the front and back legs for now. Later, you can scribe the tenon shoulders to the specific curve of the rockers. This technique will be described in detail later.

### Crest Rail and Lower Rail

The next major chair components are the crest rail (piece 2) and the lower rail (piece 3). Rip the rails to their finished width from 1½" thick stock. Layout the curves and the mortises for the slats (pieces 12) on the bottom edge of the crest rail and on the top edge of the lower rail as shown at right on page 11, and layout the angled tenons at each end of these pieces using the full size template shown in **Figure 2** on page 9. Be sure to align the front edge of the template with the front edge of the stock.

Chuck a 3/8" Forstner bit in your drill press and adjust the drill to bore 1/2" into the bottom edge of the crest rail. Now drill four holes into each mortise area to remove the bulk of the waste, then readjust the drill press bed to perform this same operation on the narrower lower rail. Once the drilling is complete, square the ends of each mortise with a sharp 3/8" chisel and clean up the mortise walls with a larger 1" chisel.

Due to the widening of the chair from back to front, the pieces connecting the back legs or the front legs join the legs at a 5° angle. Since all the mortises are routed squarely into the legs, the 5° angle must be accomodated by the tenons, and the first step in this process is cutting the tenon shoulders.

Cutting the angled shoulders on the crest rail and lower rail is easily done on the tablesaw. Attach a 16" long scrapwood auxiliary fence to your miter gauge and set your blade to a 5° angle. Put your miter gauge in the slot to the left of the blade and cut off the end of the wood fence at a 5° angle, then repeat this process on the right side of the blade to cut the other end of the fence. The ends of the fence now serve as guides for cutting the tenon shoulders.

With the back side of the crest rail facing down, line up the right tenon shoulder line with the cut off end of the fence (with the fence on the left side of the blade). Adjust the height of the blade so the teeth just reach the cheek line on the rail stock and pass the rail over the blade. Flip the stock around and cut the matching shoulder on the other end. Now make these two cuts on the lower rail.

Cut the shoulders on the front face of the rails by lowering the blade so the teeth just reach the cheek, and then follow the procedure you just used for the first set of shoulders.

The next step in forming the tenons is cutting the cheeks on the bandsaw. Set the rail stock on edge and feed the wood slowly into the blade, staying just outside the layout lines. Be careful to stop cutting when you reach the shoulder kerf. Cut both cheeks on each tenon, and then nip off the pointed bit of waste material that remains at the end of the tenon.

Now cut the shoulders on the top and bottom edges of all the tenons using a handsaw and chisel. Remember that these cuts follow the 5° angle of the shoulders. With a handsaw, cut into the stock 1/8" and then remove the waste with a chisel. Once the edge shoulders are formed on each tenon, smooth the tenon cheeks with a sharp 1" chisel. Continually check the fit of the tenons in their mortises.

Cut the rail curves on the bandsaw using a medium toothed 1/2" wide blade. Cut just outside the layout lines, then belt sand the backs of the pieces smooth. Chuck a drum sander in the drill press and clamp a V-block to the bed to uniformly smooth the inside curves of the rails.

The top edge of the crest rail can now be cut on the bandsaw to its curved profile. Layout the curve (shown at right) and cut just outside the layout line. Carefully remove the ridges with a belt sander.

### Seat Supports and Stretchers

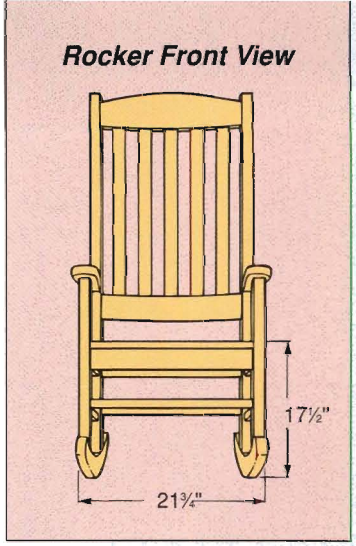
Rip all the seat support rails (pieces 4, 5 and 6) and the lower stretchers (pieces 8, 9 and 10) to width on the tablesaw, and then cut them to length.

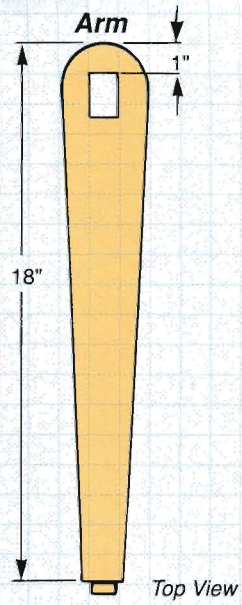
On the rails and stretchers crossing between the back or front pairs of legs (pieces 4, 5, 8 and 9), layout the angled tenons using the template on page 9. Cut the shoulders on these pieces just as you did earlier on the crest rail and lower rail. Cut the cheeks on the bandsaw, and use a handsaw and chisel to cut the edge shoulders. Fit the tenons in their mortises after smoothing the cheeks with a sharp 1" chisel.

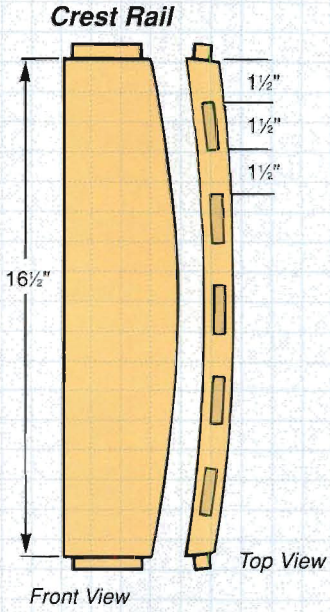
The rails and stretchers spanning the sides of the chair (pieces 6 and 10) enter the legs at a 90° angle and therefore do not need specially angled tenons. Clamp a 3/4" thick spacer block to your tablesaw fence, keeping the block forward of the blade. Reset the blade to 90° and clamp the fence 1⅛" away. This will allow you to repeatedly cut 1/2" long tenons. Rest the stock in your miter gauge, butting one end of the piece against the spacer block. Now cut the square shoulders, making additional passes over the blade to form the tenon cheeks. Repeat this procedure for all four pieces, and cut the edge shoulders in the same way. Carefully smooth the cheeks with a chisel, refining the tenons until they fit snugly into their mortises.

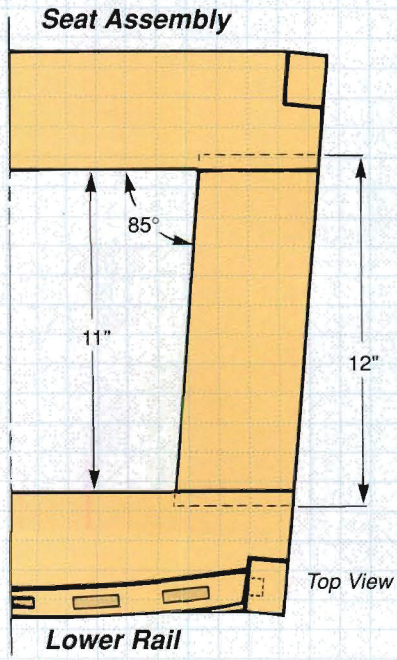
### The Slats

The five slats for the back rest (pieces 12) are cut from 4/4 material. Rip five strips 1½" wide and layout the slat profile on the edge of each strip. Cut the 7/16" thick slats on the bandsaw with the same medium toothed, 1/2" wide blade you used earlier, staying outside of the lines so you can sand down to the finished dimension.



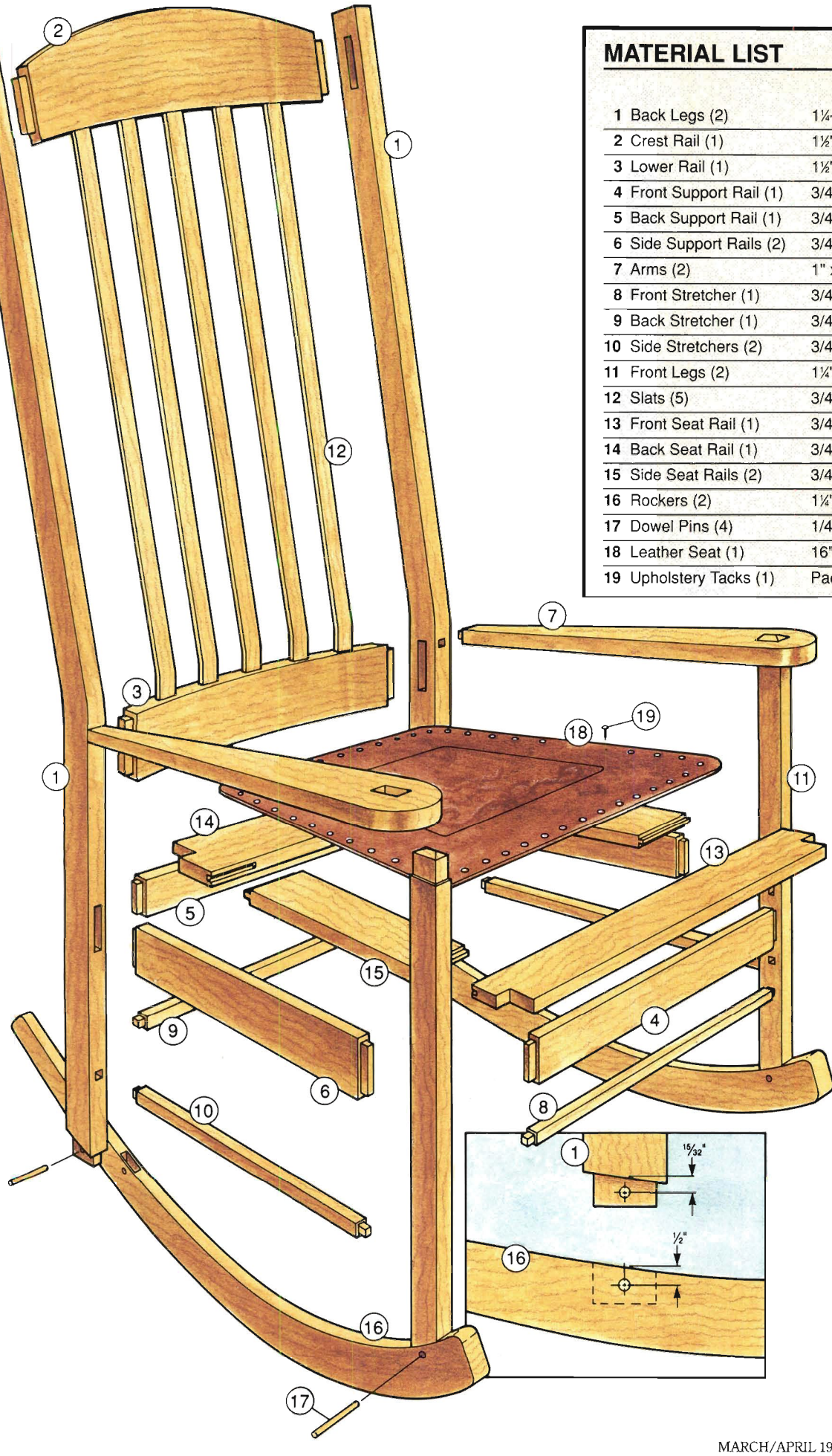



## MATERIAL LIST

| | | T x W x L |
|---|---|---|
| 1 | Back Legs (2) | 1¼" x 5" x 46" |
| 2 | Crest Rail (1) | 1½" x 4" x 17½" |
| 3 | Lower Rail (1) | 1½" x 3" x 17½" |
| 4 | Front Support Rail (1) | 3/4" x 2½" x 20⁹⁄₁₆" |
| 5 | Back Support Rail (1) | 3/4" x 2½" x 17½" |
| 6 | Side Support Rails (2) | 3/4" x 2 ½" x 16¼" |
| 7 | Arms (2) | 1" x 3" x 18½" |
| 8 | Front Stretcher (1) | 3/4" x 1" x 20⁹⁄₁₆" |
| 9 | Back Stretcher (1) | 3/4" x 1" x 17½" |
| 10 | Side Stretchers (2) | 3/4" x 1" x 16¼" |
| 11 | Front Legs (2) | 1¼" x 1¾" x 21⅜" |
| 12 | Slats (5) | 3/4" x 1½" x 21" |
| 13 | Front Seat Rail (1) | 3/4" x 4" x 21¹¹⁄₁₆" |
| 14 | Back Seat Rail (1) | 3/4" x 4" x 19⁹⁄₁₆" |
| 15 | Side Seat Rails (2) | 3/4" x 4" x 12" |
| 16 | Rockers (2) | 1¼" x 5" x 30½" |
| 17 | Dowel Pins (4) | 1/4" x 2" |
| 18 | Leather Seat (1) | 16" Rectangular |
| 19 | Upholstery Tacks (1) | Pack of 100; Antique Finish |



Belt sand the front of the slats so they're even and smooth. Now use the drum sanding set up on your drill press to sand the back sides of the slats to a uniform thickness of 3/8". Once again, make sure that the feeding direction of the stock goes against the rotation of the sanding drum.

### Assembling the Chair

By this time you've made most of the parts of the chair. Those parts that are left —the arms, rockers and the seat —are made after the main structure is assembled.

Gather together all the pieces you've made so far and organize them into three groups. The first group should include all the parts that make up the back of the chair, including the back legs, the crest rail and the lower rail, the slats, the back seat support rail and the back stretcher. The second group should include the parts for the front of the chair, which are the front legs, the front seat support rail and the front stretcher. The final group includes the side seat support rails and the side stretchers.

Dry assemble all the parts in the back and, once everything fits properly, spread glue in all the mortises of the crest rail and the lower rail and insert the slats into position. Now apply glue in all the mortises of the back legs and on the tenons of the rails and stretcher. Slip the right leg onto the crest rail and lower rail tenons, then add the seat support rail and the stretcher. Pull the left leg onto the assembly and check for squareness by taking each diagonal measurement from the crest rail to the lower rail. When the spans are equal the unit is square. Clamp the assembly and let the glue dry.

Assembling the front section is much easier since there are a lot fewer parts. Spread glue in the leg mortises and on the tenons of the front seat support rail and the stretcher. Draw the legs onto the stretchers, check for squareness and clamp the assembly for a couple of hours.

After the glue on the front and back assemblies has dried, put glue in the mortises for the side seat support rails and the stretchers. Insert these pieces into the back leg mortises, then glue the front assembly onto their other ends. Set the chair aside to allow the glue plenty of time to dry.

### The Seat

The four pieces of the seat (pieces 13, 14 and 15) are 4" wide, so rip enough 3/4" thick material to this width, leaving the pieces run long for the moment. The two side pieces are joined to the front and back pieces by mortise and tenon joints, however, since the seat is tapered from front to back, the joints form an 85° angle.

Cut each piece to length, remembering that all the crosscuts must be made at an 85° angle. Once cut to length, stop mortise the front and back pieces for the joints using the dimensions shown on page 11. This can easily be done on the router table with a stop block on the fence. Mount a 3/8" straight bit in the router, raise the bit 1/2" above the table and adjust the fence so the bit cuts exactly down the center of the 3/4" thick seat pieces. Clamp a stop block 4⅜" beyond the bit and then rout the four mortises.

Next, form the tenons on the seat side rails. Remove the router from the router table and add the edge guide to its base. Install a 1/2" straight bit and set it to cut 3/16" deep. Adjust the edge guide to limit the cut to 1/2" in width. Following the angled end of each side piece, rout one side of the tenon and then flip the piece over to make the second cut. Once the joints fit properly, glue the seat together and use the inside diagonals to check for squareness. Sand the seat flush when you remove the clamps, and notch each corner of the seat to fit around the legs as shown on page 11. Run a bead of glue on the seat support rails and clamp the seat into position. By gluing the seat to the rails the overall strength of the chair will increase tremendously.

**Figure 3: Align the arm mortise with the front leg tenon and rest the arm on the shoulder. Layout the rear joint where the arm intersects the back leg.**

**Figure 4: Position the rocker on the legs, then trace the curve to layout the tenon shoulders.**

### Arms and Rockers

The arms (pieces 7) are cut from 1" thick material, which must be planed from thicker stock. Rip two pieces of 1¼" thick oak to 3" in width and cut them 20" long. Try to find highly figured stock for these pieces as they show off the chair more than any other single component. Mill the stock down to 1" in thickness.

Layout the through mortise location on the front end of both arms. The mortises must be cut at a 5° angle to allow the arms to slope properly. To do this, tilt your drill press table 5° and install a 3/8" bit in the chuck. Now bore through the mortise area to remove the waste, being sure to drill around the perimeter of the mortise first so that you get the slope properly laid out. Once the bulk of the material is removed, clean up the mortise with a sharp chisel while maintaining the 5° angle.

Rest the right arm on the outside shoulder of the front leg tenon and align the arm mortise with the tenon. The arm is now positioned as it will be when installed, sloping 5° to the back leg. Put a mark on the arm where it intersects the back leg. In addition, draw lines on the leg indicating the top and bottom of the arm. Now layout a 1/2" high by 3/4" wide mortise on the back leg, centering it between the arm intersection marks and across the width of the back legs.

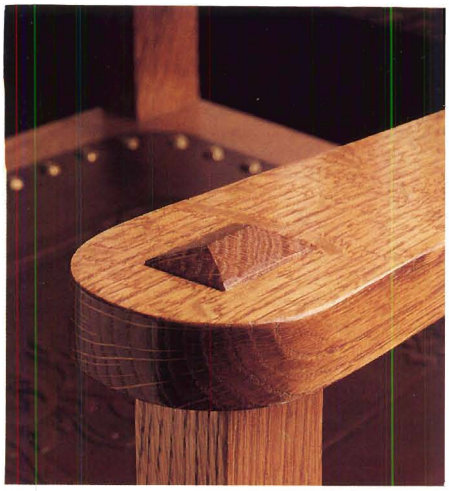


**Figure 5: Recreate this symbol of superior craftsmanship from the Arts and Crafts era using a 1" chisel, a tenon saw and your hand tool skills.**

**Figure 6: Trim the leather to lap onto the side rails by 1" and 2" on the front and back rails. To prevent splitting, predrill the nail holes 1" apart.**

At the mark you just made on the arm's edge, layout the angled tenon, once again using the tenon template shown on page 9. Follow this same procedure with the left arm.

Drill out the bulk of the waste in the 1/2" deep mortises with a 1/2" bit, then square the walls with a sharp chisel. Cut the angled tenons on the arms using the tablesaw and long miter gauge fence, just as you earlier cut the other angled tenons. Once the tenons are formed, layout the shape of the arm on the stock and cut this profile on the bandsaw. Sand the edges smooth with a belt sander. Next, cut the tenon side shoulders and edges with a handsaw and chisel, paring down the shoulders and the cheeks for a perfect fit. Put glue on all the mortises and tenons and slip the arms into place on the chair. Use clamps to draw the arms tightly against the back legs.

Now that the basic chair is made you can move on to make the rockers. Cut two rockers (pieces 16) out of 1¼" thick material following the scale drawing on page 10. Clamp the two rockers together to sand their bottom edges smooth, ensuring the two pieces match exactly. Now pass the rockers over the drum sander to smooth their inside curves. Mark the position where the rockers intersect the legs as shown on page 10.

Set the chair on its left side and lay the right rocker onto the legs, as shown in **Figure 4**. Align the marks you just made on the rocker with the points of intersection on the legs (see drawing on page 10). Holding the rocker in place, trace the curve of the rocker onto the legs and outline the position of the legs on the rocker. Flip the chair over and repeat this process for the other rocker.

Layout the leg tenons below the shoulder lines following the elevation drawing on page 10. Using a dovetail saw, make straight cuts very close to the shoulder lines, then pare the shoulders with a chisel to match the curved lines. Cut the side shoulders and edges with the dovetail saw.

On the rockers, layout the mortises between the lines you traced off the leg positions. When you drill out the waste with a 1/2" bit, drill 3/4" deep at the shallow end of each mortise and drill slightly deeper as you follow the rising curve of the rocker. If you do this you'll end up with nice, flat bottomed mortises that easily fit the tenons. Clean up the walls with a chisel.

Drill a 1/4" hole through the center of the four mortises on the rockers (see exploded view detail on page 12) and then mount the rockers onto the leg tenons. Use an awl to mark the center of these holes onto the tenons, then remove the rockers. Now drill a 1/4" hole through each tenon 1/32" above your awl mark.

Put glue on the tenons and in the mortises and drive the rockers onto the legs. Now chamfer the ends on four lengths of 1/4" dowel rod and drive these into the pin holes at each joint —the offset holes will draw the joint very tight so clamps aren't necessary. Cut the dowels flush with the rockers.

Cut off the top of the back legs 1" above the crest rail, then saw and chisel the ends into pyramid shapes as shown in **Figure 5**. Sand the entire chair to 180 grit.

### Finishing

Arts and crafts furniture was traditionally finished with a fumed ammonia process. Ammonia causes woods high in tannic acid, like oak, to darken considerably, and the longer the wood is exposed to the fumes the darker it becomes. Controlling this process requires a fair amount of experience and an elaborate set up to contain the fumes. Fortunately, modern stains and dyes can closely duplicate the colors that result from ammonia fuming, and these are much easier to handle in the home shop. Watco Danish Oil Finish in medium dark walnut matches the tone of the traditional craftsman colors very closely. You can easily darken or lighten the color by using other shades of this product. Apply one coat of Watco Oil and let it dry for a couple of days, then follow with two coats of Gillespie Tung Oil Finish to increase the luster.

The leather seat is held to the chair by upholstery nails, which have a large, dome shaped head. First trim the leather with a sharp razor blade to overlap the seat opening by one inch on the left and right sides and by 2" on the front and back. After lightly coloring the freshly cut edges with a brown stain, begin securing the leather by driving one nail in the center of each side (**See Figure 6**). From these points work toward the corners installing more nails, leaving about 1/2" between the heads. Hide any discrepancies by varying the spacing near the corners.

Chairs are indeed a specialized branch of woodworking, but there isn't any reason to fear their construction. Most of the joint cutting on this chair can be done by machine with excellent results, and the handwork required involves mostly fine paring and fitting. By making this chair you will have fulfilled one of the original precepts of the arts and crafts movement; that is, combining the best of hand and power tool techniques for creating quality furniture that is pleasant to build and to have in your home.

*Chris Inman is the associate editor of Today's Woodworker magazine, and a professional woodworker.*

# Laminated Napkin Holder

*Accessorize your dining room table with a set of fancy napkin rings and an elegant holder.*

By Bill Johnson

Here's a project that will add a touch of grace to any dining room table. This napkin holder and ring set is built with 1/4" thick laminations of maple and walnut, contrasting woods that add even more interest to a terrific design. The shape and tone of the set is reminiscent of art deco designs of the twenties and thirties, a style that is resurfacing in modern decorating schemes.

Making the napkin holders and eight rings involves using a scroll saw and some basic carving tools. The full size templates on the next page make the design easy to follow, and I recommend copying the outlines onto some clear plastic so that you have a durable template to trace around. Make templates for both the angled blanks as well as for the cutting outline on the finished pieces.

Building the napkin set doesn't require very much material, in fact you'll use less than than three square feet of 1/4" thick maple and an equal amount of 1/4" thick walnut. The design also calls for two 1/4" walnut dowel rods, a short length of 1/2" walnut dowel and one 1/8" birch dowel rod. The napkin holder and the rings are all constructed in the same way. Basically, the pieces are laminated into a sandwich, with a maple core covered by walnut and maple surfaces. Making the napkin holder and the eight rings cost under $25.00.

### Forming the Blanks

Make the napkin holder first, which will clearly illustrate the procedure for making the rings. Start by cutting two pieces of maple into 6¾" squares for the core material in the napkin holder panels. Now, following the templates on the next page, draw the shapes onto pieces of maple and walnut for the surface appliques. You'll need four pieces of walnut and two pieces of maple for each panel. The maple goes in the center of the panel and the walnut is glued to the core on either side of the maple center. A narrow, tapered gap is left uncovered between the walnut and maple appliques. The base of the panels are entirely maple, but you must be sure to cut crossgrain strips for these pieces, otherwise the bond between the strips and the core will eventually delaminate due to conflicting grain expansion.

Begin the gluing process by first applying the maple base strips to the maple core. Use yellow glue for all the bonds as it sets fairly quickly and be conservative with the amount of glue you use on these laminations. This will prevent the pieces from slipping around too much when the clamps are applied. Try spreading on the glue and letting it sit for a few minutes before clamping the pieces together. This will increase the glue's initial tack and reduce its runniness.

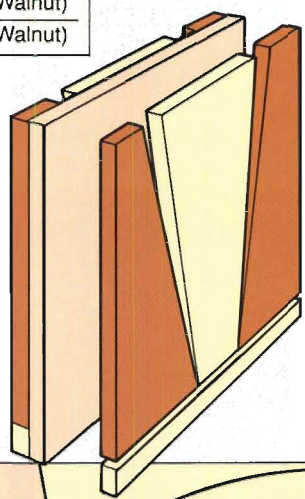
Once the base strips are well adhered to the core you can apply the center applique of maple and then the two outside pieces of walnut. This is best done one face at a time; there is just too much slipping around when gluing pieces to opposite sides of the core at the same time.

## MATERIAL LIST

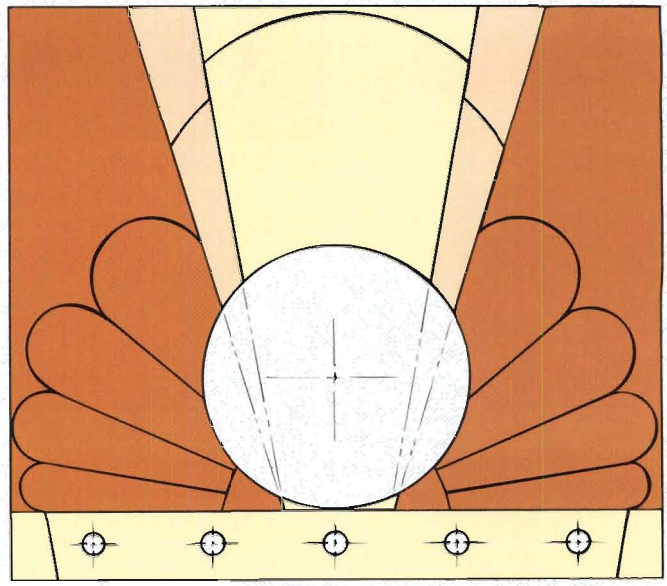
| Napkin Holder | T x W x L |
|---|---|
| 1 Maple Cores (2) | ¼" x 6¾" x 6¾" |
| 2 Maple Base Strips (4) | ¼" x ¾" x 6¾" |
| 3 Maple Wedges (4) | ¼" x 2 13/16" x 5¼" |
| 4 Walnut Wedges (8) | ¼" x 2 13/16" x 3⅛" |
| 5 Connectors (5)* | ¼" x 8½" (Walnut) |
| 6 Pressure Bar (1)* | ½" x 6¾" (Walnut) |
| 7 Glides (2)* | ¼" x 1⅝" (Walnut) |

*Dowel Rod

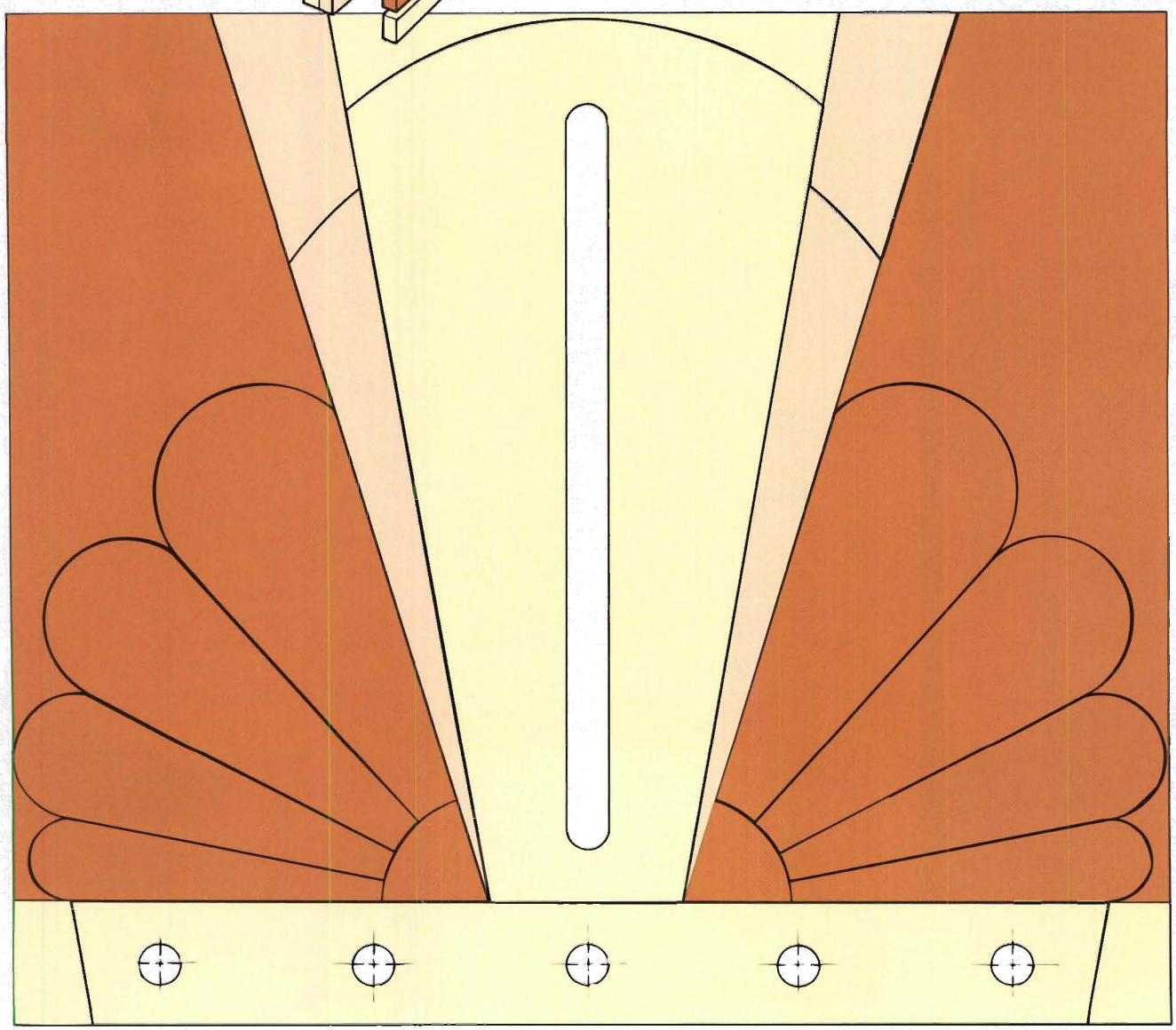
***Photocopy these full size patterns to make templates for setting directly onto your 1/4" thick stock.***



*Napkin Ring Pattern*



*Napkin Holder Pattern*



After the appliques are glued to the core, layout the five 1/4" diameter hole positions along the base strip on each panel as well as the vertical slot for the pressure bar. To insure accuracy, bore the 1/4" holes through the panels using a drill press. Make the pressure bar slots on a router table using a 1/4" diameter straight bit. This bit isn't beefy enough to rout through the full thickness of the panel in one pass, so take three passes in all. Clamp the router table fence 3⅜" from the center of the bit and then clamp two stop blocks to the fence. Set one block 5¾" to the right of the center of the bit and the other block 4⅞" to the left of the center of the bit (**See Figure 1**). These blocks will limit the length of the cut to 4⅜".

To use this router table set up, brace the panel at an angle against the right hand stop block and then plunge the panel into the bit, which should be raised to 1/4". Push the panel over the bit until it contacts the other stop block, then turn the router off. Follow the same procedure on the second panel and then raise the bit to 1/2". Repeat the process, and finally raise it to 7/8" for the final pass on each panel. You'll find that once the router table is set up with the stop blocks this is a safe method for routing on small stock.

Trace the outline of the finished shapes onto the stock and be sure that the template is centered on the panel. Cut the shape out on the scroll saw or, if you don't have this machine in your shop, use a coping saw.

After the panel is cut to shape you'll want to add the carving details on both faces. Use a ruler to line up the division between each outside hump and the point of conversion at the base strip. Pass a razor knife along the ruler to cut a kerf 1/16" deep at each of these locations. Now take your knife and cut a line about 1/16" to the right of the first line, making this cut angle toward the first line at about 60°. Now repeat this cut on the other side of the lines. The final result should be a series of nice grooves that create the fan shape on the walnut areas.

Carefully sand all the V-grooves to round the edges and blend them into the surrounding area. Now file and sand the outside edges of the panel into a distinctly round profile. One tool that is very helpful at this stage is a Sand-O-Flex™ flap sanding wheel, which will roundover the edges of the napkin holder in very short order.

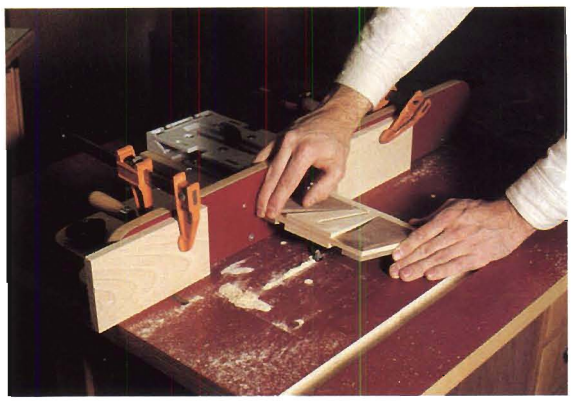


**Figure 1: Make the pressure bar slot by clamping stop blocks against the fence to limit the cut and routing 1/4" deep per pass.**

### Assembling the Holder

Cut your 1/4" diameter birch dowel rods into five pieces 8½" long. Slightly round over the ends of the dowels with a belt sander. Now put glue into the 1/4" holes of one panel and drive one end of the five dowels into each hole so that the dowel projects out the other side by 1/8". Wipe off the excess glue and let the assembly dry before attaching the other panel. In order to guarantee the squareness of the panels to each other, cut a 6" wide by 6¾" long scrap board and set it on the dowels and against the fixed panel. Put glue in the holes on the other panel and drive it onto the dowels until it contacts the end of the board. The dowels should project through the panel by 1/8". Again, clean up any glue squeeze out.

The pressure bar is made from 1/2" walnut dowel rod cut to a length of 6¾". A short piece of 1/4" dowel is then glued to each end to fit in the panel guide slots. Using a center finder, locate the center on each end of the 1/2" dowel. Clamp the dowel in a vise and drill a 1/4" hole 3/4" deep in each end. Now cut two pieces of 1/4" dowel 1⅝" long and glue them into the holes. Round over the ends of the 1/4" dowels to match the appearance of the dowels in the base of the napkin holder. Check the fit of the pressure bar in the slots and sand the 1/4" dowels if the fit is too tight.

Sand the whole piece to 180 grit and then apply several coats of Gillespie's Tung Oil for a satin finish.

### Making the Rings

The napkin rings are made in the same way as the holder with only two exceptions. Instead of routing a slot in the center section for a pressure bar, drill a 1⅜" diameter hole for cloth napkins to pass through. This is best done with a forstner bit on the drill press, although an economical alternative is to use a spade bit or hole saw. Be sure to clamp the work to a piece of scrapwood on the drill press table before boring the hole.

The second difference between the rings and the holder is that the small dowels in the base strip of the rings are purely cosmetic. Cut an 1/8" diameter birch dowel into pieces 7/8" long, round over the ends slightly and stain them dark brown. Glue the dowels into the holes and leave 1/16" project out each side of the ring's base.

Sand and finish the napkin rings in the same fashion as you did the holder, making sure to round the edges and the carved details so that everything blends together. Make eight of the rings so you'll have enough for a dinner party.

*Bill Johnson is a professional woodworker based in Minnetonka, Minnesota.*

# Technicolor Toy Box

*Loaded with appealing features —two bins, a pullout desk and three doors — and accented with eye catching colors, this toybox should keep an industrious kid at heart busy for hours.*

By Rick White

I don't know who gets a bigger kick out of projects like this, me or the kids. Building toys and toy boxes is so much fun that I'm never sure I want to actually finish the project.

I wanted a box to store some of the trucks, Legos® and stuffed animals that decorated our living room floor. To spark the kids' imaginations, I added a couple of bins and doors and built a pull-out desk extension on one end of the box. I stuck with simple, straightforward construction methods, building with solid birch frames and birch plywood panels, and using plastic laminate for the top surfaces. The materials for the toy box cost about $150.00, which is made up primarily of 18 board feet of birch, one half sheet of 1/2" thick birch plywood and a full sheet of 3/4" birch plywood. This lumber can all be purchased at a well stocked building supply center.

### Making the Walls

Begin by ripping material for all the toy box stiles (pieces 2, 10, 24 and 27) and rails (pieces 1, 9, 23 and 26) to 3" in width, then crosscut the stock to the lengths shown in the material list on page 22. Label each piece with a number and letter. The number will denote the actual piece and the letter will indicate the particular wall where this piece goes. Use a different letter to identify each wall.

Cut all the plywood pieces to size (labeling these with a number and letter too). The sizes in the material list allow for any tenons that you will need, which in all cases are 1/4" long by 1/4" thick. Wherever a fixed panel meets a rail or a stile it must be tenoned. Panel edges that do not meet a frame member should be banded.

After cutting all the plywood to size set about the task of banding the appropriate edges on each panel (pieces 3, 11, and 16) as well as all four edges on the doors (pieces 4) and bin fronts( pieces 12 and 17). Rip about 28 feet of 1/2" wide by 3/4" thick birch for the banding. Glue the banding to the plywood edges and sand the surfaces until they are flush.

Before moving on to cut the tenons, cover the three sections of the top (pieces 22 and 28) with plastic laminate (pieces 25). Since the panels are secured in frames it's not necessary

to laminate both sides to prevent cupping. Select the best side of the plywood to face down and apply the laminate to the poorer side of the material.

Cut the laminate oversize and spread contact cement over the surface of the panels and on the underside of the laminate. Allow this cement to sit for about twenty minutes so that it's dry to the touch, then apply a second coat to all the surfaces. Give the second coat time to dry. Place stickers onto each plywood panel and then lay the laminate into position on top of the stickers. Beginning at one end of the panel, remove the stickers one at a time and press the laminate to the plywood. Once all the stickers are removed, apply heavy pressure to improve the contact cement's bond by rolling the surface with a jay roller. Chuck a flush cutting bit into your router and trim the overhanging laminate off the panels.

The next major step in building the toy box is mortising the frame stock for the panels and corner joints. Layout the mortises on all the stiles and rails as shown in the elevations drawings. Be sure to note that the mortises on many frame pieces stop when they reach door or bin locations. Cut the stopped mortises with a router equipped with an edge guide. Chuck a 1/4" diameter straight bit into your router and set the edge guide to rout a groove down the center of the 3/4" thick frame stock. For additional balance during the cut, clamp a second board to the one you're routing so that the top edges are flush (**See Figure 1**). This creates a more stable surface while operating the router. Chisel out the round ends of the stopped mortises so that the square ended tenons fit easily.

### Cutting the Tenons

To cut the tenons on the rails (pieces 1, 9, 23 and 26) set up a 1/4" wide dado blade in the table saw and raise it 1/4". Next, clamp a spacer block to the rip fence and adjust the fence so that one edge of the blade's swath is even with the edge of the spacer block. Make sure your miter gauge is properly set at a 90° angle to the blade and then cut the tenons. Pass the ends of the rails over the blade, then flip the boards over to cut the other side of the tenons.

To cut the tenons on the fixed plywood panels (pieces 3, 7, 11 and 16), not including the top and desk pieces, remove the short spacer block from the fence and replace it with a piece of scrap pine the full length of the fence. Move the fence so that the blade just barely grazes the pine. First cut the edges on one face of each panel, then flip the plywood panels over and cut the other side. As a reminder, put an X near each edge that requires a tenon.

Since the laminated panels (pieces 22 and 28), are thinner than the other panels, cut their tenons by lowering the dado blade to a height of 5/32". Pass all four edges of each panel over the blade, then flip the panels over to complete the other side of the tenons.

The mortises you just routed in the frames for the banded plywood panels (pieces 3, 11 and 16) are 1/2" shorter than the panels. Notch the banding off the corners of the three panels,

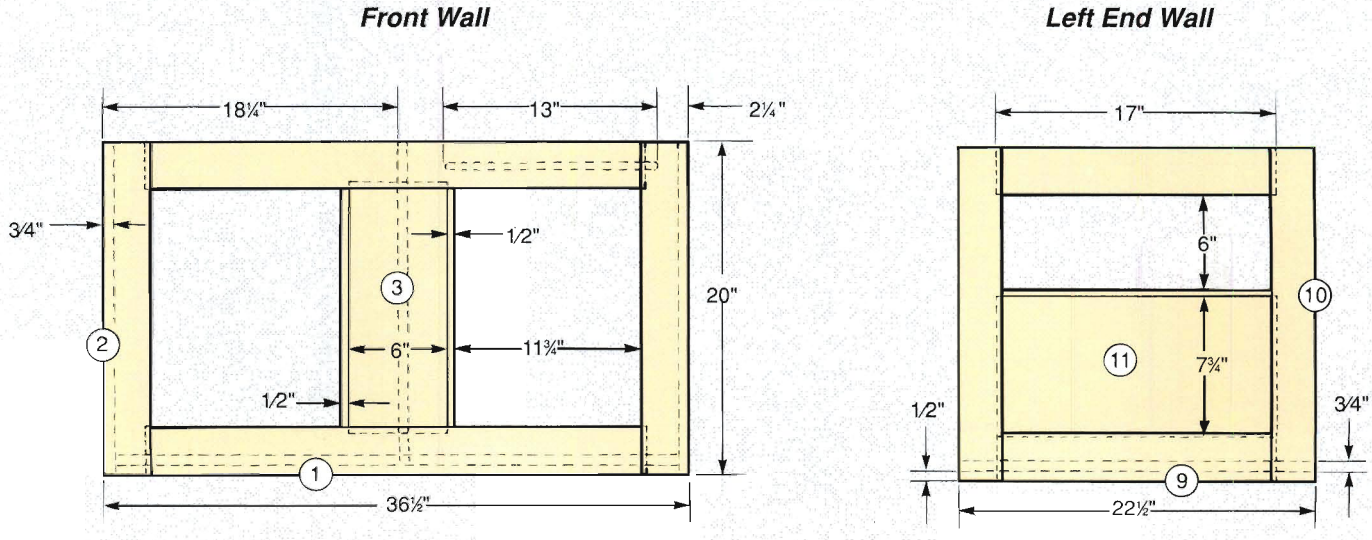
**Figure 1: Clamp two frame pieces together to increase router stability while routing mortises.**

and you'll have a perfect fit. The banding on each panel will now conceal any mortise overcuts.

Assemble the four walls, the two top sections and the desk top individually, spreading glue into the mortises and drawing the frame pieces onto the panels. Leave the units clamped for several hours to allow the glue to dry, then sand the surfaces flush while being careful not to go through the thin veneer on the plywood or to dip into the laminated areas of the top.

### Routing the Walls

Dry assemble your four walls and clean up all the edges so the corners match evenly. Now separate the walls and rout dadoes 1/2" up from the bottom edge of each wall to house the bottom panel (piece 31). Set up your router with a 3/4" mortising bit and an edge guide to rout dadoes 3/8" deep.



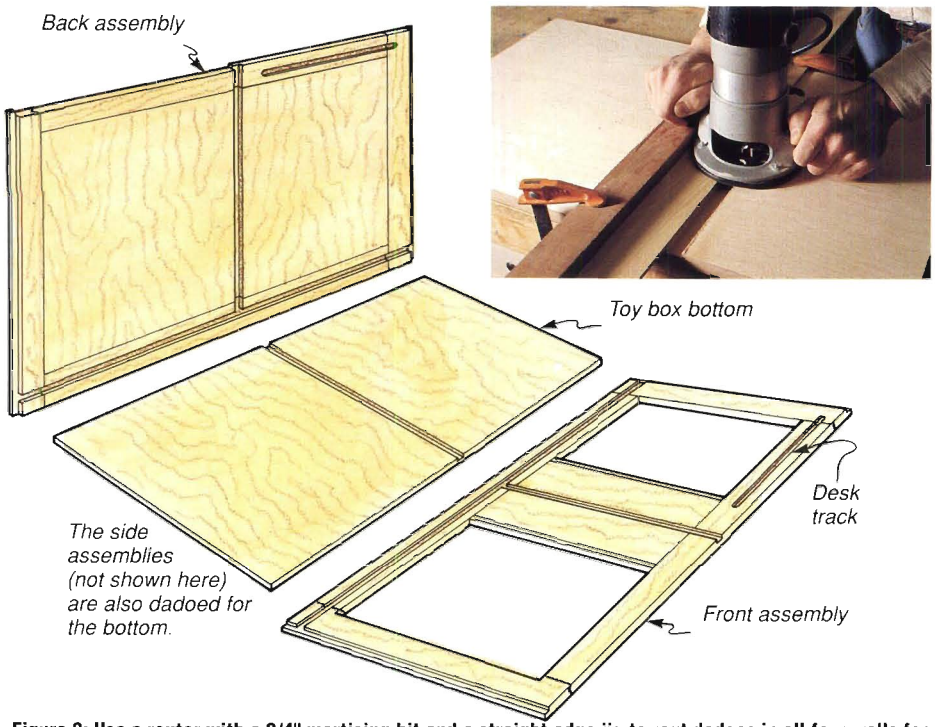



**Figure 2: Use a router with a 3/4" mortising bit and a straight edge jig to rout dadoes in all four walls for holding the bottom panel and in the front wall, back wall and bottom for the center divider.**

A 3/4" wide by 3/8" deep dado must also be routed in the front wall, back wall and bottom panel for housing the center divider (piece 32). Layout the dado on each of these three pieces (**See Figure 2**) and make a straight edge jig for your router, as shown in the photo above. Clamp the jig to each wall and rout the dado with a 3/4" mortising bit, but don't go past the groove in the front and back walls for holding the bottom panel in place.

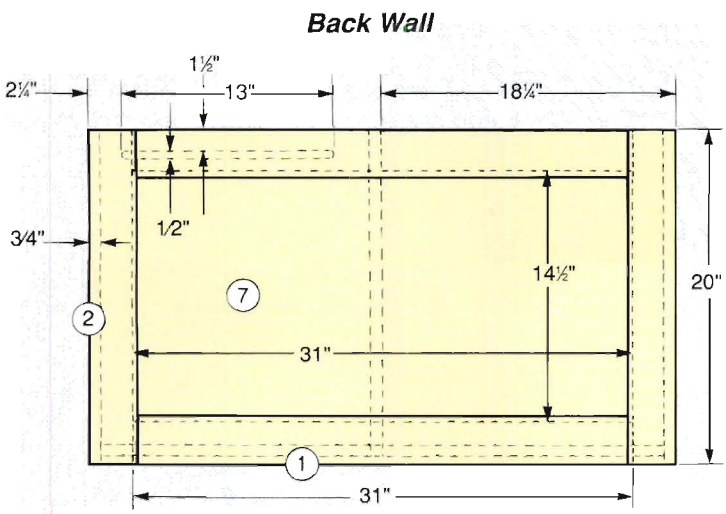
The front and back walls also have a track in which a retaining pin (piece 30) rides to prevent the desk from pulling right out of the cabinet (see page 22 for exploded view detail). Following the procedure with the router and edge guide just described, use a 1/2" diameter straight bit to rout the 3/8" deep stop dadoes into the inside of the top rails on both walls.

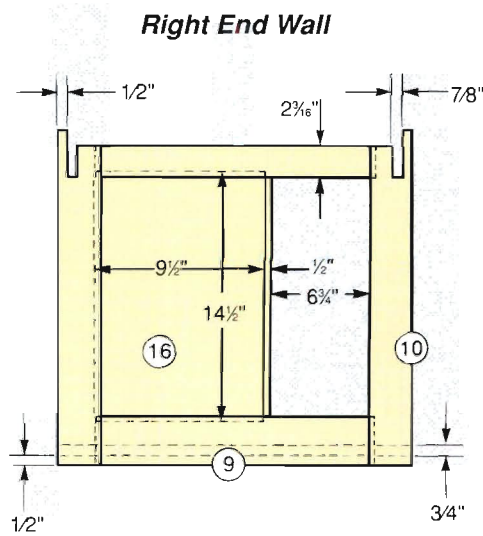
The front and back walls have rabbets cut at each end to help align the toy box during assembly. Adjust your dado blade in the table saw to make a 3/4" wide by 3/8" deep cut. Position the rip fence so that your auxiliary pine strip just grazes the blade and cut the rabbets on the inside of the front and back walls. At this time you should also rip 3/8" off each vertical edge of the end walls. This is done so that when the rabbeted front and back walls are assembled with the end walls, the stiles on the end walls will still appear to be 3" wide.

The left top section is piano hinged (piece 6) to the back wall of the toy box. In order to get this piece to sit level with the adjacent top section, both leaves of the hinge must be completely mortised into the back wall. Mark out the placement of the hinge on the top edge of the back rail (**See Figure 3**), and then clamp a straight edge jig to the back wall so that the router bit makes a 3/16" deep mortise. Run the router along the guide, being very careful not to go beyond the stop mortise marks. Finish the preparation for the piano hinge by squaring the curved ends of the cut and drilling the numerous pilot holes.

### Box Assembly

Check the fit on all the toy box parts and, once you're satisfied, spread glue in all the internal dadoes on the walls and bottom, and on the vertical edges of the walls. Lay the back wall face down on your bench and install the bottom panel in its dado. Next, set the divider into the dadoes on the back wall and the bottom. Slip the end walls into position, first placing the dadoes onto the bottom panel and then dropping the glue covered edges into the rabbets on the back wall. Finally, set the front wall onto the assembly and clamp the structure together. Line up all the edges of the walls and check for squareness by measuring diagonally across the top. Clean up any glue squeeze out now with a damp rag, especially on the inside corners of the box.



The last detail before assembling all the parts of the toy box is to cut four 3" by 3" pieces to serve as feet (pieces 33). Use 3/4" thick stock to raise the box off the ground slightly.

### Bins and Doors

You've already cut the plywood doors (pieces 4) and bin fronts (pieces 12 and 17) to size, and banded their edges with 1/2" by 3/4" birch. Sand the banding and the plywood flush, then begin cutting the rest of the parts for the bins as shown below.

Use 3/4" thick plywood for the backs (pieces 13 and 18) and 1/2" plywood for the sides (pieces 14 and 19). Follow the shapes outlined in the bin elevation below to cut the pieces to size. Note that one corner on each side piece is nipped off —this allows the sides to fit into the rabbets you're about to rout in the fronts and backs.

Chuck a 1/2" diameter straight bit in your router and install an edge guide on its base. Adjust the guide to limit the width of the cut to 1/2" and set your cutting depth to 3/8". Now rout rabbets along the right and left edges of each bin back and rout stopped rabbets on the edges of the two bin fronts. Stop the rabbets on the bin fronts 1/2" from the top edge and 3/8" from the bottom edge, then square the corners with a chisel.

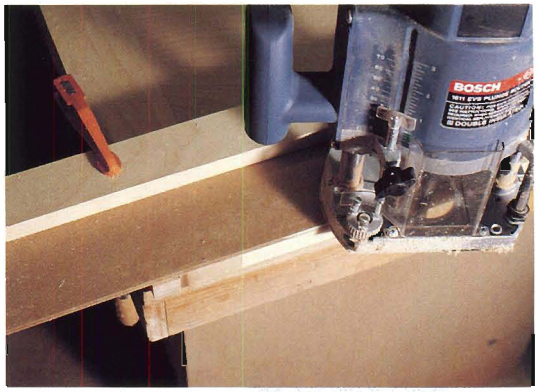
Spread glue in the rabbets and on the bottom edge of the back walls, and clamp each bin assembly together. Once the glue dries, cut the two bin braces (pieces 15 and 20) and carefully glue them into place. Now drill the pilot holes for the 1½" diameter birch knobs (pieces 8).

### Desk and Top Sections

You've already assembled and labeled the top sections and the desk top, but now you must take care of a few details before installing them on the toy box. First cut all the corners to a 1½" radius and rout the edges with a 3/8" round over bit. The left top section receives a finger grip groove on the underside of its front edge. Chuck a 1/2" core box bit in your router and, using a straight edge guide, cut the 3/8" deep grooves 1/4" from the front edge of the frame. The desk is also pulled out of the toy box by means of a finger grip identical to the one just routed in the left top section, so duplicate this procedure on the underside of the desk top.

Make the two rib supports (pieces 29) for the desk from solid birch. Rip the 3/4" thick stock to 2" in width and cut the pieces 20" long. Counterbore five pilot holes in the bottom edge of each rib and cut the chamfer on the lower front corner of the two pieces (**See Elevation on page 23**). Drill a 1/2" diameter hole near the back end of each rib for housing the dowel pin that rides in the desk retaining track. Secure the ribs to the desk top with #10-1½" long wood screws.

Make the removable retaining pins (pieces 30) by cutting out two 2" squares from 1/2" thick scrap plywood and drill a 1/2" hole through the center of each piece. Drill two pilot holes in each piece on either side of the 1/2" diameter holes. Now glue a 1⅜" long piece of 1/2" birch dowel rod in the center hole of each pad, pushing the dowel through the hole until the end is flush with the face of the block. Sand the dowels with 100 grit paper to reduce their size slightly, enabling them to easily slip into the holes in the ribs. Once the retaining pins slip into the holes easily, extend the screw pilot holes from the pads into the ribs.



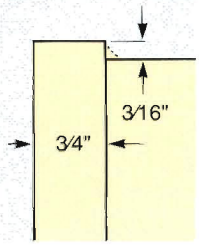
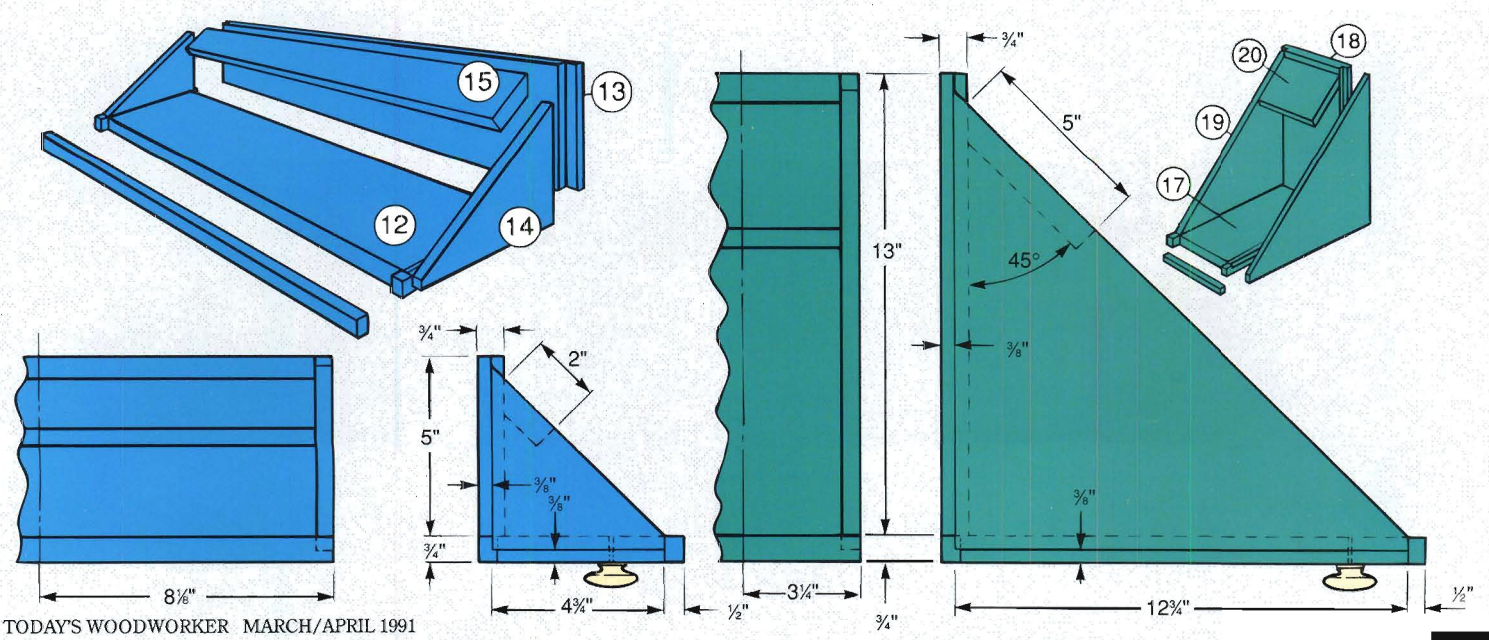
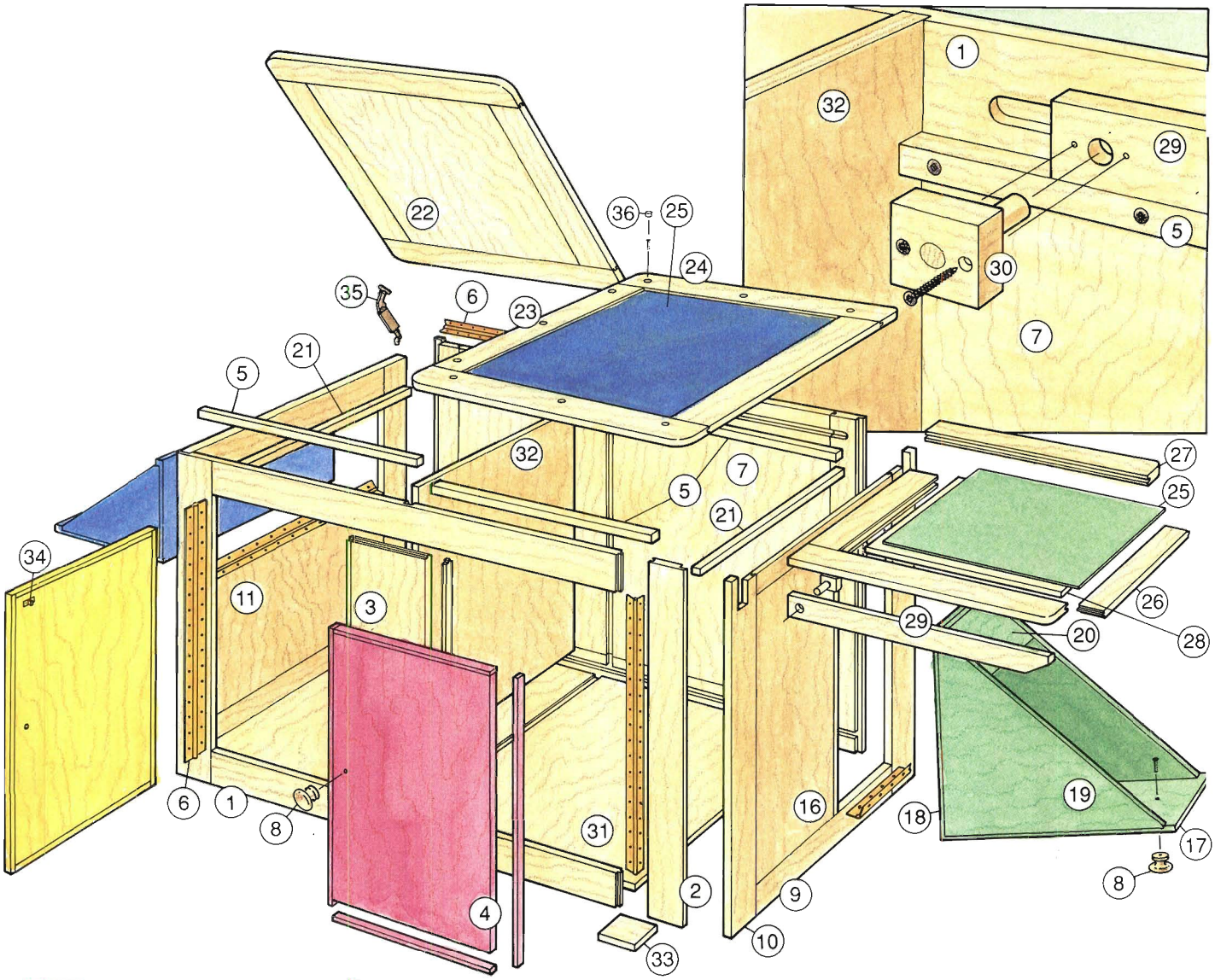




**Figure 3: To install the hinged top section, clamp a straight edge jig to the back wall and rout a stopped mortise deep enough for both leaves of the piano hinge. Square the ends of the mortise with a chisel.**

The right end wall of the toy box must now be modified to accept the desk, and this requires a few saber saw cuts (**See Figure 4**). Cut the area out with a fine toothed blade to minimize the filing and sand the new edges.

The ribs of the desk ride on the door stop for the right front door and a matching strip secured to the back wall (pieces 5). Rip two pieces of birch 3/4" by 1" and cut them to 17½" in length. Mount these to the inside of the front and back with glue and






## MATERIAL LIST

* Birch Plywood

| | | T x W x L |
|---|---|---|
| 1 | Front & Back Rails (4) | 3/4" x 3" x 31" |
| 2 | Front & Back Stiles (4) | 3/4" x 3" x 20" |
| 3 | Front Panel (1)* | 3/4" x 6" x 14½" |
| 4 | Front Doors (2)* | 3/4" x 10½" x 12¾" |
| 5 | Door Stops (3) | 3/4" x 1" x 17½" |
| 6 | Piano Hinges (2) | 1½" x 36" (cut to size for openings) |
| 7 | Back Panel (1)* | 3/4" x 31" x 14½" |
| 8 | Knobs (4) | 1½" Diameter |
| 9 | End Rails (4) | 3/4" x 3" x 17" |
| 10 | End Stiles (4) | 3/4" x 2⅝" x 20" |
| 11 | Left End Panel (1)* | 3/4" x 17" x 7¾" |
| 12 | Left Bin Front (1)* | 3/4" x 15¼" x 4¾" |
| 13 | Left Bin Back (1)* | 3/4" x 16¼" x 5" |
| 14 | Left Bin Sides (2)* | 1/2" x 5⅛" x 5⅛" |
| 15 | Left Bin Brace(1)* | 1/2" x 2" x 15⅜" |
| 16 | Right End Panel (1)* | 3/4" x 9½" x 14½" |
| 17 | Right Bin Front (1)* | 3/4" x 5¾" x 12¾" |
| 18 | Right Bin Back (1)* | 3/4" x 6½" x 13" |

| | | T x W x L |
|---|---|---|
| 19 | Right Bin Sides (2)* | 1/2" x 12¾" x 12¾" |
| 20 | Right Bin Brace (1)* | 1/2" x 5" x 5⅜" |
| 21 | Bin Stops (2) | 3/4" x 1" x 19½" |
| 22 | Top Fixed Panels (2)* | 1/2" x 18½" x 13½" |
| 23 | Top Rails (4) | 3/4" x 3" x 18½" |
| 24 | Top Stiles (4) | 3/4" x 3" x 19" |
| 25 | Laminate (3) | 20" x 15" (2 green: 1 blue) |
| 26 | Desk Rails (2) | 3/4" x 3" x 15⅛" |
| 27 | Desk Stiles (2) | 3/4" x 3" x 19⅛" |
| 28 | Desk Panel (1)* | 1/2" x 15⅛" x 13⅜" |
| 29 | Desk Supports (2) | 3/4" x 2' x 18½" |
| 30 | Retaining Assembly (2) | 1/2" x 2" x 2" (with 1/2" x 1⅜" dowel) |
| 31 | Toy Box Bottom (1)* | 3/4" x 21½" x 19" |
| 32 | Center Divider (1)* | 3/4" x 21½" x 19" |
| 33 | Feet (4) | 3/4" x 4" x 4" |
| 34 | Catches (2) | small brass ball catches |
| 35 | Lid Supports (2) | side mounted (35-40# rating) |
| 36 | Wood Plugs (9) | 3/8" diameter face grain |

*Note: 28 lineal feet of 1/2" wide by 3/4" thick birch banding is also required.*

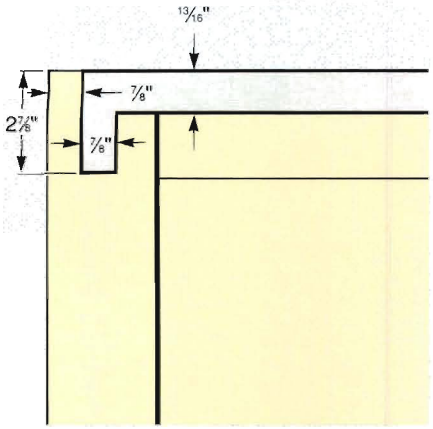



**Figure 4: Cut the slots in the right end wall with a saber saw so the sliding desk fits in the box.**

screws. Butt one end of the stops to the inside face of the right side wall just below the entry holes for the desk supports, then level the strips and secure them to the walls.

Three more stops (pieces 5 and 21) must be added to the toy box for the two bins and the remaining door. Rip 3/4" by 1" birch and cut one piece 17½" long for the left end wall bin, one 8½" long for the right end wall bin and a 14¼" long piece for the left front door. Chamfer the ends of these stops, then glue and screw them into place above each specified door or bin location. Allow 1/2" of each strip to overhang each opening.

### Finishing Up the Top Sections

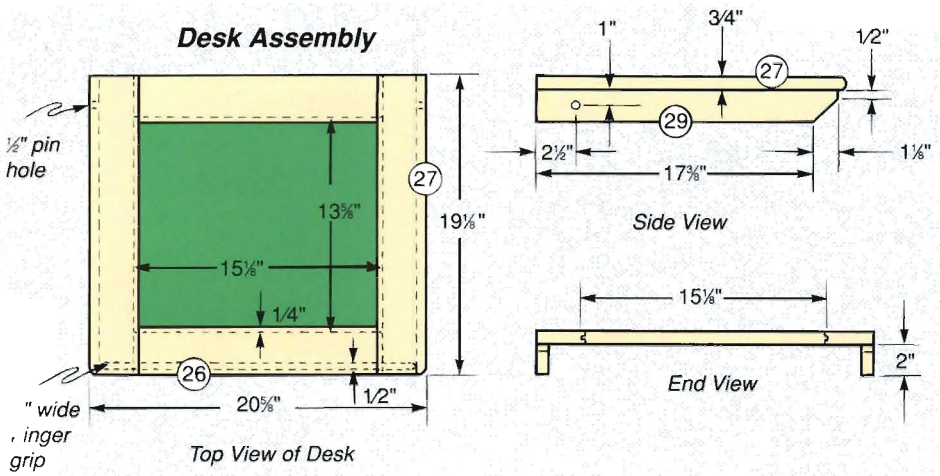
The right top section is permanently fixed to the toy box with screws and glue. Drill nine counterbored holes with a 3/8" brad point bit and follow with a 5/32" twist drill for the screw pilot holes. Carefully position this section on the box and extend the pilot holes into the top edge of the walls and divider. Remove the top and run a bead of glue on the walls that support it. Set the panel back in place and drive the #8-1½" screws home. Cover the screws with birch face grain plugs (pieces 36) and sand them flush with the top.

Cut the piano hinge (piece 6) for the left top section to length and mount it in the mortise on the back wall. Set the left top section in place and mark the hinge position. Now raise the top, mark the hinge hole locations with an awl and drill the pilot holes. Mount this hinged top section to the toy box.

Mount the remaining piano hinges on the doors and bins and secure them to the cabinet. Make sure everything fits just right, then add the door catches (pieces 34), and the child safe lid supports (pieces 35; see Hardware Hints on page 5). Next, remove the doors and bins to sand all the sharp corners with 100 grit paper. Use a piece of thin cardboard to protect the laminate as you sand the top frame edges. Sand the entire toy box to 150 grit. Now remove the doors and bins, and finish all the wood parts with two coats of tough polyurethane to withstand the coming abuse. To color the doors and bins, see "Finishing Thoughts" at right.

The kids filled the toy box as soon as it was reassembled, reserving the large bin for their legos® and the small bin for various prized possessions. Their methods of organization are mysterious, but then I guess that's how my shop must appear to them.

*Rick White, a professional woodworker, serves on the editorial advisory board of Today's Woodworker.*






# Using Alcohol Based Aniline

According to our finishing expert Jerry TerHark, alcohol based aniline dyes are a speedy way to get bright, vivid colors on a project. The alcohol dries very quickly without raising the wood grain like water based dyes will do. However, you have to work very fast while applying the aniline mixture.

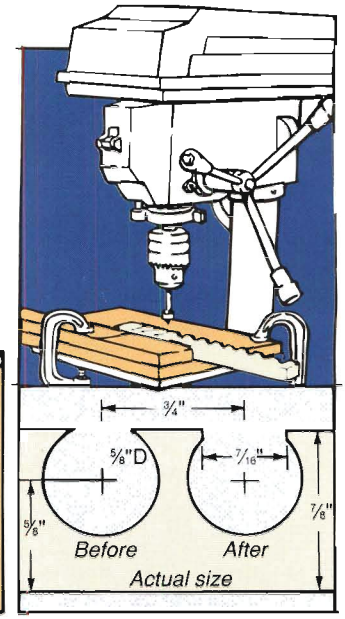
Since alcohol dries extremely fast it's difficult to spread with a brush and not get lap marks. For the home shop, sponging on the dye is best. Jerry recommends that you thin the alcohol based solution with 10% water to extend the working time and make drying slower. He also suggests spreading the aniline quickly and then backing away; continually working the finish only results in a blotchy mess.

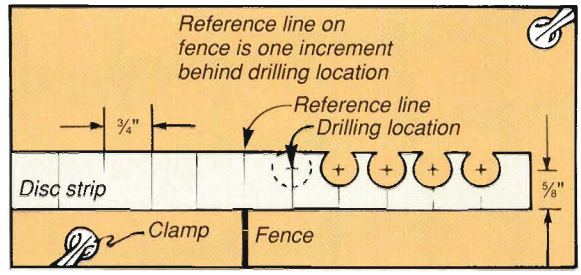
Follow the aniline dye with an application of oil based sanding sealer, then sand very lightly with 300 grit wet or dry paper. If you want the color to be more opaque, apply another coat of aniline dye and top it with a coat of sealer. Continue these steps until you reach the desired color density, but be careful as this process builds up to leave the finish looking more like paint. When you're satisfied with the color, top off your last coat of sanding sealer with a layer of high quality polyurethane. The Technicolor Toy Box has just two coats of aniline dye.

# An Easy To Build CD Tray

*No more squinting or twisted necks. Our CD tray design lets you comfortably flip through your disc collection from the front.*

By Larry N. Stoiaken




**Clamp the jig in position when the drill bit's tip is exactly 5/8" from the fence. Now center the bit on the first line and extend the second line onto the fence to serve as a registration mark for the rest of your holes. After all the holes are drilled, a file is used to open and flatten the sides of the entry slot.**

Anyone who owns compact discs (CDs) knows what a pain in the neck it is to read the titles off those tiny splines. First you twist and then you start squinting. This unique design allows you to easily flip through your CDs, comfortably viewing them from the front instead of the spline.

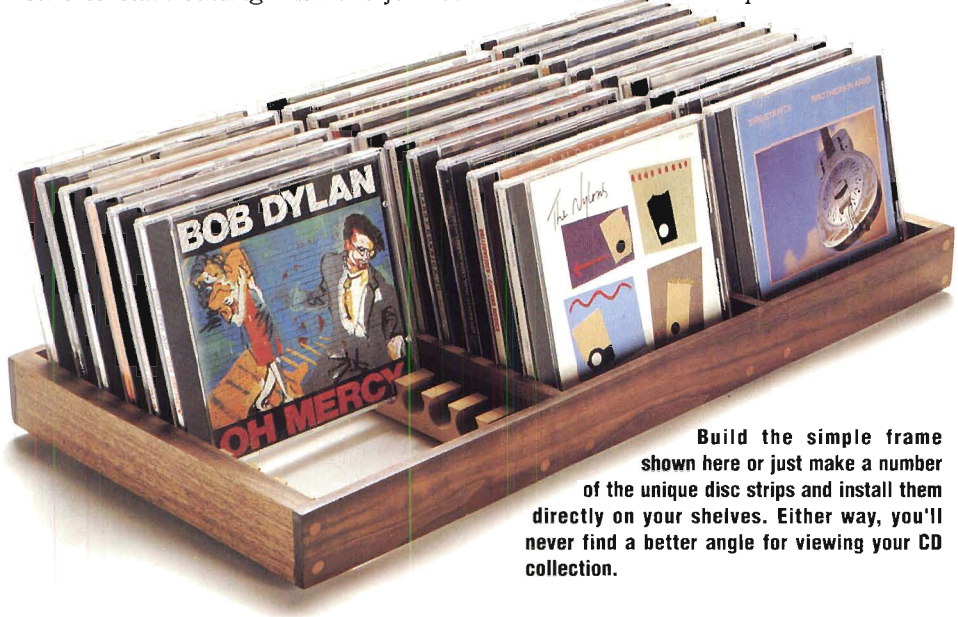
In fact it's the "disc strips" that are really the central attraction of this project, and you'll be pleasantly surprised at how easy they are to make. The frame itself is a simple box with two stretchers and can be redesigned to suit your bookshelf or stereo center. Likewise, you may choose to simply make the disc strips and install them directly onto a shelf.

### Start With The Disc Strip

To make the disc strips (pieces 1), start out with a 3/4" thick piece of 7" wide maple, about a foot long. Make sure there aren't any knots or defects or you'll have problems later. Joint one edge and square off one end to that edge. Starting 3/4" in from your squared-off end, draw 11 layout lines across the width of the board, one every 3/4". Now rip six strips from this board, each 7/8" wide, making sure to start cutting with the jointed edge against the fence. When all six disc strips are ripped to width, go to the last layout line on each and cut them to length.

Now make a jig for the drill press consisting of a plywood base and a 3/4" high fence, as shown above. Chuck a 5/8" Forstner bit in the drill press. Move the jig until the center of the bit is exactly 5/8" from the fence and clamp it in position. Lay one of your disc strips on the jig and line up the first layout line with the tip of the bit and then extend the second layout line onto the fence to use as a reference mark (see drawing above). It's as simple as that. You're now ready to start drilling all six of your strips. To drill your first hole, simply line up the second line on a strip with the reference line on the fence, drilling through at the first line. To drill the last hole on each strip, line up the end of the strip with your reference mark.

At this point, you'll notice that a CD will not quite fit into the opening at the top of the holes you've just drilled. That's as it should be. To keep the tops of the holes from scratching the CDs and to limit the chance that they'll snap off, each opening is filed, fairly aggressively, until a disc fits in and rotates easily. This squares off each entry nicely and actually goes quite fast if you have a good file —about five minutes per strip.




**Build the simple frame shown here or just make a number of the unique disc strips and install them directly on your shelves. Either way, you'll never find a better angle for viewing your CD collection.**

### Easy Assembly

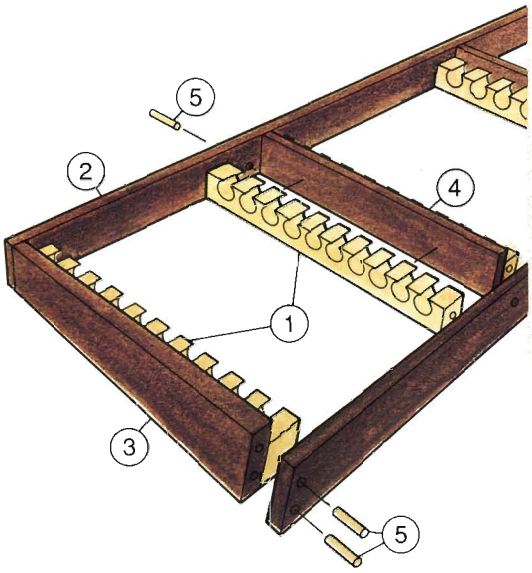
Once you've got your six disc strips filed and sanded, the tricky part is behind you. As noted, these strips are now ready for installation in a shelf, or you can go ahead and build our frame.

Start by cutting the front and back (pieces 2), sides (pieces 3) and stretchers (pieces 4) to exact size. Now clamp one disc strip to the inside of each side, being sure to line up the fronts of each subassembly as you're gluing. Next, glue two disc strips to each stretcher, again taking care to keep their front ends aligned as you glue.

Take the dried subassemblies over to the tablesaw and butt their front ends up against the rip fence so just a hair of each back end will be cut by the blade. With the miter gauge in the left slot, fasten a fence that extends 8¼" past the blade, almost reaching the rip fence. Slide the miter gauge up

# Pocket Hole Joinery

*By Hugh Foster*




| MATERIAL LIST | | T x W x L |
|---|---|---|
| 1 | Disc Strips (6) | 1" x 3/4" x 8¼" |
| 2 | Front/back (2) | 1/4" x 1½" x 18½" |
| 3 | Sides (2) | 1/2 " x 1½" x 8¼" |
| 4 | Stretchers (2) | 1/4" x 1½" x 8¼" |
| 5 | Pins (16) | 1/4" x 1" birch |

to the pieces and clamp them in position. Push the rip fence out of the way and trim the ends. Flip the pieces around, using the rip fence to line them up again, and trim the other ends in the same manner. This insures that you'll have a nice square fit when gluing on the front and back.

Before starting your final assembly, lightly mark the position of each stretcher on the front and back pieces. Each section should be a hair over 5⅝" wide to easily accommodate your discs. Now glue and clamp the front and back on, checking for squareness often and making sure the piece stays flat as you tighten your clamps.

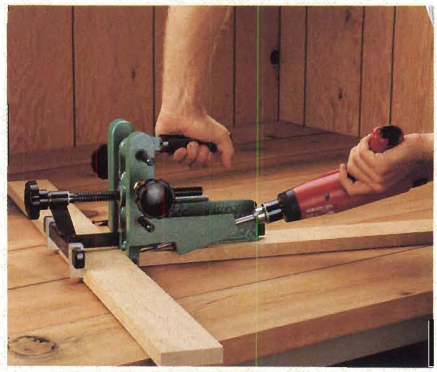
The sixteen 1/4" by 1" long dowels are easy to install and add a little strength to the piece. Drill 1/4" by 1" deep holes at the top and bottom of each corner, 1/4" in from the edges. The middle four disc strips also get a dowel 1/4" up from the bottom. After trimming your dowels off and completing your final sanding, apply two coats of Watco Danish oil and wrap up your finishing with one coat of liquid wax.

Here are two well thought out tools for making face frame butt joints that require no glue. While the tools aren't much alike in design, practice or price, they share the same key feature. Both are designed to use self-tapping auger-cut wood screws, that cut their way through the joints in hard or soft woods without predrilling and without splitting.

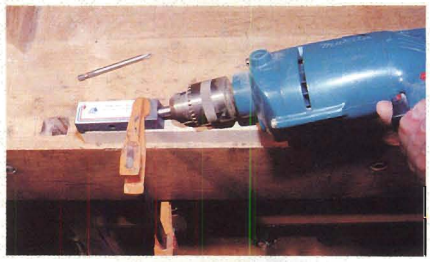
The **Face Maker** from Omark Industries' *(605 Oro Dam Blvd., Oroville, CA 95965)* is designed specifically for joining cabinet face frames. Its cast aluminum, self-centering jaws are clamped onto one piece of the frame, then a second piece slides under the adjoining frame member. After gently tightening all the clamps, a shallow hole is drilled into the frame through the drill guide. This hole need only be deep enough to bury the screw head beneath the wood surface. Then both sides of the jig are drilled, unless you're working with stock so narrow that installing a pair of screws is impossible. After the drilling is done, a power driver is used to run the square drive screws tightly into the joint. Omark's sample joint was so tight that I couldn't break it even when I applied my full strength and body weight to it; the very first sample I made fit just as tightly.

The sliding front jaws can be adjusted around rails or stiles already in place on the frame, and will even fit into 3/4" spaces to slip around bread board rails. By using two drills in production rhythm you could connect the face frames for a whole kitchen of cabinets in quick order.

If the concept sounds good, but you don't want to spend the money on a Face Maker, you may prefer the **Quik-Joint System** from Kencraft Co. *(821 N. Westwood, Toledo OH 43607)*, which is sold in two versions. The basic version consists of a drill guide-block, a carbide tipped drill bit and a 6" long phillips power drive bit. An alternate version uses the same drill bit and driver but comes with an extruded platform that holds the stock at the proper angle in your drill press for making the joint. With this unit I wasn't able to join pieces longer than 12", so I much preferred the basic kit.



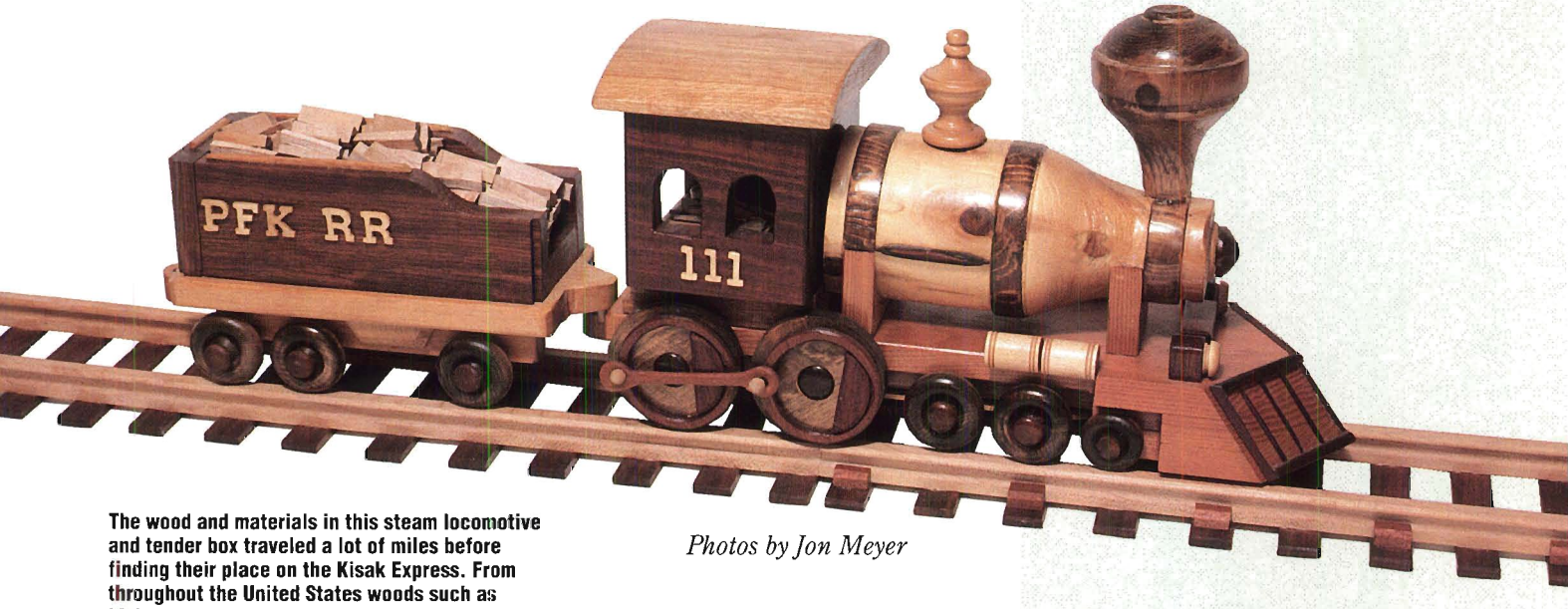
**At $295.00 the Face Maker may be better suited for the professional or someone ready to make a kitchen full of cabinets.**



**Kencraft's Quik-Joint System is priced for the weekend woodworker and is designed to be used with the drill press ($15.95) or with a portable drill ($44.95).**

To use the basic kit, clamp the drill guide block to the work and apply the self-tapping screw. As with Omark's unit, the first joint I made was essentially perfect. The main difference between the two products appears to be their different levels of convenience and speed of use. The Face Maker is an excellent solution to a basic problem facing professional cabinetmakers, but by carefully studying Kencraft's ingenious manual, you can build a number of jigs that will speed its operation greatly, making it nearly the equal of the Face Maker. Thus, at both ends of the price spectrum, we find useful pocket hole jigs designed to do the job much more quickly and neatly than can be done by eye. Depending on how much you're prepared to spend, either of these tools is highly recommended for speeding up face frame construction.

# All Aboard!




The wood and materials in this steam locomotive and tender box traveled a lot of miles before finding their place on the Kisak Express. From throughout the United States woods such as hickory, cypress, butternut and birdseye maple have been used for various train parts, and from the rest of the world comes bubinga, kelodra, wenge and dozens of others to complete the car.

*Photos by Jon Meyer*


Paul Kisak's train is made up of 38 individual cars, four of which are engines. Complimenting the many wood species in every car is the unique cargo, which has been collected from landmarks and historic places across the U.S.

Some people go into their shop for a day or two and build a toy train. Then there are those who stay a little longer. Paul Kisak stayed a lot longer.

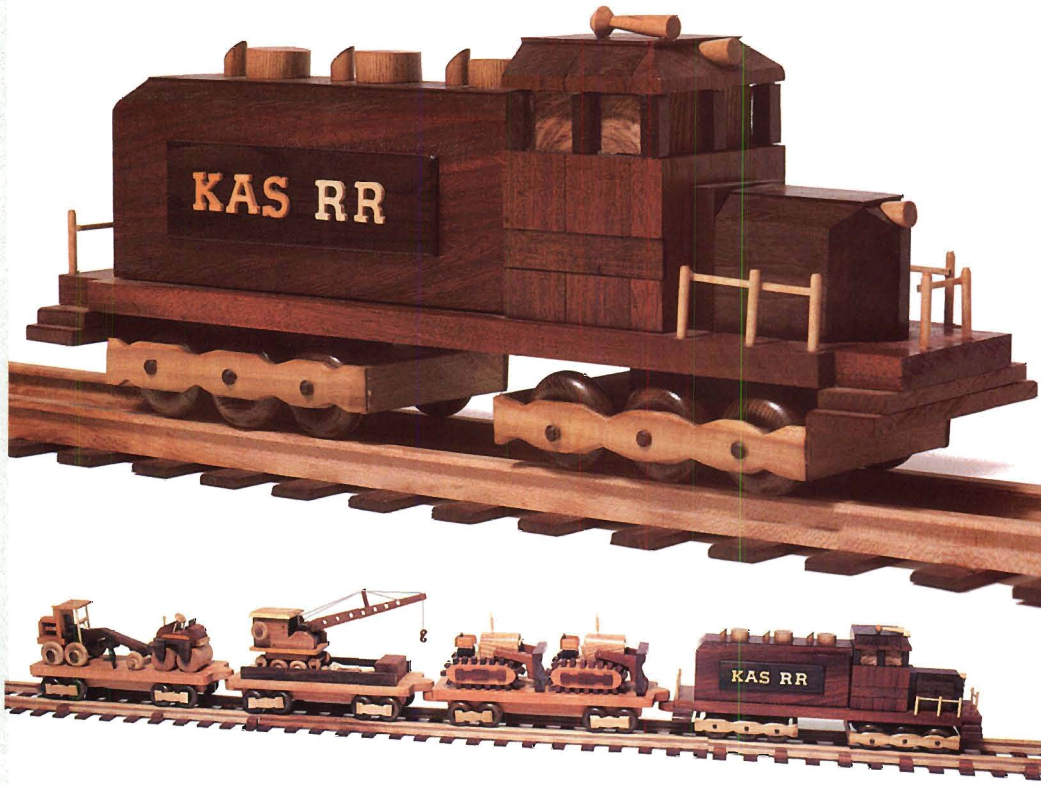
This imaginative and industrious woodworker ended up spending over 240 hours on his monumental train during an 18 month period. Paul actually began collecting the various wood species and artifacts that make up his train ten years ago, during extensive travels in the U.S. and abroad.

In all, Paul says that 632 types of wood were used, coming from all 50 states and 5 different continents. There's wood from the White House and the estates of the first four U.S. presidents, as well as wood and artifacts from major national monuments and parks. Paul has included items from Mt. St. Helens, Mt. Ranier, Pikes Peak, The Matterhorn and various mountain ranges. Some of the material carried within the train cars was picked up at Mt. Rushmore, the Grand Canyon, and other historic sites throughout the country.

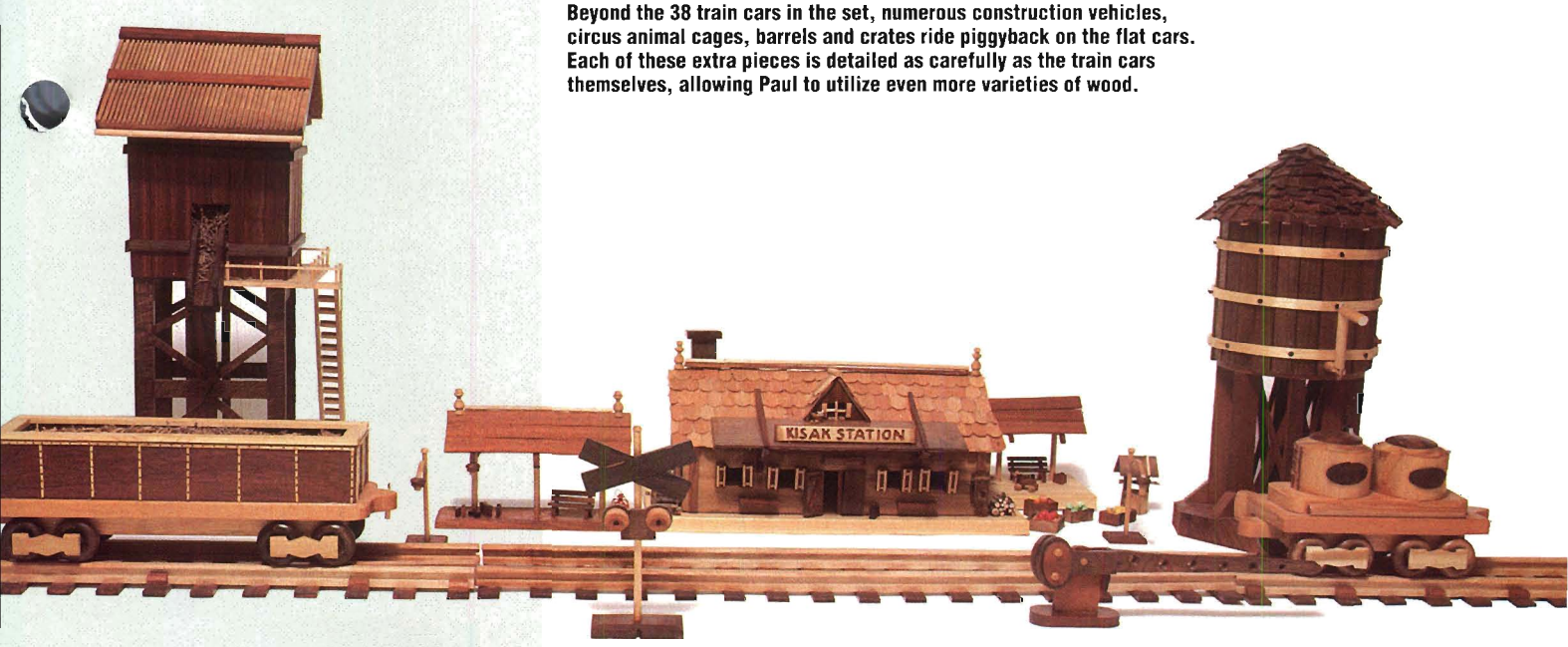
The train set consists of 38 individual cars and when joined together runs on for over 70 feet. The cars contain an average of 16 different wood species, including a fair number of novelty woods, such as althea (Rose of Sharon), and harewood that provide unusual details.

To give you an example of the complexity of some of these pieces, one of Paul's engines, (shown at left) has 18 different woods in its body and another 46 in the tender box. The cab and headlights are made of hard maple, the nose of the engine is California burlwood, the headlight cans are bubinga and the wheels are trimmed in padauk. Other species on these two pieces include koa, wenge, holly, kelodra, tamarack, magnolia and ziricote.

Many train cars carry elaborate wooden construction vehicles or cargo that further extends the range of wood species and other materials. In all, 320 wheels were required to mobilize this wooden wonder, along with 140 board feet of lumber and 100 lineal feet of glue sticks.




**Beyond the 38 train cars in the set, numerous construction vehicles, circus animal cages, barrels and crates ride piggyback on the flat cars. Each of these extra pieces is detailed as carefully as the train cars themselves, allowing Paul to utilize even more varieties of wood.**




**From the vantage point of this train station, with its coal and water towers, you can almost see the mighty rush of the engine and hear the lonesome whistle blow as the conductor calls out "all aboard!"**

## SHOW US YOUR BEST WORK!

*We'd like to encourage you to share your best work with fellow readers. In future issues our staff will choose their favorite piece from those submitted by subscribers. That lucky builder will then be sent* ***$100.00 worth of FREE LUMBER*** *to get going on their next project.*

*And don't worry about the quality of your pictures. If your work is selected for inclusion, we'll be glad to have a professional photographer your piece if necessary, as we did for Paul Kisak in this issue.*

TODAY'S WOOD

# Padauk

## (Pterocarpus spp.)

In the past, when the resources of the world were largely untapped, padauk was a favorite wood for boat-building because of its superb decay resistance and luxurious appearance. Moreover, the durability of this wood was able to withstand the pounding harshness of the high seas, making padauk a logical choice for the structural framework of boats.

Native to Africa and the Andaman Islands, padauk is generally reserved for small projects and as an accent wood these days because of its high cost and out of respect for rain forest preservation efforts. Although supplies are adequate to fulfill today's demand, the days of using this beautiful exotic for flooring are pretty much over.

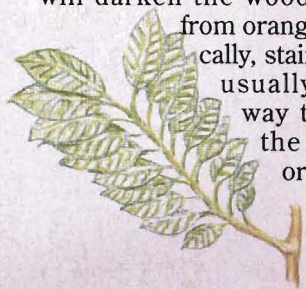
Also known as vermilion for its unique reddish-orange color, padauk creates a look of distinction when used with other woods of various hues. When exposed to sunlight, it develops a dark reddish patina as it ages.

For an exotic wood, padauk offers relatively good stability and machining properties. For instance, padauk has an exceptionally low shrinkage rating, almost twice as good as that of white oak. With a degree of hardness that falls between hard maple (softer) and hickory (harder), padauk saws, planes, turns, and machines well. The strength of this wood exceeds all commonly used domestic species.

Some tropical species, including padauk, have toxins to repel insects. When the wood is machined or sanded, the toxins are released into the air, possibly causing skin, eye or breathing irritation to those in the shop. However, for most people without extreme allergic sensitivities, padauk can be safely worked when a face mask is worn.

Although not as touchy as other exotics, padauk has oils that can inhibit the penetration of glues. Therefore, yellow and hide glues that need to penetrate should be avoided. Surface bonding epoxy glues are generally a better choice for exotics.

Being somewhat coarse textured, padauk accepts finishes well and can be polished to a high luster. Most oils will darken the wood, changing it from orange to red. Ironically, staining padauk is usually the only way to maintain the distinctive orange color for years to come.



**NEXT ISSUE:**

*The May/June 1991 issue will feature a backyard picnic table, an unusual birdhouse, a joiners mallet and a country dulcimer.*

TODAY'S
WOODWORKER®



# IMPORTANT:

## CORRECTIONS FOR

*Vol. 3, No. 2 (Issue 14)*
*March/April 1991*

*Dear Reader,*

*Please make the following corrections in your copy of Today's Woodworker as soon as possible to avoid problems later.*

*The two corrections appear on page 22 in the material list for the* **Toybox** *article.*

*Piece 31: The width and length of the Toy Box Bottom should be 21¾" x 35¾" instead of 21½" x 19".*

*Piece 32: The width and length of the Center Divider should be 21¾" x 19⅛" instead of 21½" x 19".*

*Sincerely,*

*Larry N. Stoiaken*
*Editor in Chief*

Rogers, Minnesota 55374-0044 (612) 428-4101