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# Woodsmith®

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## Heavy-Duty Workbench

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EDITOR'S COLUMN

# SAWDUST

What's the most satisfying thing about building a project? For me it's not so much the final results. More often than not, it's the interesting technique involved in building it.

**TABLE LAMP.** This is certainly the case for the Craftsman-style table lamp featured on page 30. Don't get me wrong. The lamp is definitely a great-looking project. But what really makes it interesting to build is a unique joint used to assemble the lamp. It's one I hadn't seen before. (In fact I'm not exactly sure what to call it.)

The idea for this joint came about when I mentioned to Ken Munkel (our Project Developer) that I was planning to build a table lamp. What I had in mind was a Craftsman-style lamp that had four individual legs that combined to form a tapered column.

As with any lamp, the challenge was figuring out a way to get the cord to run through the center of the column. So I was a little surprised when just a few minutes later, Ken said he thought he had the answer.

He vaguely remembered working on a type of dovetail joint that would automatically create a space in the center of a column. I was intrigued. It sounded like the ideal solution, so we decided to give it a try.

The next day he showed me four narrow, wood blanks. Each had a half-dovetail profile routed on the two inside edges. The dovetailed edges interlocked with one another to form a column with a hollow channel down the center — a perfect solution for feeding the cord through the column.

Okay, sounds great. But it's probably a difficult joint to make, isn't it?

That's the best part of all. This dovetail joint can be done on the router table with one setup. That's right — *one* setup. It's one of the few joints I've run across that's actually easier to make than it looks. But don't take my word for it, check out the box on page 32 and see for yourself.

**WORKBENCH.** Another project we've been working on lately is a new workbench for the shop. Our old bench has needed to be upgraded for some time. But it's like the old saying about the cobbler's kid always needing new shoes. Our workbench project always seemed to get put off.

Well, I finally set aside some time to build the new bench. And I'm glad I did. It has a rock-solid base, and a top big enough to handle just about any size project. We even added a tool storage system that fits under the top.

To make a long story short, I was so pleased with the way the project turned out that I decided to feature it in this issue. Take another look at the front cover, and I think you'll agree that this is one impressive workbench. For more on building the bench, check out the step-by-step article beginning on page 6.

Terry

A Look Inside

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# TIPS & TECHNIQUES

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## Sanding Disc Guard

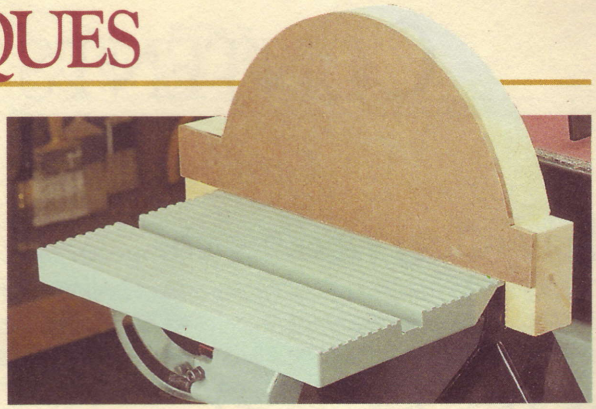
I have a belt/disc sander and have had more than one close call between my sleeve and the disc when using the belt sander. So I came up with a slip-on guard to cover the disc, as shown in the photo at right.

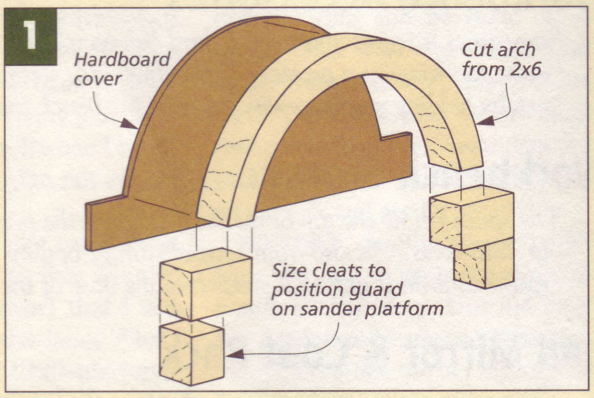
The arched portion that goes around the perimeter of the disc is cut from a section of 2x6 (Fig. 1). (You'll have to size this piece to fit your sander.) Then attach a couple of small cleats to each end of the arch. One cleat rests on the disc sander platform to position the guard at the right height. The other extends down the side of the platform to keep the guard in place.

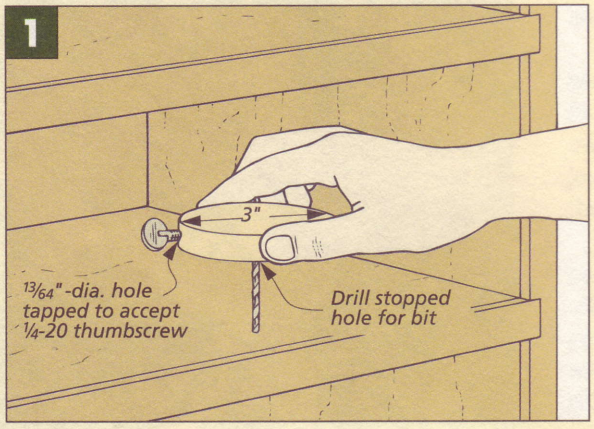
Next, add a cover to hide the disc itself. To lay out this piece, just place the arched assembly on a piece of hardboard and trace the profile down to the platform cleats. Cut out the cover on the band saw and glue it to the framework. Then sand the edges of the cover flush with the frame.

When I need to cover the disc sander, the guard simply drops into place. It's easily removed when the disc sander is needed.

*Watson Burts*
*Charlotte, North Carolina*



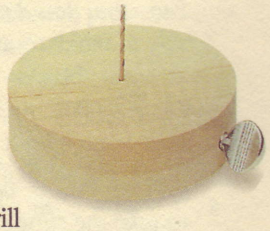



## Tight Quarters Drill

If you've ever forgotten to bore holes before a cabinet assembly, and a regular drill won't fit inside the carcase, the simple, shop-made hand drill shown at right will do the job slowly, but surely.

The body of the drill is a 3"-dia. hardwood circle, as shown in Fig. 1. To accept a thumbscrew, I drilled a hole from one edge of the disk to the center, then tapped 1/4-20 threads in the hole.



Finally, drill a hole centered on the face of the disk to accept the drill bit. Before reaching into that tight spot to start drilling, just tighten the thumbscrew to clamp the bit in place.

*Guy Gerrard*
*Orlando, Florida*

## QUICK TIPS

### Plastic Cover

To keep the storage area below a workbench dust-free but still accessible, attach a clear plastic "apron" using short strips of self-adhesive hook-and-loop tape (*Velcro*). I stapled the hook portion to the bench, while the sticky backing holds the loop portion to the plastic sheet.

*Ken Everett*
*Sleepy Hollow, Illinois*

### Cabinet Fan

The enclosed base of my router table greatly reduces noise and dust. But I was concerned about the router overheating.

So I mounted a bathroom exhaust fan to the cabinet to pull in cooler outside air and blow it up onto the router.

*Paul M. Bowman*
*Ferndale, Washington*

### Cylinder Line Guide

On a recent project, I needed to transfer several marks from one end of a cylinder to the other end.

My solution was to lay the cylinder behind a piece of angle iron laying on my bench. Align a mark with the top edge of the angle iron and then mark the other end.

*Henry Ellis*
*Melbourne, Florida*

## Small Shelf Wall Hanger

As I was using my biscuit joiner to assemble some simple, L-shaped wall shelves recently, it occurred to me that a couple of biscuit slots would work as part of an invisible hanging system.

Note: This system is meant to hang shelves that will hold lighter loads.

The first part of the system is a couple of extra #20 biscuit slots in the bottom face of the horizontal shelf. Position a slot near each end of the shelf, like you see in Fig. 1.

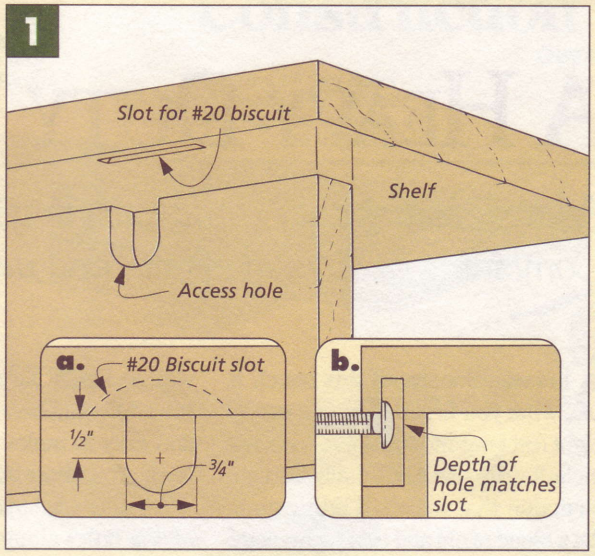
The second part of the system consists of two U-shaped slots cut in the vertical piece of the shelf assembly. These slots align with the biscuit slots in the shelf, as shown in Fig. 1a. I formed each slot by drilling a shallow hole with a ¾" Forstner bit. The depth of the hole should match the distance from the back edge of the shelf to the far edge of the biscuit slot, see Fig. 1b. Then to complete the "U" shape, chisel away the outside edge of the hole.

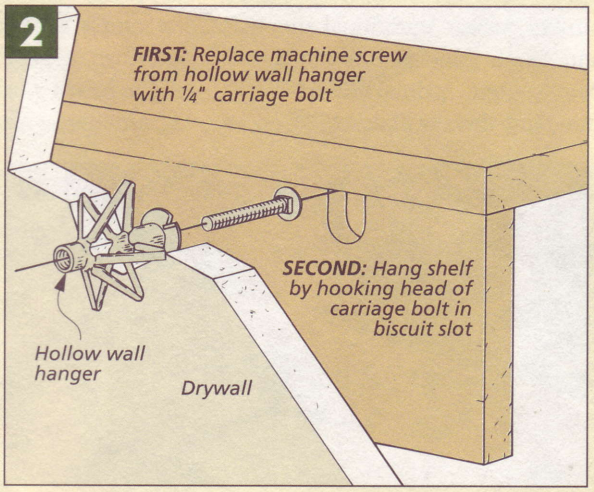
To hang the shelf, I used some expandable hollow wall hangers, but with a small modification. (These hangers can be found at most hardware stores.) After installing the hangers in the wall, remove the machine screws that come with them and replace the screws with carriage bolts (Fig. 2). The biscuit slots "capture" the bolt heads to support the shelf.

One advantage to this system is that it's easy to get the shelf tight to the wall — and that helps keep the shelf in place. Simply adjust the carriage bolts in or out until the heads fit snug to the back edges of the biscuit slots, as shown in Fig. 1b.

Once the carriage bolts are adjusted, the shelf can be hung on the wall.

*Robert Porter*
*Clinton, Ohio*



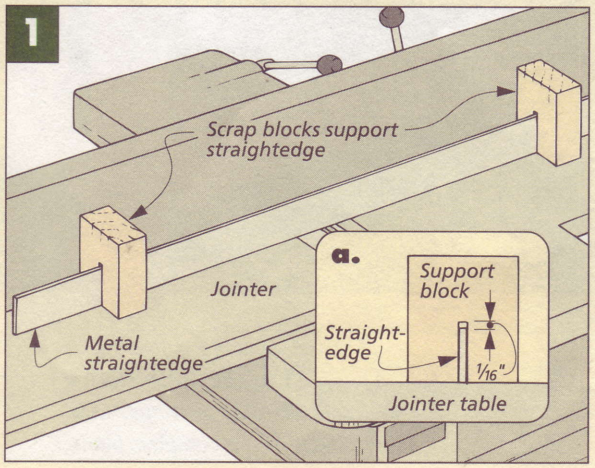



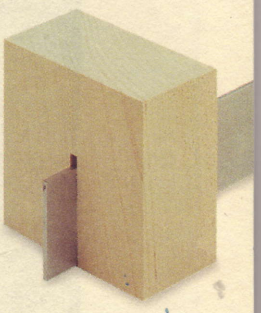

## Straightedge Support Blocks

When adjusting the height of my jointer knives, I balance a metal straightedge on the outfeed table to serve as a gauge. But every little bump knocks the straightedge over. This problem was solved with a short piece of scrap and a few cuts on the table saw.

All that's needed is a kerf in each end of the scrap. Make each kerf just a little wider than the thickness of the straightedge and a little deeper than the width of the straightedge, as shown in Fig. 1a. Then cut a support block from each end of the scrap. As you can see in Fig. 1, when these blocks straddle the straightedge, they act like an extra pair of hands to keep it from falling over.

*Joseph A. Zischkau*
*Monroeville, PA*



▲ *A support block keeps a straightedge on edge.*

### SUBMIT YOUR TIPS

If you have an original shop tip, we would like to hear from you and consider publishing your tip in one or more of our publications. Just write down your tip and mail it to: *Woodsmith,* Tips and Techniques, 2200 Grand Avenue, Des Moines, Iowa 50312. Please include your name, address, and daytime phone number in case we have any questions. If you would like, FAX it to us at 515-282-6741 or send us an email message at: woodsmith@woodsmith.com. We will pay up to $200 if we publish your tip.

SHOP PROJECT

# A HEAVY-DUTY WORKBENCH

*A large, heavy-duty workbench that's easy to build. Combining traditional joinery and modern materials is the key.*

Although the size of this bench is what you first notice (it's nearly eight feet long and three feet wide, not including the vise), it's really the construction that makes it interesting. It's a blend of old and new technology.

The base is built of heavy, solid lumber, using traditional mortise and tenon joinery. But the top is constructed primarily of MDF (medium-density fiberboard). So as well as being flat and stable, it has the additional benefit of being quick and easy to make (unlike a top that is glued up from solid wood).

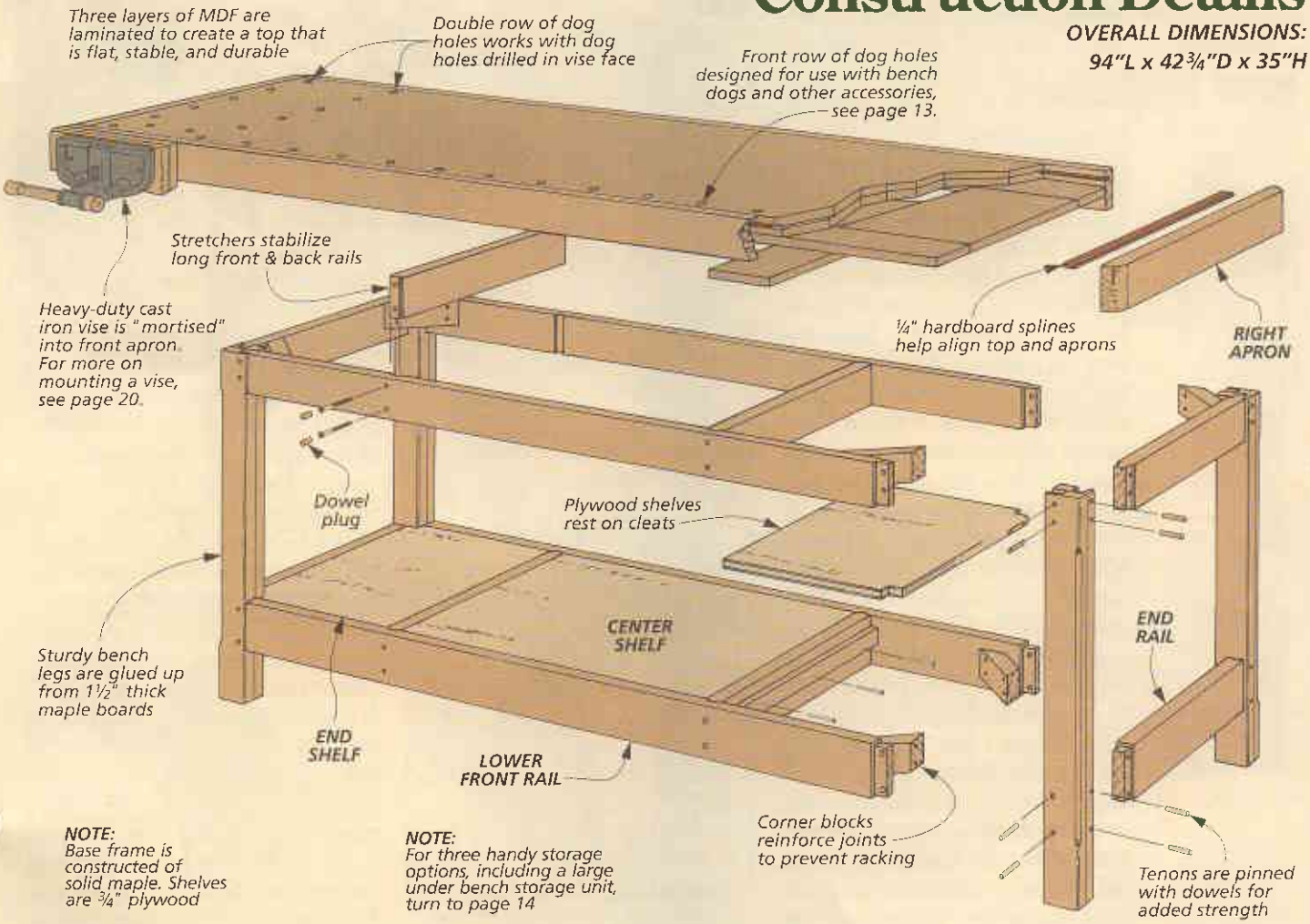
Another nice feature are the rows of dog holes along the front and left side of the bench. Combined with a few simple accessories (which are described on page 13), these make it easy to hold a workpiece while routing, sanding, or planing.

**OPTIONAL STORAGE.** As great as this workbench is to work on, you can make it even better by adding some optional storage units underneath (see inset photo below). With the bank of drawers, the cupboards at each end, and the open shelving at the back, you won't be running out of space anytime soon. You can read the story behind these storage units on page 14.

*Tired of looking for your tools? They'll always be within reach if you build this slide-in storage unit. Turn to page 14 for complete plans.* ►

# Construction Details

**OVERALL DIMENSIONS:**
**94"L x 42¾"D x 35"H**




***NOTE:***
*Base frame is constructed of solid maple. Shelves are ¾" plywood*

***NOTE:***
*For three handy storage options, including a large under bench storage unit,* *turn to page 14*

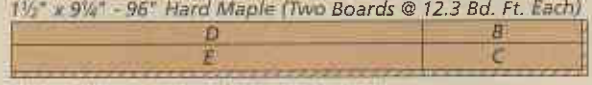
## MATERIALS, SUPPLIES & CUTTING DIAGRAM

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **A** | Legs (4) | 3 x 3 - 32¾ | **L** | Top Layers (2)* | ¾ MDF - 33 x 91 | **W** | Top Cleats (2) ¾ MDF - 1½ x 26 7/16 |
| **B** | Upper End Rails (2) | 1½ x 3¾ - 26½ | **M** | Support Block (1) | 1½ x 6 - 15 | • | (50) #8 x 1¼" Fh Woodscrews |
| **C** | Lower End Rails (4) | 1½ x 4½ - 26½ | **N** | Top End Pieces (2) | ¾ MDF - 15 x 21 | • | (12) #8 x 1½" Fh Woodscrews |
| **D** | Upr. Fr./Bk. Rails (2) | 1½ x 3¾ - 68½ | **O** | Top Frt. Piece (1) | ¾ MDF - 6 x 76 | • | (48) #8 x 2½" Fh Woodscrews |
| **E** | Lwr. Fr./Bk. Rails (2) | 1½ x 4½ - 68½ | **P** | Top Bk. Piece (1) | ¾ MDF - 6 x 91 | • | (4) #14 x 2" Fh Woodscrews |
| **F** | Upper Stretchers (2) | 1½ x 3¾ - 27 | **Q** | Top Ctr. Pieces (2) | ¾ MDF - 6 x 21 | • | (2) 5/16" x 4½" Hex Head Bolts |
| **G** | Lower Stretchers (2) | 1½ x 4½ - 27 | **R** | Front Apron (1) | 1½ x 3½ - 92½ | • | (2) 5/16" Lock Nuts |
| **H** | Corner Blocks (8) | 1½ x 2½ - 7½ | **S** | Back Apron (1) | 1½ x 3½ - 91 | • | (4) 5/16" Flat Washers |
| **I** | Shelf Cleats (4) | 1½ x ¾ - 26½ | **T** | Left Apron (1) | 1½ x 3½ - 34¼ | • | (1) Woodworking Vise |
| **J** | Ctr. Shelf (1) | ¾ ply. - 26 7/16 x 32 7/16 | **U** | Right Apron (1) | 1½ x 3½ - 35½ | • | (1) ⅜"-dia. Hardwood Dowel (48" long) |
| **K** | End Shelves (2) | ¾ ply. - 26 7/16 x 16 7/16 | **V** | Face Block (1) | 3 x 4½ - 18 | • | (1) ¼" Hardboard (1" x 240" In. in.) |

*Note: One top layer starts out oversized.

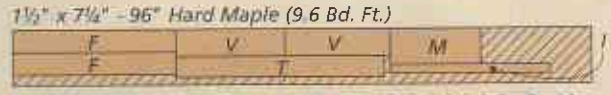
*1½" x 9¼" - 96" Hard Maple (12.3 Bd. Ft.)*


*1½" x 9¼" - 96" Hard Maple (Two Boards @ 12.3 Bd. Ft. Each)*




*1½" x 5½" - 96" Hard Maple (7.3 Bd. Ft.)*


*1½" x 7¼" - 96" Hard Maple (9.6 Bd. Ft.)*




*1½" x 7¼" - 72" Hard Maple (Two Boards @ 7.3 Bd. Ft. Each)*


***ALSO NEEDED:*** *Two 4x8 sheets of ¾" MDF and one 4x8 sheet of ¾" maple plywood*

## Base

When it comes to building a workbench, the base has to meet two requirements. It needs to be strong. And it needs to be stable. I decided to use hard maple for the base because of its strength and the added mass it gives the bench. But a good, less expensive substitute would be "two-by" framing lumber. (I would suggest Douglas fir.)

**LEGS.** The first step in building the base of this bench is to make the legs. As you can see in Fig. 1, each *leg (A)* is glued up from two pieces of 1½"-thick stock. I ripped these pieces slightly wider than the finished width of the legs. This way, you don't have to worry about keeping the two pieces exactly aligned when gluing them up. After squaring up each blank, you can cut the legs to final length (32¾").

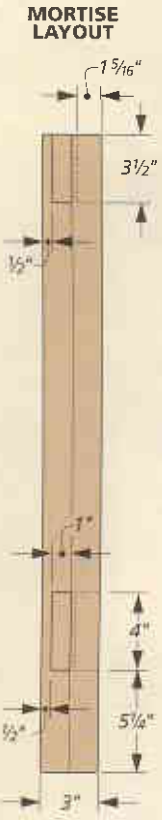
**MORTISES.** Large mortise and tenon joints are used to join the rails of the bench with the legs. Before making the mortises, I laid them all out on the legs, like the drawing in the left margin shows. The important thing to notice when laying out the mortises is that the legs aren't identical. The right-hand legs and left-hand legs mirror each other. This way, the jointline won't show from the front of the bench (Fig. 1a).

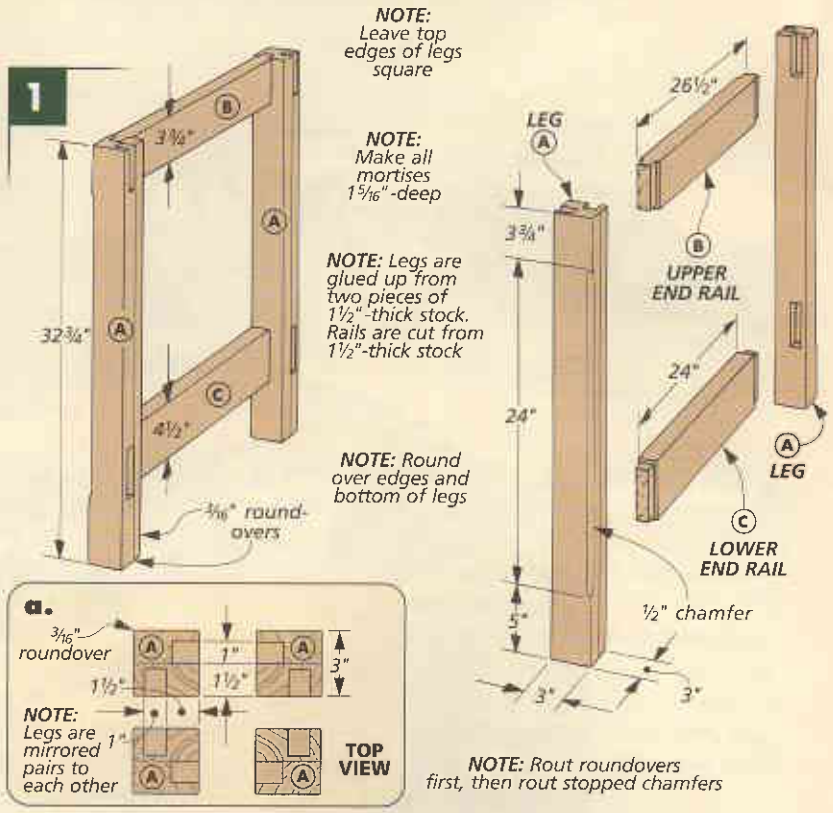
After the mortises are laid out, you can begin drilling out the waste. I did this on a drill press, using a Forstner bit. Drilling overlapping holes removes most of the waste, and what little is left behind can be quickly removed with a chisel. You can see in the drawing at the left that the mortises at the top of each leg are open on one end. This way, you won't have to worry about "blowing out" the mortise at the top of the legs during assembly.

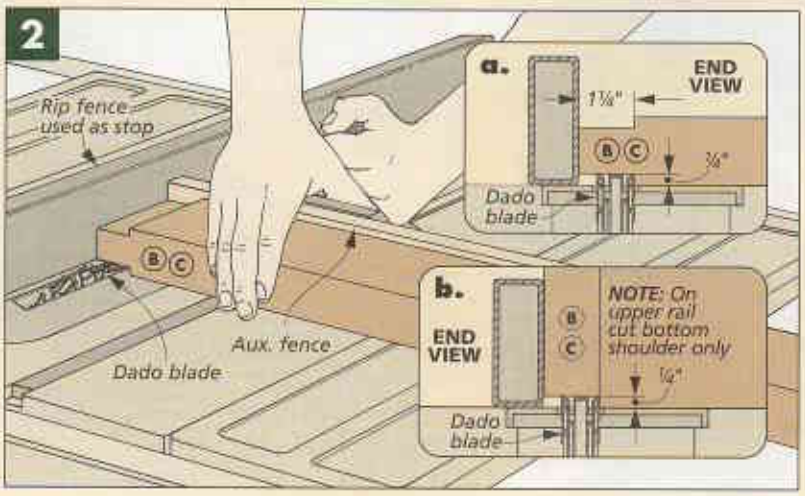
To complete the legs, a 3/16" roundover is routed along the edges of each leg and on the bottom. Then a ½" stopped chamfer is routed on the outside corner of each leg.

**RAILS.** The legs are connected by two sets of rails at the top and bottom. I started by making the end rails. (All the rails are made from 1½"-thick stock.) You'll need two *upper end rails (B)* and two *lower end rails (C)*. After cutting the rails to size, you can cut tenons on the ends to match the mortises in the legs, as shown in Figs. 1b and 1c. Since each tenon has ¼" shoulders, one set up on the table saw is all you need, as shown in Fig. 2. Note that the tenons on the upper rails are bare-faced — to match the open mortises at the top of each leg. Finally, the two ends of the base can be glued up.

**FRONT/REAR RAILS.** Except for their length, the rails at the front and rear of the bench are practically identical to the end rails (Fig. 3). The *upper front/back rails (D)* and *lower*



*front/back rails (E)* are cut to size, and tenons are cut on the ends. These tenons are identical to the ones cut on the end rails. (For a tip on cutting tenons on long workpieces, see page 21.)

Before assembling the ends and rails, there's one other detail to take care of. To hold some stretchers that will be added between the front and back rails, a couple of shallow dadoes are cut on the inside face of each rail, as shown in Fig. 3. Once this is done, the rails and ends of the bench can all be glued together.

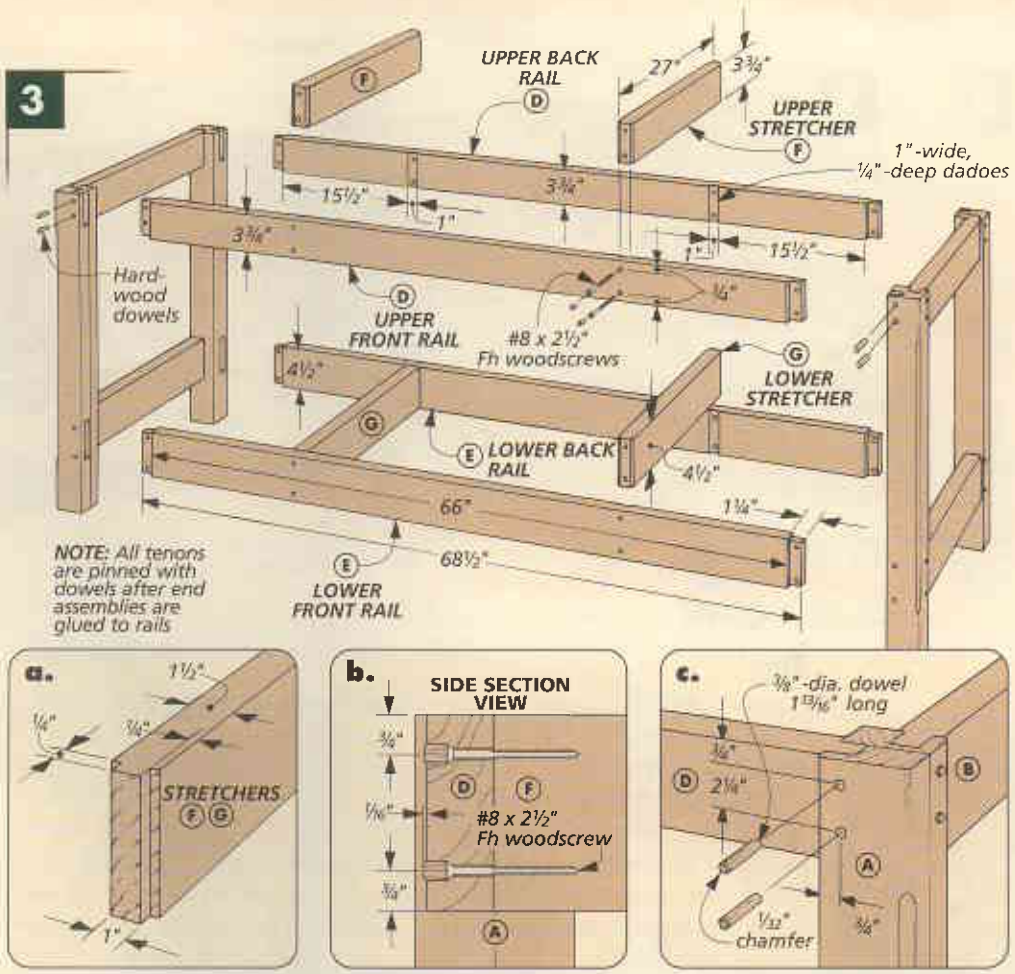
**STRETCHERS.** The *stretchers (F, G)* that I just mentioned are cut to size from 1½"-thick stock. Stub tenons are cut on the ends of the stretchers, and then after brushing a little glue on the tenons, each stretcher is slipped in between the front and back rails. A few screws help to hold the stretchers in place.

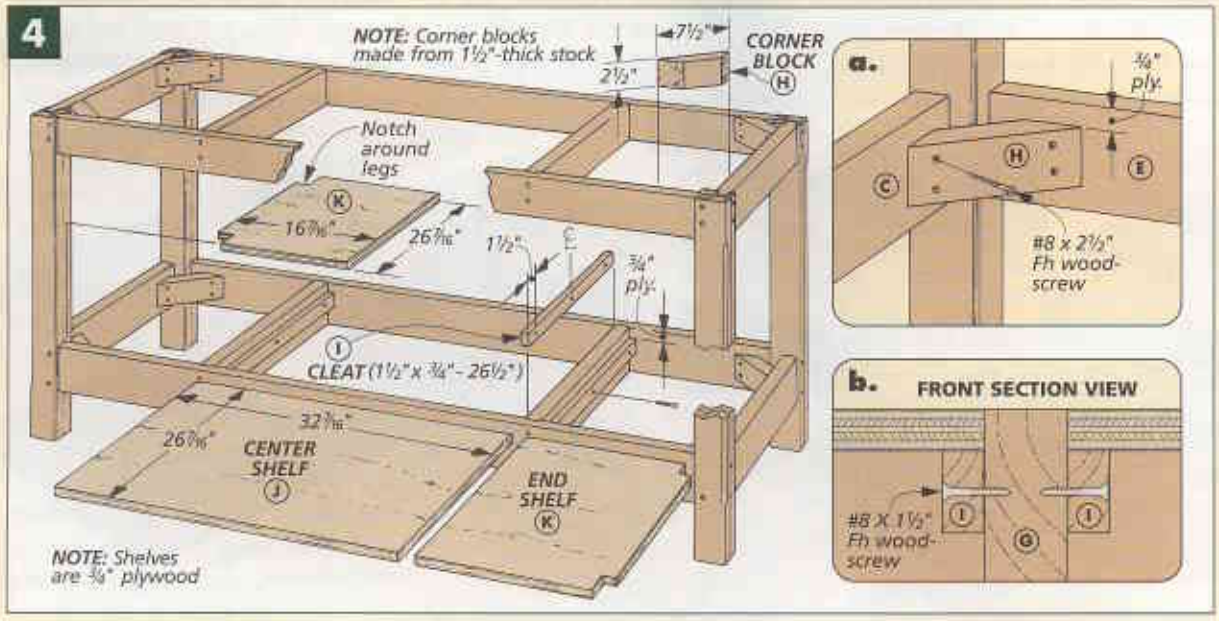
Once the stretchers are screwed in place, the screws can be plugged (Fig. 3b). While you're at it, go ahead and drill holes in the legs and pin the tenons with ⅜"-dia. dowels (Fig. 3c). I sanded a slight chamfer on the exposed ends of the plugs (and pins), then glued them in place so they stood slightly proud of the surface (about 1/16").

**CORNER BRACES.** Each corner of the base is reinforced with a couple of *corner blocks (H)* (Fig. 4). In addition to beefing up the corners, the lower blocks serve an extra purpose. They provide support for some shelves that are added next.

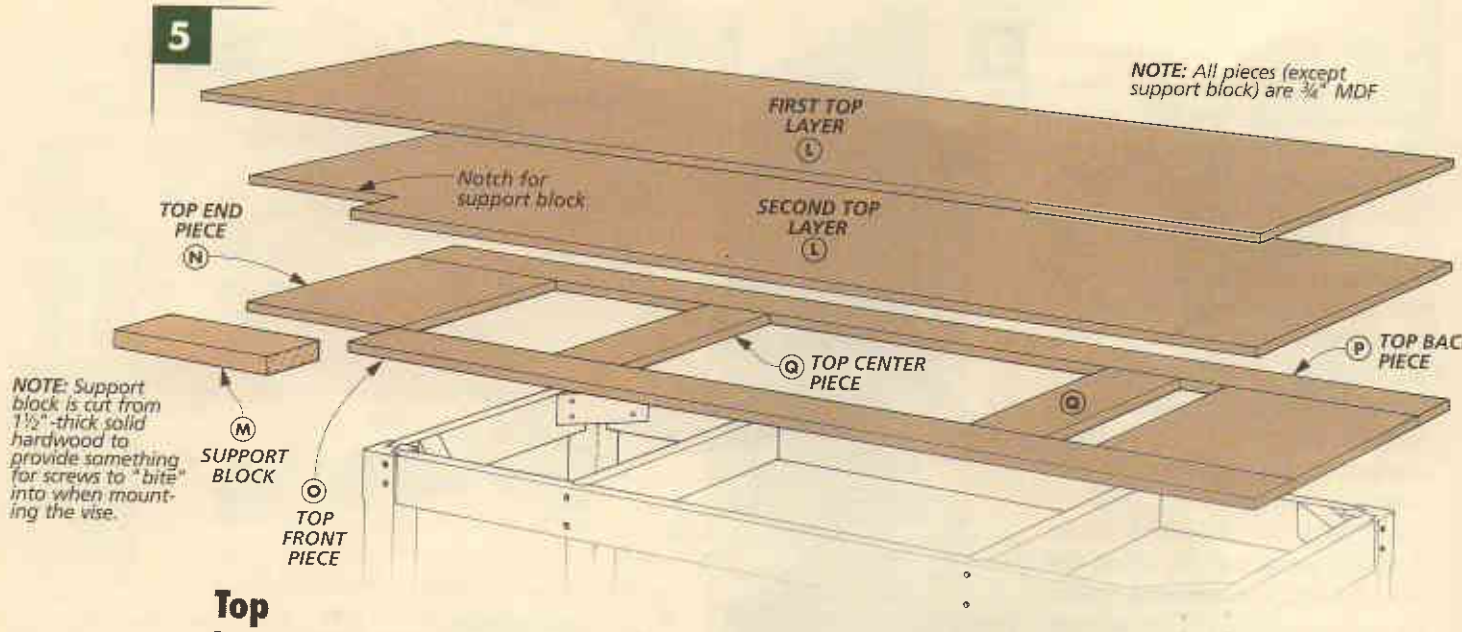
**SHELVES.** Shelves are fitted into the bottom of the bench for storing tools and equipment. Or if you're going to add the optional storage units, the shelves provide a flat, solid base.

The shelves rest on *cleats (I)* that are glued and screwed to the lower stretchers (Fig. 4). Once these are in place, you can cut a *center shelf (J)* and two *end shelves (K)* from ¾" plywood. The center shelf is simply cut to size and dropped in place. But the two end shelves have to be notched in the corners to fit around the legs of the bench.




**DOWEL PIN LAYOUT**




## Top

It goes without saying that the top of a workbench needs to be strong and sturdy to stand up to all the abuse it will receive. But it also needs to be flat. I rely on the top of my workbench as a reference when assembling a project or dimensioning stock. So it's important that the top be perfectly flat *and* stay that way.

Although solid wood is a more traditional choice for bench tops, I decided to use MDF. It's heavy, tough, and very flat. And unlike solid wood, you don't have to worry about MDF twisting or warping out of shape over time. Plus as an added benefit, MDF is a whole lot less expensive than solid wood.

In order to beef up the thickness, I built up the top out of three separate "layers" of MDF, as you can see in Fig. 5 above. This makes the top plenty thick for mounting a vise and for holding bench dogs.

To make the top, start by cutting the first *top layer (L)* to finished size (Fig. 6). Then before adding the second layer, I glued a hardwood *support block (M)* to the corner where the vise will get mounted. (This block will give the screws something to bite into when you're mounting the vise later.) However, as you can see in Fig. 6, the top piece is upside-down when you glue this block in place. (That's why the block is shown in the right corner.)

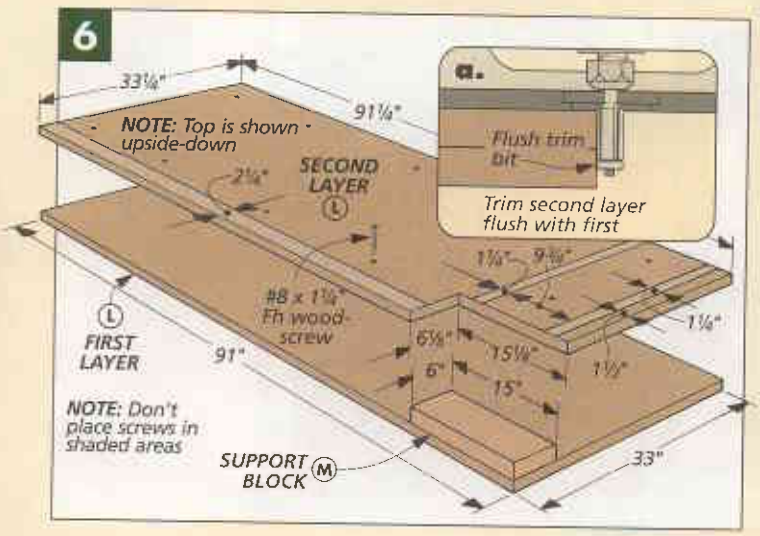
**SECOND LAYER.** The *second layer (L)* ends up the same size as the first layer. But trying to keep two large, identically-sized workpieces aligned when gluing them together can be tricky. So I cut the second layer slightly oversize (¼" in both length and width). After it's glued to the first layer, it will be trimmed flush.

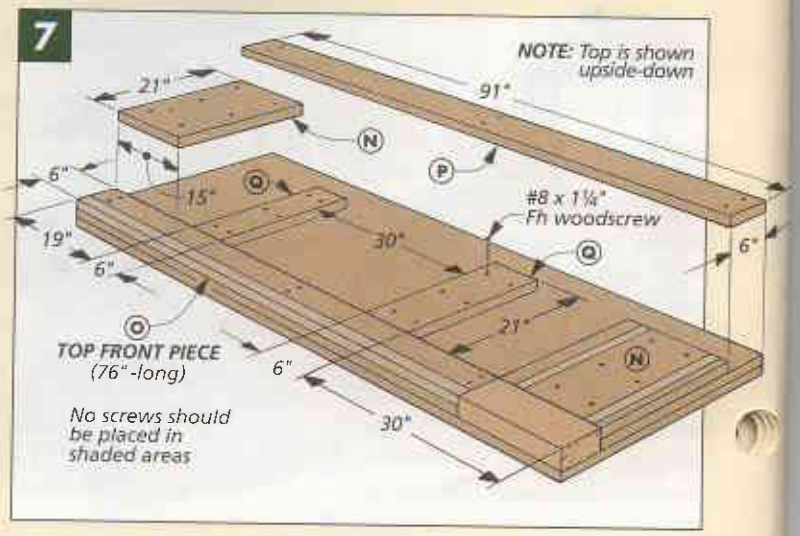
In addition to making the second layer oversized, a notch needs to be cut in one corner to allow it to fit around the hardwood block that's glued to the first layer. This can be done with a sabre saw or a hand saw, and you don't need to be too fussy with the fit. (My notch was ⅛" larger than the block.)

Once the notch is cut out, the two layers can be glued and screwed together. I used yellow woodworking glue, spreading it on the large surfaces with a 3" paint roller.

The screws help to hold the MDF layers together while the glue sets up. There's just one thing to be aware of when you're adding the screws. Later on, you'll be drilling dog holes in the top of the bench,

▲ *Hard maple aprons wrap around three layers of MDF to protect the hard, flat work surface.*



and you don't want to accidentally drill into a screw. So I laid out some "no screw zones" to make sure this wouldn't be a problem (Fig. 6).

Once the two layers are laminated together, you can trim the second layer flush with the first using a router and a flush trim bit (Fig. 6a).

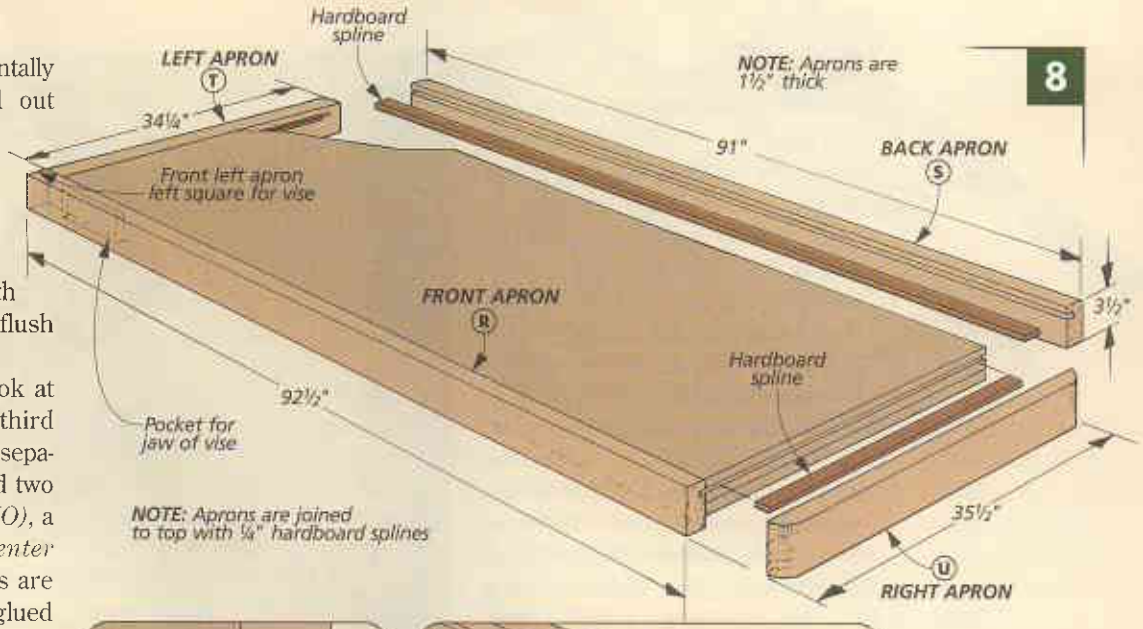
**THIRD LAYER.** If you take a look at Fig. 7, you'll see that the third "layer" is really made up of six separate pieces of MDF. You'll need two *end pieces (N)*, a *front piece (O)*, a *back piece (P)*, and two *center pieces (Q)*. Once these pieces are cut to exact size, they can be glued and screwed to the second layer.

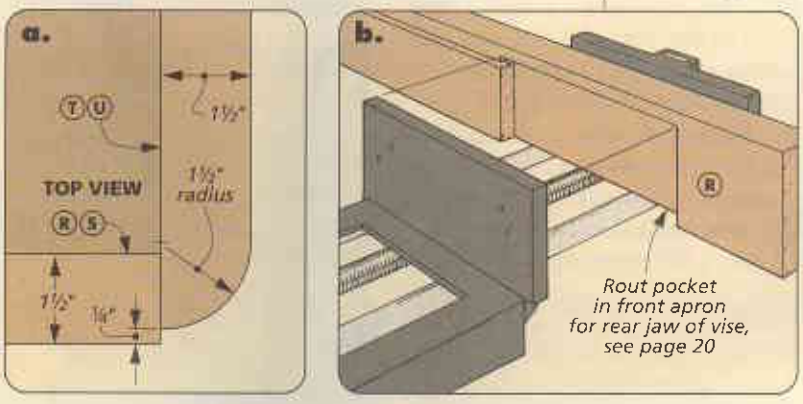
**APRONS.** To protect and conceal the edges of the MDF, the top is wrapped with 1½"-thick hardwood *aprons (R, S, T, U)* on all four sides. If you look closely at Fig. 8, you'll see that each apron is a little different. To begin with, the ends of the right apron and one end of the left apron are rounded over (Fig. 8a). (This roundover will also be created on the face block that will be added to the vise.)

Second, a "pocket" is routed in the back face of the front apron to accommodate the back jaw of the bench vise (Fig. 8b). (The size of this pocket will depend upon the vise you are using, see page 20.)

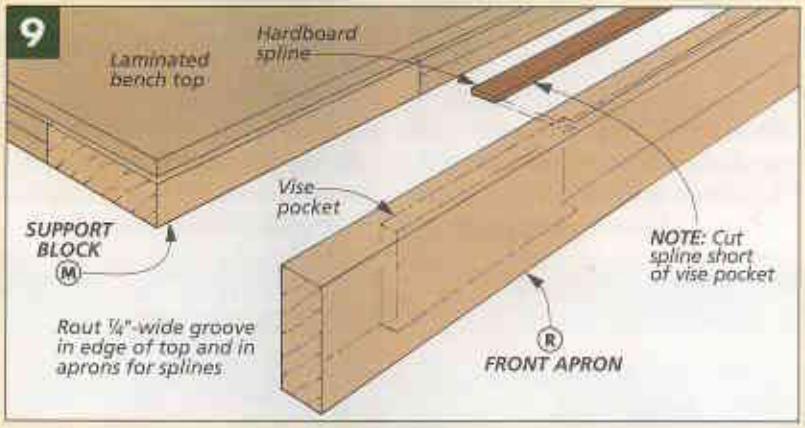
After routing the pocket, you can rout a groove around the top of the bench as well as on the aprons (Fig. 9). These grooves will hold splines that help align the aprons with the top of the bench. A router and a slot cutter is all you need to make the grooves. But note that the grooves in the aprons are stopped short of the exposed ends (Figs. 9 and 10).

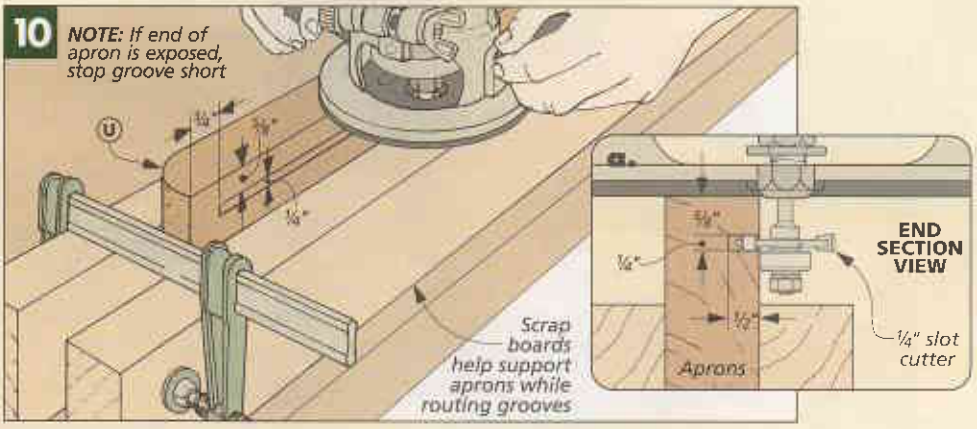
**SPLINES.** Once the grooves have been routed, you can glue the aprons to the top using splines cut into strips from a sheet of ¼" hardboard. Clamping the front and back aprons in place is no problem. But clamping across the length of the bench is a challenge, unless you have some extra long clamps. For a simple solution, see the margin photo at right.




▲ *A couple of cleats clamped to the top of the bench allow you to clamp the end aprons in place.*



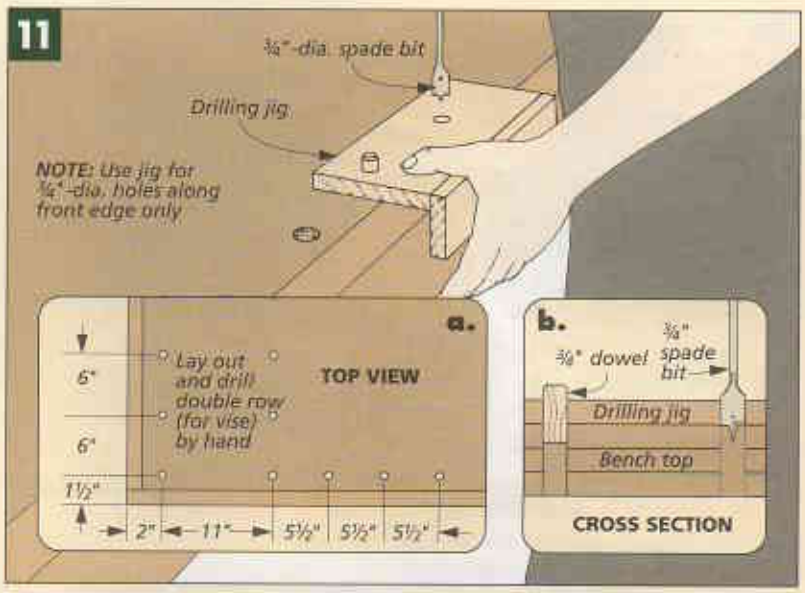
## Top (continued)

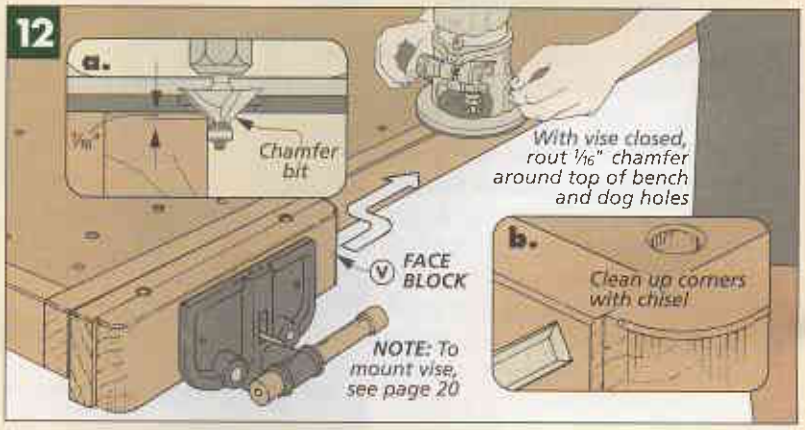
With the aprons attached, the ¾"-dia. dog holes can be drilled. There's one row along the front edge and a double row at the end (for the vise). To keep the hole spacing consistent on the long front edge (as well as to guide the drill bit), I made the simple indexing jig shown in Fig. 11. For the few holes at the end of the bench, I carefully laid out each one individually.

With the top just about complete, I added the vise. Depending on the size of the vise you plan to install, you may need to mount a spacer block to the underside of the bench beforehand. Then after mounting the vise, I added a wood *face block (V)* to the front jaw. You can read more about the vise mounting procedure on pages 20 and 21.

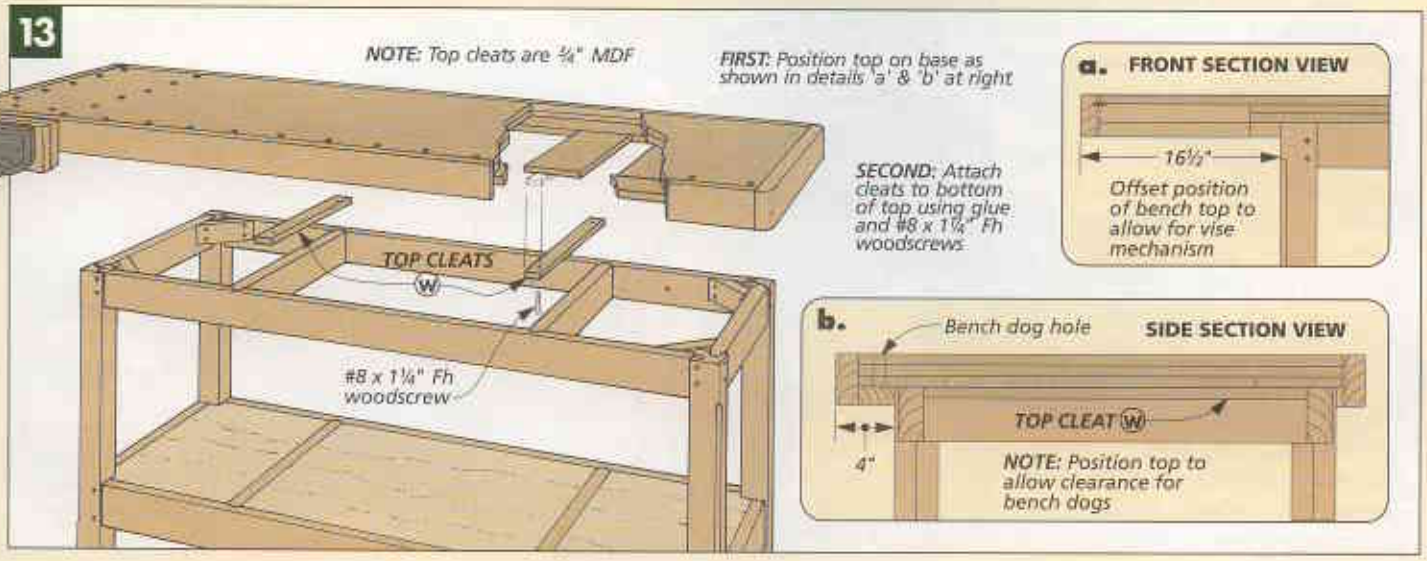
The last step to complete the top is to rout a small (1/16") chamfer around the top of the bench and around the inside edge of the dog holes. I wanted to incorporate the vise into this chamfer detail as well, so before turning on the router, I closed the face block against the front apron. Then I routed the chamfer around the top and the face block, as well as around the inside of each dog hole (Fig. 12b).

The bearing on the chamfer bit doesn't allow you to rout the chamfer all the way into the corners of the face block or the ends of the bench. So after you're done routing, you can clean up these inside corners with a chisel (Fig. 12b).




**ATTACHING THE TOP.** The top of this workbench is heavy enough that it will stay put without being attached to the base. But to keep the top from shifting or sliding, I added a couple of cleats to the underside of the top. These *cleats (W)* are just strips of MDF that butt against the upper stiles, locking the top in position. But before the cleats are attached, you should make sure that the top is set squarely on the base (Figs. 13a and 13b). Then the cleats can be screwed in place. W



# Workbench Accessories

▲ *When you need an extra pair of hands, these bench accessories help you get a grip on your projects.*

Even the sturdiest bench is nothing more than a fancy table if you can't hold your work to it securely. That's where all the holes drilled through the top of the workbench come in. These holes accept accessories that keep your work where you want it.

**BENCH DOG.** The simplest of these items is a type of bench dog, shown in the left photo below. It's just a cylinder with a flat face at one end and a spring in the side. A single dog can be used as a stop when planing or scraping a board. And since the dog is brass, it's less likely to damage a cutting edge if your plane or chisel slips. (Rubber face pads are also available, see the photo above.) By using dogs in the face block of the vise and a couple more dogs in the bench, you can clamp wide panels easily.

**WONDER PUP.** Bench dogs alone won't handle every clamping situation. What if you want to hold a long piece from each end? Or need a board clamped along the front edge of the bench? That's where a *Wonder Pup* comes in handy (middle photo). The name might sound like a kid's toy or a super hero's pet, but it's actually a small vise that fits in any ¾" dog hole. Use it with a bench dog (or another *Wonder Pup*) to secure a workpiece. And two holes in the head of the Pup let you screw a shop-made block to it.

**HOLD-DOWN.** Sometimes you just need to hold a workpiece flat to the bench top. In these cases, you need a hold-down (photo below). The long shaft allows you to clamp items up to 8" thick. Turning a threaded knob gradually adjusts the pressure the arm places on the workpiece.

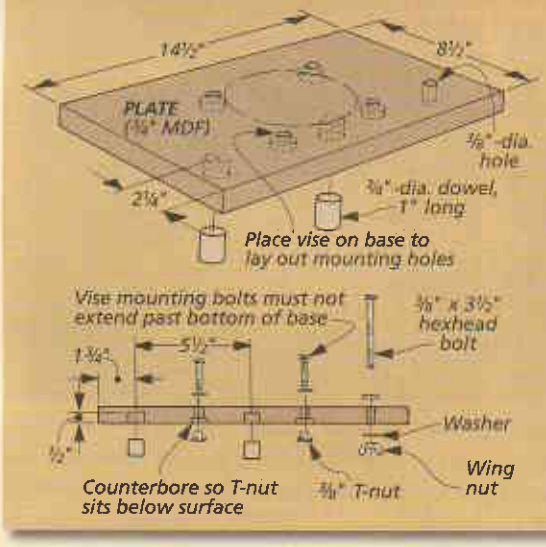
Note: These accessories are manufactured by *Veritas*. See page 35 for mail-order sources. W

**Round bench dogs.** *Put dogs in the bench top and vise, and you can clamp workpieces in a variety of ways.*

**Wonder Pup.** *With its threaded shaft, the Pup serves as an end vise that can be placed in any dog hole.*

**Veritas hold-down.** *To keep your work clamped firmly to the bench, just tighten the knob on the top.*

## VISE MOUNTING PLATE




When you need to cut metal pieces, it's best to use a machinist's vise to hold them. The wood faces of the workbench and vise can be scarred if you nick them with a hack saw or try to clamp down on a threaded rod. But since I don't use my machinist's vise very often, this plate lets me mount it to the bench temporarily, as shown in the photo.

In the bottom of the plate are two ¾"-dia. dowel pins, spaced to fit a pair of dog holes. A bolt and wing nut secure the assembly to the bench top through a third dog hole.

SHOP PROJECT

# WORKBENCH STORAGE

*Want to store a shopful of tools at your fingertips? Here's the answer.*

How do you make a great bench even better? The answer is to add a storage unit to the base. Actually, the design we came up with features *two* storage units — a front cabinet with drawers and doors and an open shelving unit in back. And if that's not enough, you can add an optional pegboard storage panel to each end. Build them all, and you'll be able to put a shopful of tools at your fingertips.

The reason for dividing the storage space into two separate units is simple. First, it allows you to have accessible storage on both sides of the bench. And second, it keeps the drawers in the front cabinet at a manageable depth, so items don't get lost at the back.

Of course, there's no reason you have have to build both storage units. If you're planning to place the bench up against a wall, you may only want to build the cabinet in front. So let's start with that one.

## FRONT CABINET

The front cabinet is really just a plywood box that's sized to fit in the space beneath the top of the workbench. It's divided up into compartments for the drawers and cupboard storage areas. The center section is constructed first, and then the sides are added later.

**CENTER SECTION.** The center section of the cabinet is plywood framework that creates the openings for the drawers. You can begin by cutting the *top* and *bottom (A)*, two *vertical dividers (B)*, a *horizontal divider (C)*, and a *drawer divider (D)* to size from ¾" plywood, as shown in Fig. 1 on the next page.

The front edges of all these plywood panels need to be covered with strips of ¼"-thick hardwood

***Bank of drawers.*** *Keep your hand tools clean and organized in these generously-sized drawers. Plus, they open on full-extension slides so you can fill them from front to back.*

***Shelving Unit.*** *Use every inch of the bench by adding this shallow shelving unit at the back. It's a perfect place for jigs, hardware, and other supplies. (Plans start on page 19.)*

***Pegboard End Storage.*** *In just a few minutes, you can have this optional pegboard storage panel mounted at each end of the bench. See page 19 to find out how.*

*edging (E)*, as shown in Fig. 1. I chose to do this before assembly because I found it a lot easier to attach and trim the edging flush with each panel lying flat.

Once the edging is in place, you can set up your dado blade to match the thickness of the plywood you're using (Fig. 1a). All the dadoes are the same depth and width, so when the blade is set up, it's just a matter of adjusting your rip fence to position the dadoes according to Fig. 1.

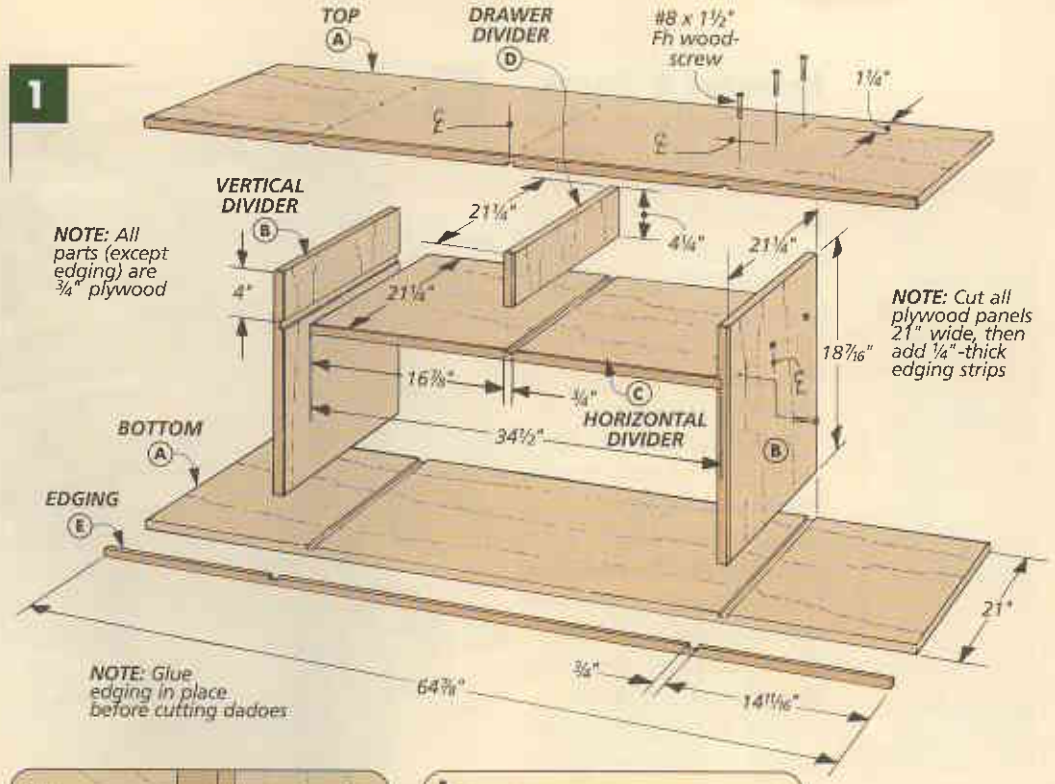
With all the dadoes cut, now is a good time to assemble the center section. I used both glue and screws to do this, drilling all the pilot and shank holes beforehand (Fig. 1b). It makes sense here to work from the inside out, starting by assembling the horizontal divider between the two vertical dividers. Then you can add the short drawer divider and the top and bottom panels.

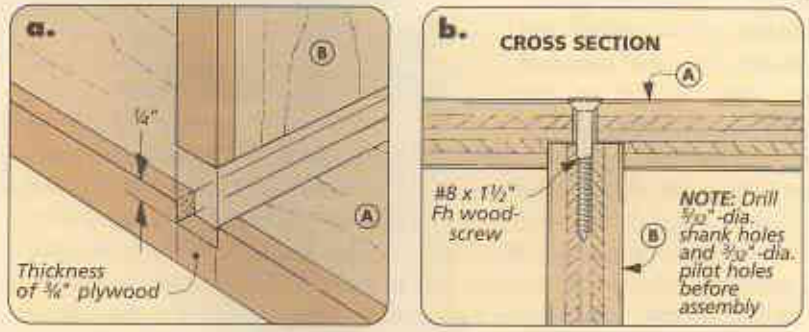
**SIDES.** All you have to do now to complete the case of the cabinet is to add a couple of sides (Fig. 2). Like the other panels you cut earlier, the *sides (F)* are also cut from ¾" plywood. But these panels are cut ¼" wider than the other plywood panels. That's because they'll be rabbeted along the back edges later to hold a plywood back.

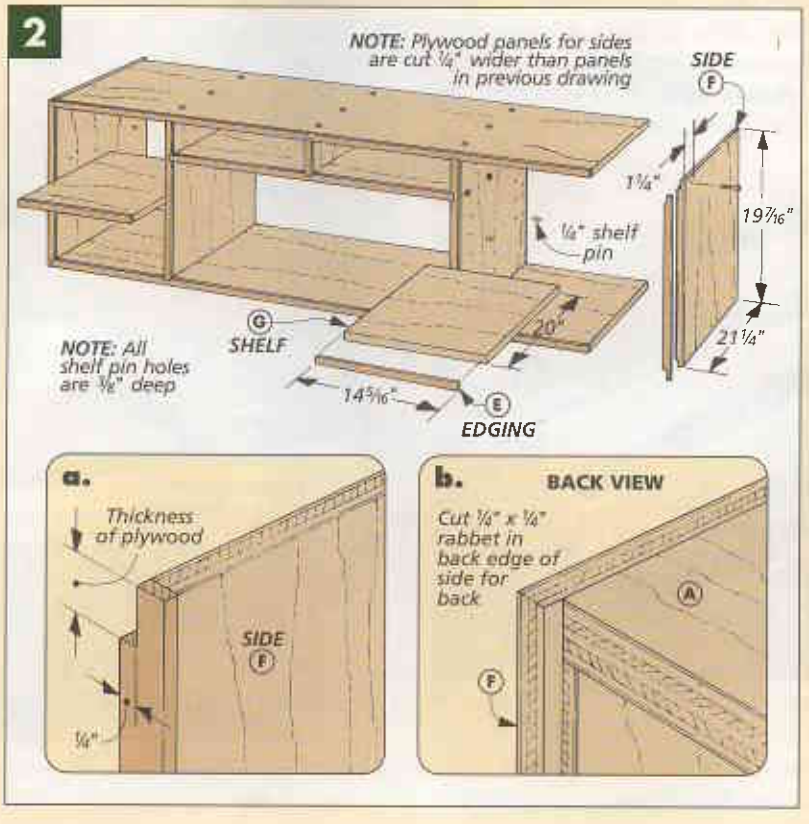
After cutting the sides to size, hardwood edging is added to the front edges. Then a rabbet is cut along the ends of each side to hold the top and bottom (A) of the cabinet (Fig. 2a). Before assembling the sides to the rest of the cabinet, a ¼"-wide rabbet is cut along the back edge of each side piece to hold a ¼" plywood back that will be added later (Fig. 2b). Then the sides can be glued and screwed in place.

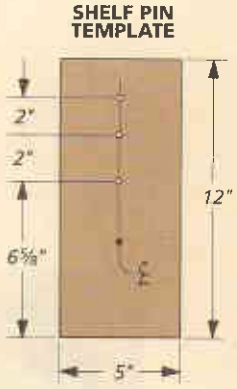
**SHELVES.** With the case of the front cabinet completed, the next step is to add the *shelves (G)*. These are nothing more than a couple of pieces of ¾" plywood with hardwood edging attached to the front.

The shelves are supported by brass shelf pins. To ensure that the holes are spaced evenly and line up accurately, I used a simple drilling template that is shown in the drawing in the margin at right.




A hardboard template allows you to accurately drill holes for the shelf pins.

## Drawers & Doors

The center section of the cabinet is designed to hold five drawers. These are graduated in size to accommodate different types of tools. But the nice thing is that the method of construction is identical for all of them. So other than a few dimension changes, the procedure is the same.

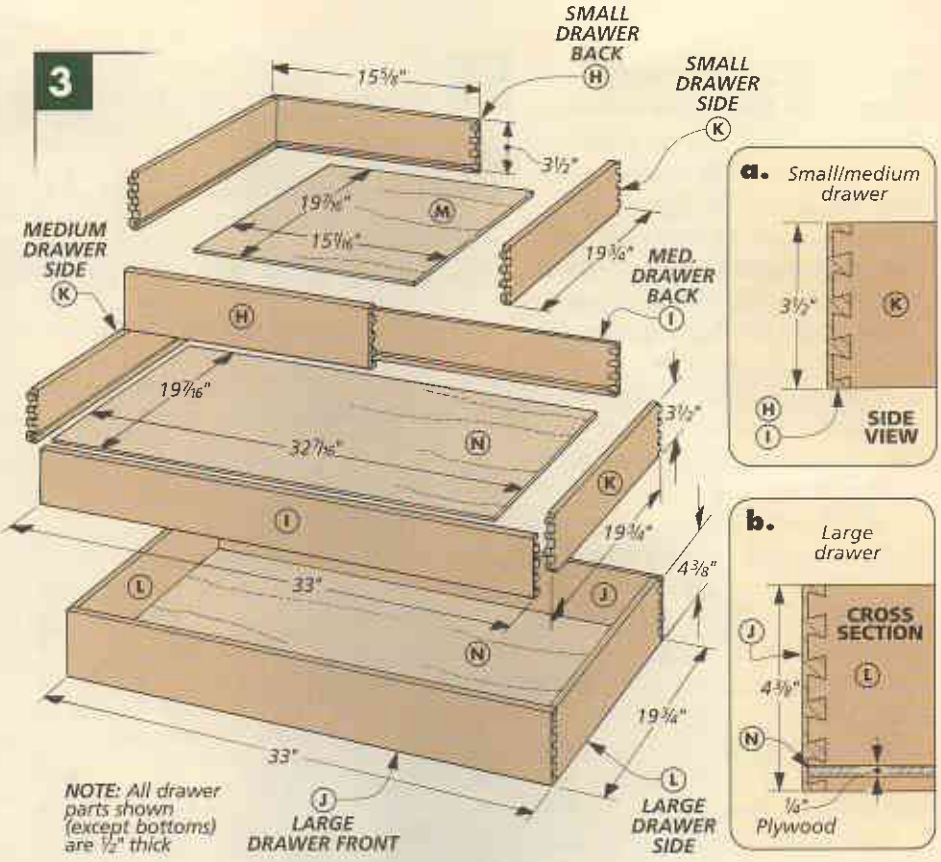
**DRAWER PARTS.** I started by cutting the ½"-thick *drawer fronts* and *backs (H, I, J)* and *drawer sides (K, L)* to size (Fig. 3). The fronts and backs are cut 1" narrower than the cabinet opening so there will be clearance for the full-extension slides.

Next the half-blind dovetails that hold the drawer together can be routed. And a groove for the drawer bottom can be cut on the inside face of each drawer piece. This groove is centered on the bottom pin of the drawer sides. This way, it won't be visible on the ends of the workpieces after the drawers are assembled.

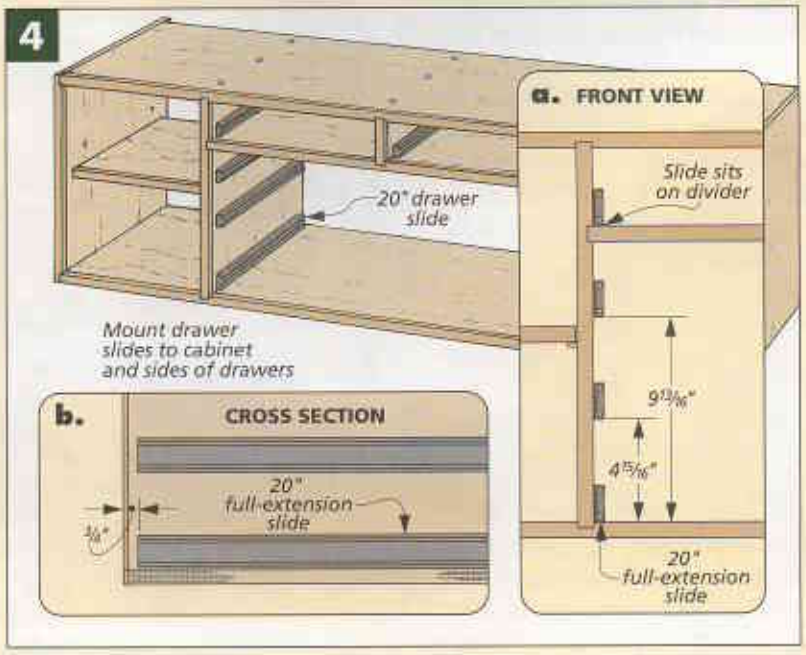
**DRAWER BOTTOMS.** The *drawer bottoms (M, N)* are all cut from ¼" plywood. After they're cut to size, the drawers can be glued up.

**DRAWER SLIDES.** Because I wanted to be able to get to items stored at the back of the drawers with ease, I used full-extension metal drawer slides to mount the drawers (Fig. 4). One half of the slide is screwed to the side of the drawer, and the other half is screwed to the side of the cabinet. The important thing is that when mounting the slide to the cabinet, you allow ¾" clearance between the slide and the front edge of the cabinet (Fig. 4b). This space is for the drawer false fronts that will be added next.

**FALSE FRONTS.** The *false fronts (O, P, Q)* are cut from ¾"-thick hardwood (Fig. 5). They are simply screwed to the front of each drawer so that there is a 1/16" gap all around the front of the drawer. To make it easier to adjust the false fronts, try drilling oversize screw holes through the ½"-thick drawer fronts




*How many tools can you pack into five drawers? Plenty. With heavy-duty, full-extension drawer slides you can make good use of every inch of each drawer.*



first. Then attach the false fronts using screws and finish washers. The oversize holes in the drawer fronts should provide enough "play" to adjust the false fronts for a perfect fit. Once the false fronts are in place, you can add the metal drawer pulls.

**DOORS.** To enclose the shelves on either side of the drawers, I added two doors. These are frame and panel doors, assembled with simple stub tenon and groove joinery.

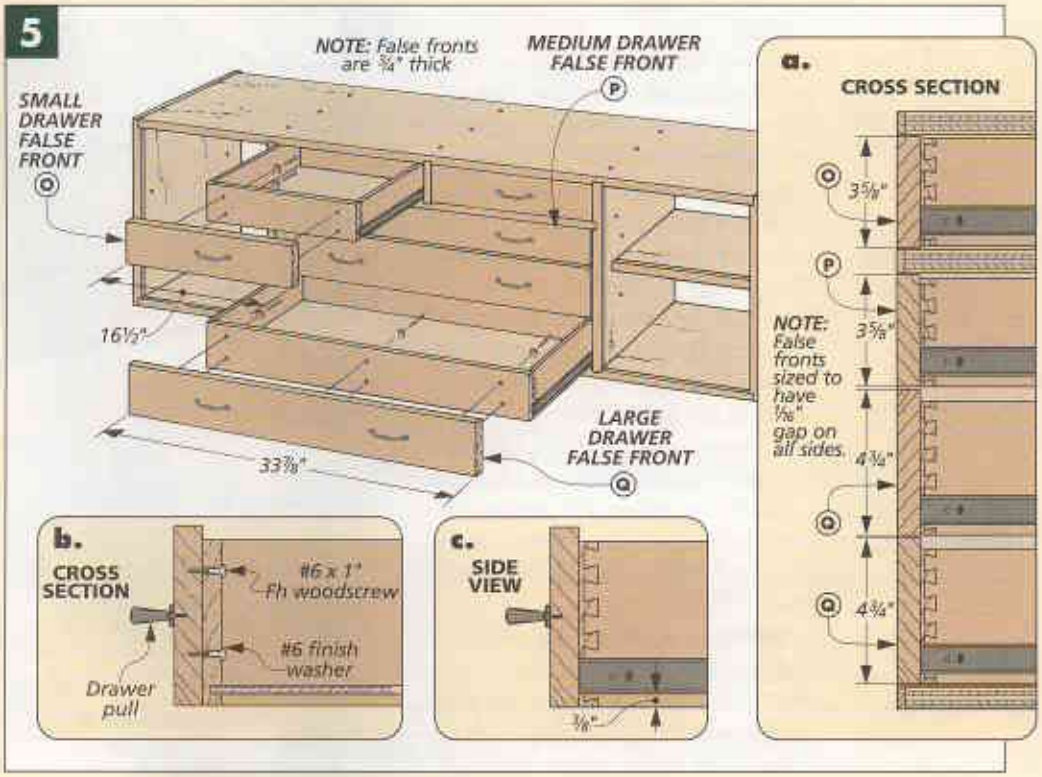
To make the doors, start by cutting the *door rails (R)* and *stiles (S)* to size (Fig. 6). Next, a groove is cut on the inside edge of each piece to hold a plywood frame. When these grooves are complete, stub tenons are cut on the ends of the rails to fit in the grooves in the stiles.

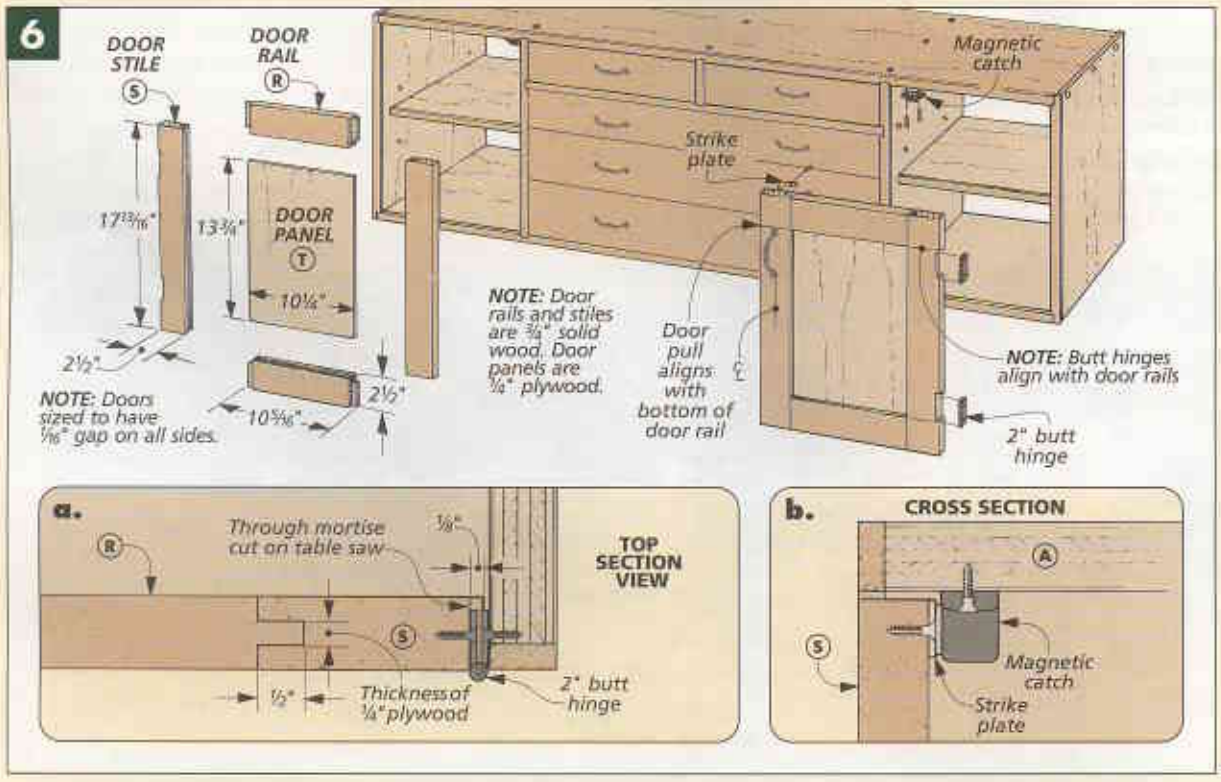
**PANELS.** Each door panel is just a piece of ¼" plywood. After cutting the *door panels (T)* to size, the doors can be assembled.

**HINGES.** The cabinet doors are mounted on common butt hinges. I wanted the hinges to match the other hardware, so I spray painted some ordinary steel hinges black.

After the spray paint has dried, the hinges can be attached to the cabinet. To make this as easy as possible, I mortised each hinge into the door stile, but screwed it directly to the side of the cabinet (Fig. 6a). And creating the mortises in the door stiles is easy. I simply set the door on edge and ran it across a dado blade on my table saw. (A tall auxiliary miter gauge fence will help support the door while you do this.)

Now that the doors are hung, a pull can be added to each. Then to keep each door closed, I installed a small magnetic catch (Figs. 6b). These catches are mounted to the underside of the top of the cabinet, and the strike plates are mounted to the back of each door.



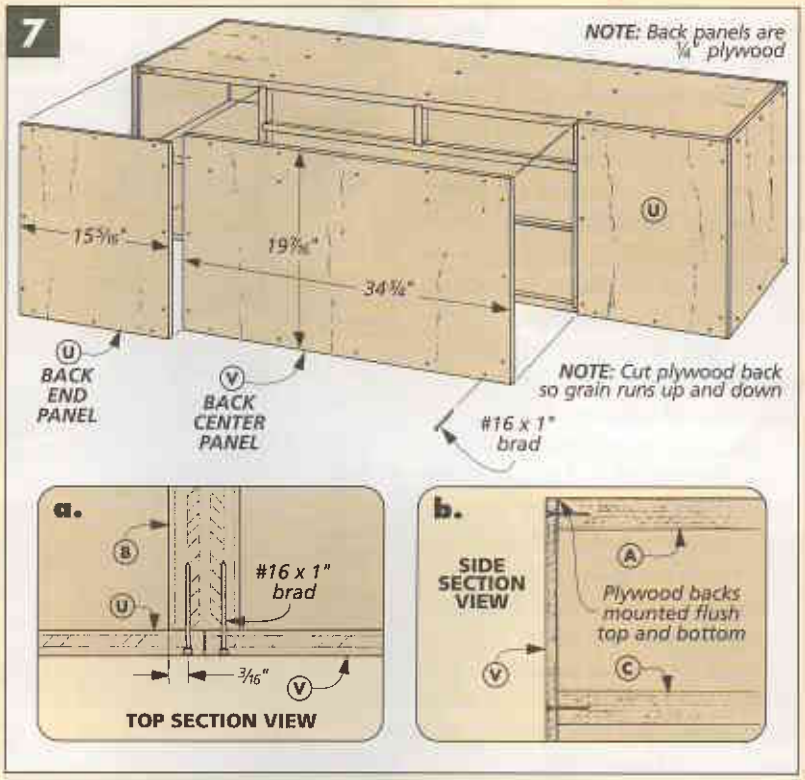
## Back

At this point, the front storage cabinet is practically complete. The only thing that's left to do is add a back. If you take a look at Fig. 7, you can see that the back is made up of three separate pieces of 1/4" plywood. There are two *back end panels (U)* and a larger *back center panel (V)*.

When measuring to determine the sizes of these back panels, keep in mind that they fit in between the rabbets cut in the sides of the cabinet but completely cover the back edges of the cabinet top and bottom.

After the panels are cut to size, they're simply glued and nailed to the back of the cabinet with wire brads (Figs. 7a and 7b).

**INSTALLING THE CABINET.** Installing the cabinet in the bench couldn't be much simpler. It just slides into place until the front edge is flush with the lower front rail of the bench.




## MATERIALS

### Front Storage Cabinet

| | | |
|---|---|---|
| **A** | Top/Bottom (2) | 3/4 ply. - 21 x 64 7/8 |
| **B** | Vertical Dividers (2) | 3/4 ply. - 21 x 18 7/16 |
| **C** | Horiz. Divider (1) | 3/4 ply. - 21 x 34 1/2 |
| **D** | Drawer Divider (1) | 3/4 ply. - 21 x 4 1/4 |
| **E** | Edging (1) | 3/4 x 1/4 - 48 lin. ft. |
| **F** | Sides (2) | 3/4 ply. - 21 1/4 x 19 7/16 |
| **G** | Shelves (2) | 3/4 ply. - 20 x 14 5/16 |
| **H** | Sm. Drawer Fr./Bks. (4) | 1/2 x 3 1/2 - 15 5/8 |
| **I** | Med. Drawer Fr./Bk. (2) | 1/2 x 3 1/2 - 33 |
| **J** | Lg. Drawer Fr./Bks. (4) | 1/2 x 4 3/8 x 33 |
| **K** | Sm./Med. Drawer Sides (6) | 1/2 x 3 1/2 - 19 3/4 |
| **L** | Lg. Drawer Sides (4) | 1/2 x 4 3/8 - 19 3/4 |
| **M** | Sm. Drawer Btms. (2) | 1/4 ply. - 19 7/16 x 15 1/16 |
| **N** | Lg. Drawer Btms. (3) | 1/4 ply. - 19 7/16 x 32 7/16 |
| **O** | Sm. Drawer False Fronts (2) | 3/4 x 3 5/8 - 16 1/2 |
| **P** | Med. Drawer False Front (1) | 3/4 x 3 5/8 - 33 7/8 |
| **Q** | Lg. Drawer False Fronts (2) | 3/4 x 4 3/4 - 33 7/8 |
| **R** | Door Rails (4) | 3/4 x 2 1/2 - 10 5/16 |
| **S** | Door Stiles (4) | 3/4 x 2 1/2 - 17 13/16 |
| **T** | Door Panels (2) | 1/4 ply. - 10 1/4 x 13 3/4 |
| **U** | Back End Panels (2) | 1/4 ply. - 15 5/16 x 19 7/16 |
| **V** | Back Center Panel (1) | 1/4 ply. - 34 3/4 x 19 7/16 |

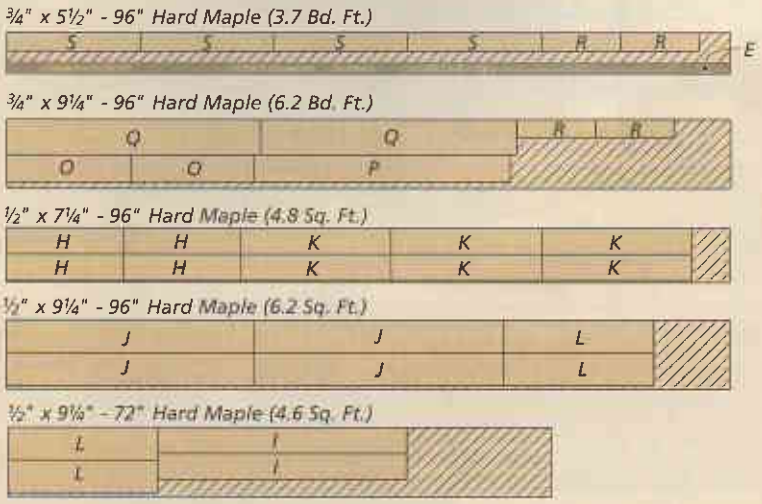
### Shelving Unit

| | | |
|---|---|---|
| **W** | Top/Bottom (2) | 3/4 ply. - 7 1/2 x 64 7/8 |
| **X** | Sides (2) | 3/4 ply. - 7 3/4 x 19 7/16 |
| **Y** | Divider (1) | 3/4 ply. - 7 1/2 x 18 7/16 |
| **Z** | Back Panels (2) | 1/4 ply. - 32 11/16 x 19 7/16 |
| **AA** | Shelves (2) | 3/4 ply. - 7 1/4 x 31 11/16 |

## SUPPLIES

- (48) #8 x 1 1/2" Fh Woodscrews
- (16) 1/4" Brass Shelf Pins
- (5 pr.) 20" Full-Extension Drawer Slides w/Screws
- (26) #6 x 1" Fh Woodscrews
- (26) #6 Finish Washers
- (10) 4 7/8" Door Pulls w/Screws
- (2 pr.) 2" x 1 1/2" Butt Hinges w/Screws
- (2) Magnetic Catches w/Strikes and Screws
- (76) #16 x 1" Wire Brads

## CUTTING DIAGRAM




***ALSO NEEDED:*** *Two sheets of 3/4" maple plywood and two sheets of 1/4" maple plywood*

## Shelving Unit

The front storage cabinet doesn't completely fill the space under the bench. So I added an open shelving unit at the back. This unit starts off as a basic box and features the same construction as the front cabinet. But the unit isn't as deep as the front cabinet, and there aren't any drawers or doors. So it's quite a bit easier to build.

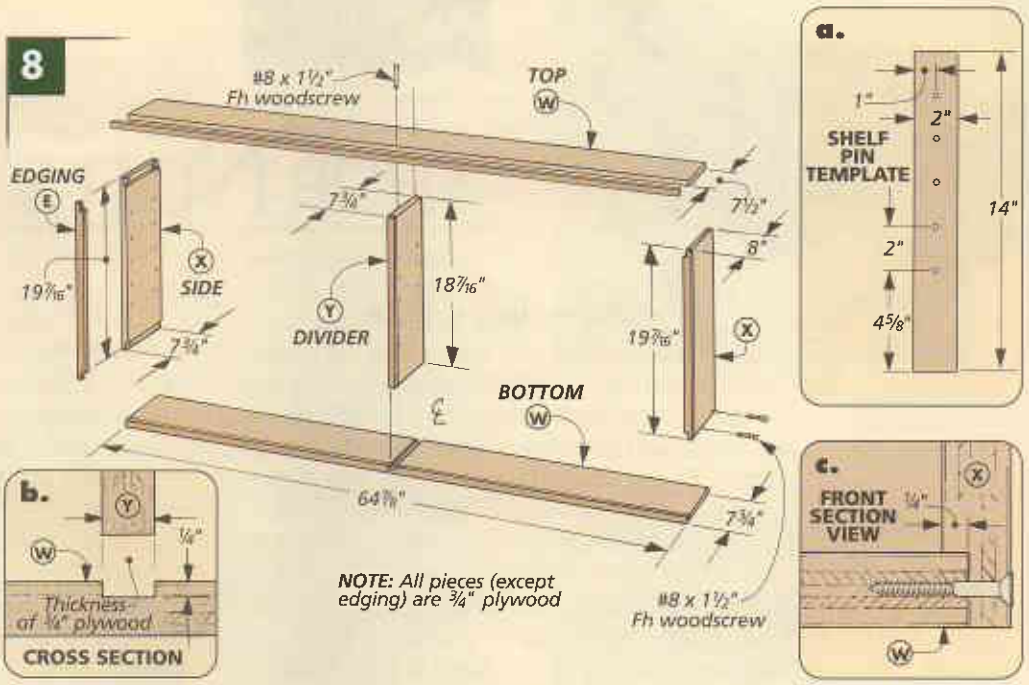
I started building the shelving unit by cutting the main pieces to size. As you can see in Fig. 8, there's a *top* and *bottom (W)*, two *sides (X)*, and a *divider (Y)*. These panels are all cut from ¾" plywood and then ¼" hardwood edging is applied to the front edges of each piece.

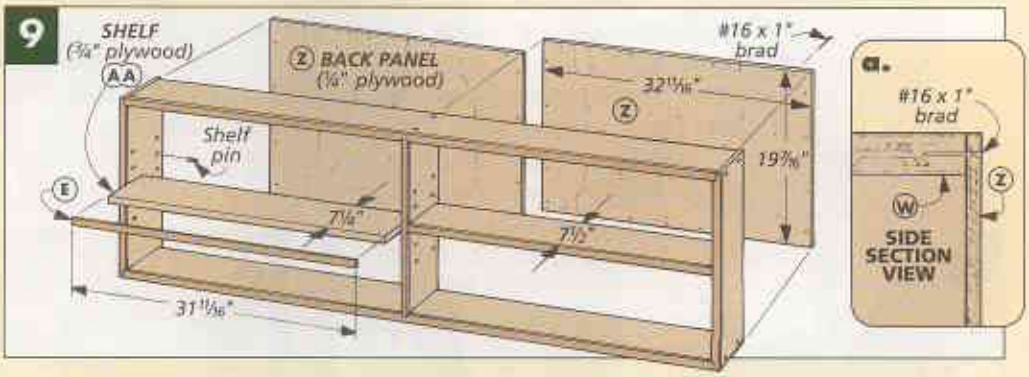
Once the edging is in place, you can begin on the joinery. Rabbets are cut on the ends of the sides to hold the top and bottom panels. A rabbet is also cut along the back edge of each side to hold the back panels that will be added later.

The top and bottom panels each receive a dado to hold the divider panel (Fig. 8b). This dado is centered on the length of the panels.

When you've finished cutting all the rabbets and dadoes, the shelving unit can be assembled. Like the cabinet, these pieces are just glued and screwed together (Fig. 8c).

**SHELF PIN HOLES.** Before adding the back, some shelf pin holes need to be drilled in the cabinet sides. Again I used a simple template to do this. But since the spacing of these holes isn't the same as the front cabinet, you'll need a new template (Fig. 8a).



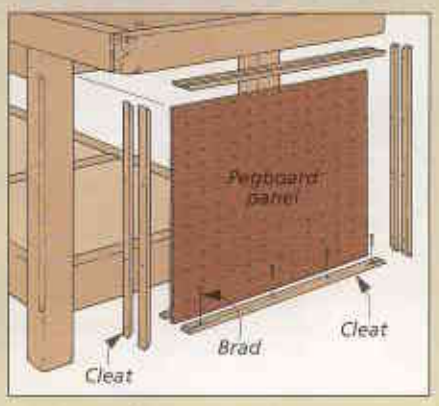

Once the shelf pin holes have been drilled, you can add a back to the unit. This time, the back is made up of two identically-sized panels of ¼" plywood, as shown in Fig. 9. After cutting these two *back panels (Z)* to final size, they can be nailed in place with brads (Fig. 9a).

**SHELVES.** All that's left now is to add two *shelves (AA)*. These are pieces of ¾" plywood with a strip of hardwood edging glued to each front edge (Fig. 9). When the shelves are in place, you can slide the shelving unit into the bench just like you did with the front cabinet. W

## PEGBOARD STORAGE

If you're looking for additional storage, these pegboard panels provide a convenient place to hang a few extra tools at the ends of the workbench. The best part is that there's hardly anything to them.

All you need to do is nail some cleats to the legs and upper and lower end rails of the bench. Then place a piece of pegboard against the cleats and tack a second set of cleats down to hold the pegboard in place. Add a few hooks, and you're ready to hang some tools.



# Shop Notes

## Mounting a Vise

Adding a vise to the workbench on page 6 isn't difficult. In fact, it's just a three-step process. First, a pocket is cut in the front apron to accept the rear jaw of the vise. Then the vise is attached to the bench. And finally, a wood face block is added to the front jaw.

But why even go to this trouble? Why not just bolt the vise to the front apron and screw a wood pad to each jaw? There are a couple of reasons. By burying the rear jaw in the apron, you have a smooth, "padded" face the length of the bench for clamping. The large face block has dog holes that align with the holes in the bench so you can secure wide workpieces. It also spreads clamping pressure.

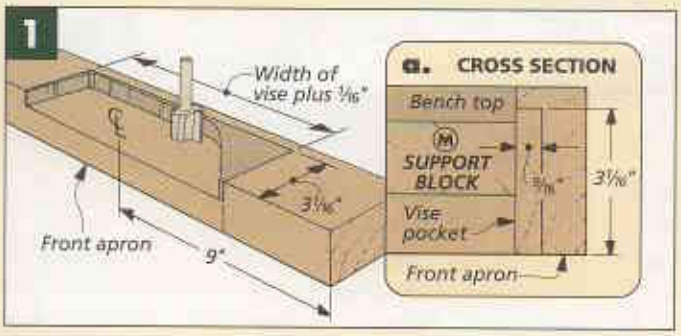
To install the vise, you'll need to take it apart first. This isn't as scary as it sounds. By removing a cotter key, I was able to separate the front jaw of my vise (along with the guide rods and threaded shaft) from the rear jaw.

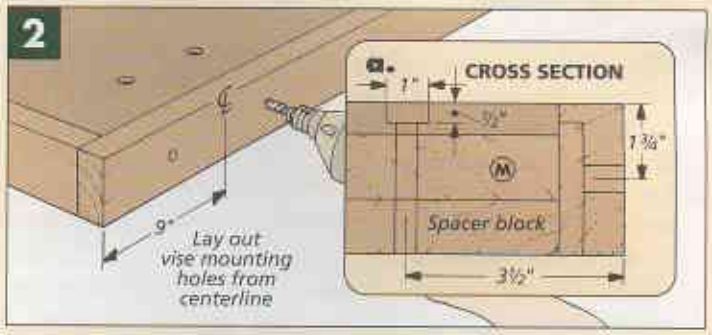
Installation of the vise begins before you attach the front apron. As you can see in Fig. 1, a pocket is laid out and routed in the back face of the apron. Position this pocket so the vise will be centered between the dog holes in the bench. Its size is 1/16" wider and taller than the rear jaw of the vise.

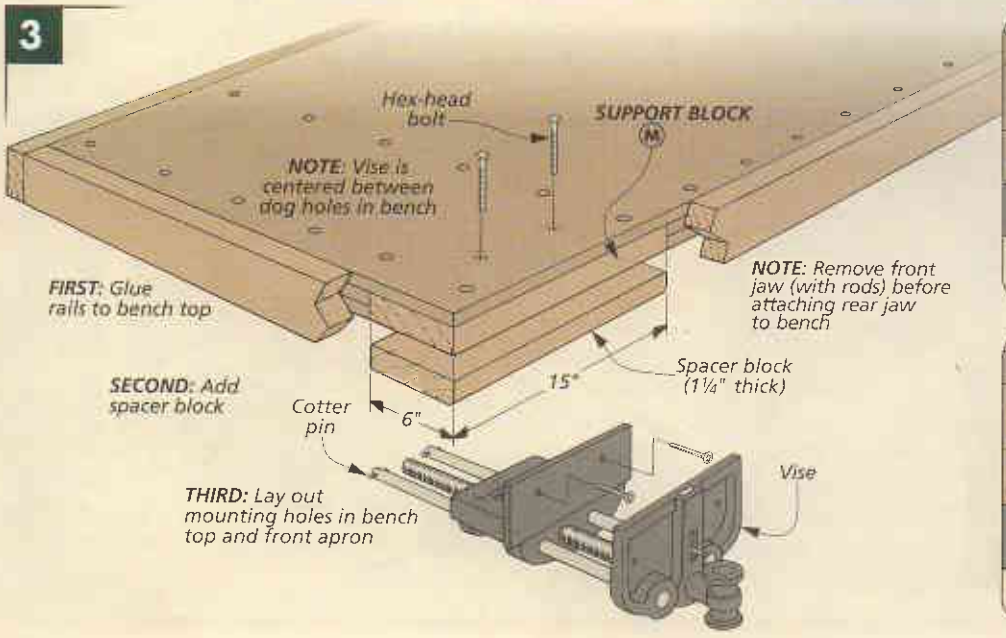
Once the pocket is done, the apron can be attached to the bench top and you can move on to the second step — attaching the vise.

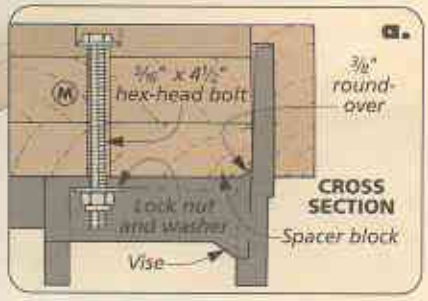
Start by adding a spacer block under the bench top. This piece fills the gap between the *support block (M)* and the vise mounting plate (Fig. 3). I routed a 3/8" roundover on one edge so it would fit snugly behind the jaw. After the spacer is cut to size, it's glued in place.

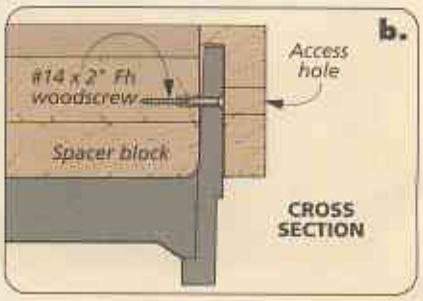
Next, a series of holes needs to be drilled. If you look at Fig. 2, you'll see two counterbored holes in the top of the bench. These accept hex-head bolts that pass through



the vise. And two holes through the front apron allow access to screws that attach the rear jaw to the bench (Fig. 3b).

To lay out the holes in the bench top, you want to work out from the centerline of the pocket in the apron *and* the centerline of the mounting plate.

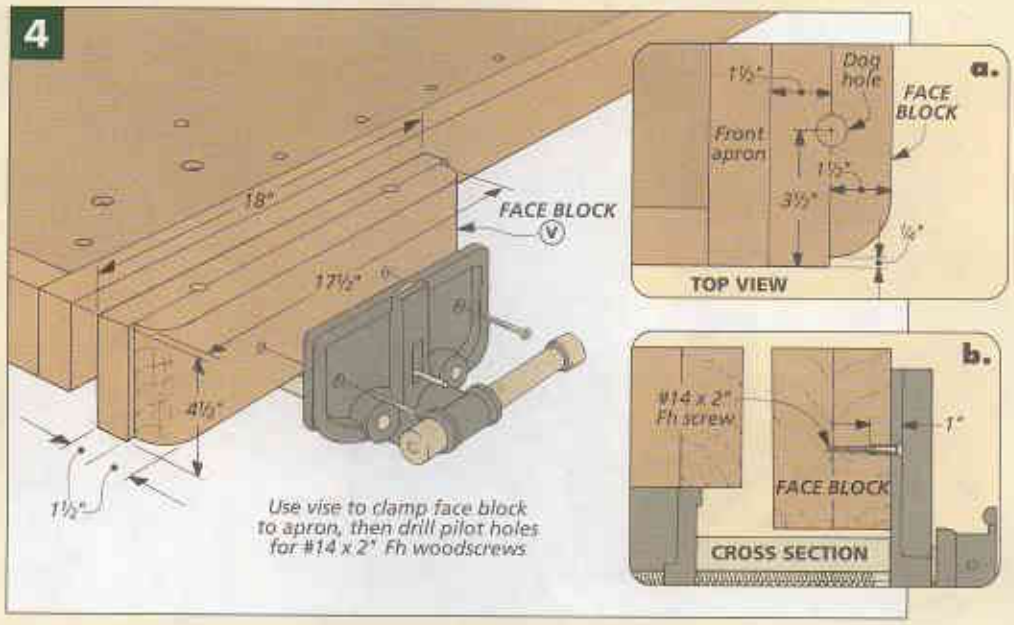
The next thing to do is to drill the access holes through the front apron (Fig. 2). These holes need to be big enough to allow the screws to pass through. Here again, lay out the holes by working from the centerlines of the rear jaw and the pocket.

The third step is making and mounting the wood *face block (V)*. This consists of two slabs of 1½"-thick maple glued together (Fig. 4). Before doing that, a radius needs to be cut on each end of one block as you can see in Fig. 4a. I did this on the band saw, then sanded the curves smooth.

After gluing the pieces together, lay out and drill a couple of dog holes in the jaw so that they align with the holes in the bench. Then to mount the face block, just use the vise to clamp the block against the apron with the top edges and ends flush (Figs. 4a and 4b). Two screws secure it to the jaw.

When you close the jaws of the vise, you'll notice a small gap between the apron and the bottom of the face block, like you see in the photo at right. Don't worry. The vise jaws cant (tilt) in slightly at the top. The reason is that as you clamp a workpiece, it forces the top of the vise apart. This tilt keeps the jaws parallel. W

*The top edges of the jaws tilt in slightly to counteract the forces of clamping that tend to drive the top edges apart.*

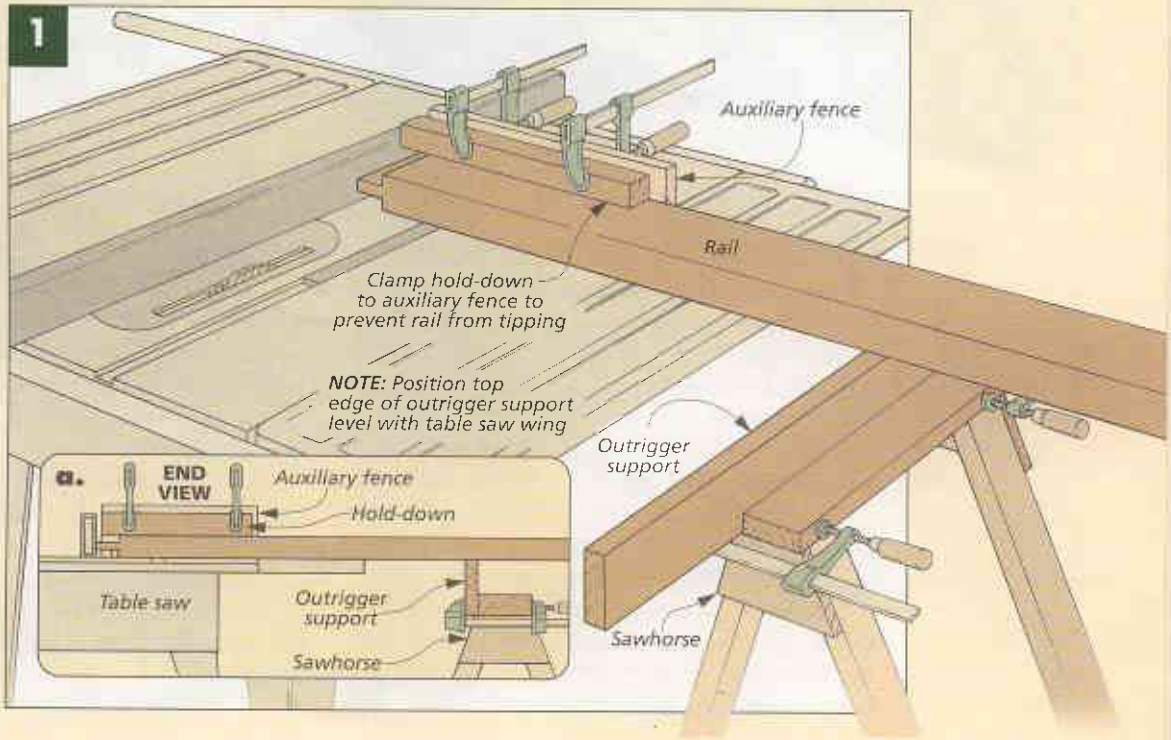



## Cutting Tenons on Long Rails

When it was time to cut the tenons on the rails for the workbench on page 6, I needed a way to handle the long pieces safely.

Fig. 1 shows the "outrigger" system I came up with to support the ends that extend past the wing of the table saw. Just clamp a board to a saw horse so that it matches the height of the wing.

An auxiliary fence attached to the miter gauge helps support the piece. And a hold-down clamped to the fence keeps the rail pressed firmly to the table. This lets you use both hands to push the workpiece through the cut. W



# HALL MIRROR & COAT RACK

*Just a traditional hall mirror? Looks can be deceiving. These coat hooks are adjustable.*

Hooks that move — that's the idea behind this project. If you think about it, a heavy winter coat or hat takes up a lot more room than a scarf or an umbrella. So it just makes sense that a coat rack would have hooks that slide back and forth, as shown in the inset photo at right. This way, everything fits comfortably.

Here's how they work: The hooks are attached to wood blocks, and these blocks have tongues that slide back and forth in a track in the frame, as shown in the cross section drawing on page 23. I added eight hooks to this mirror, but the choice is up to you.

Now sliding hooks may be a little unconventional, but this mirror is very traditional-looking. There are a number of reasons for this. For one thing, I chose heavy-duty hooks with an antiqued finish. And I think the beveled mirror and the darker stain of the frame also help give this project a bit of an old-fashioned character.

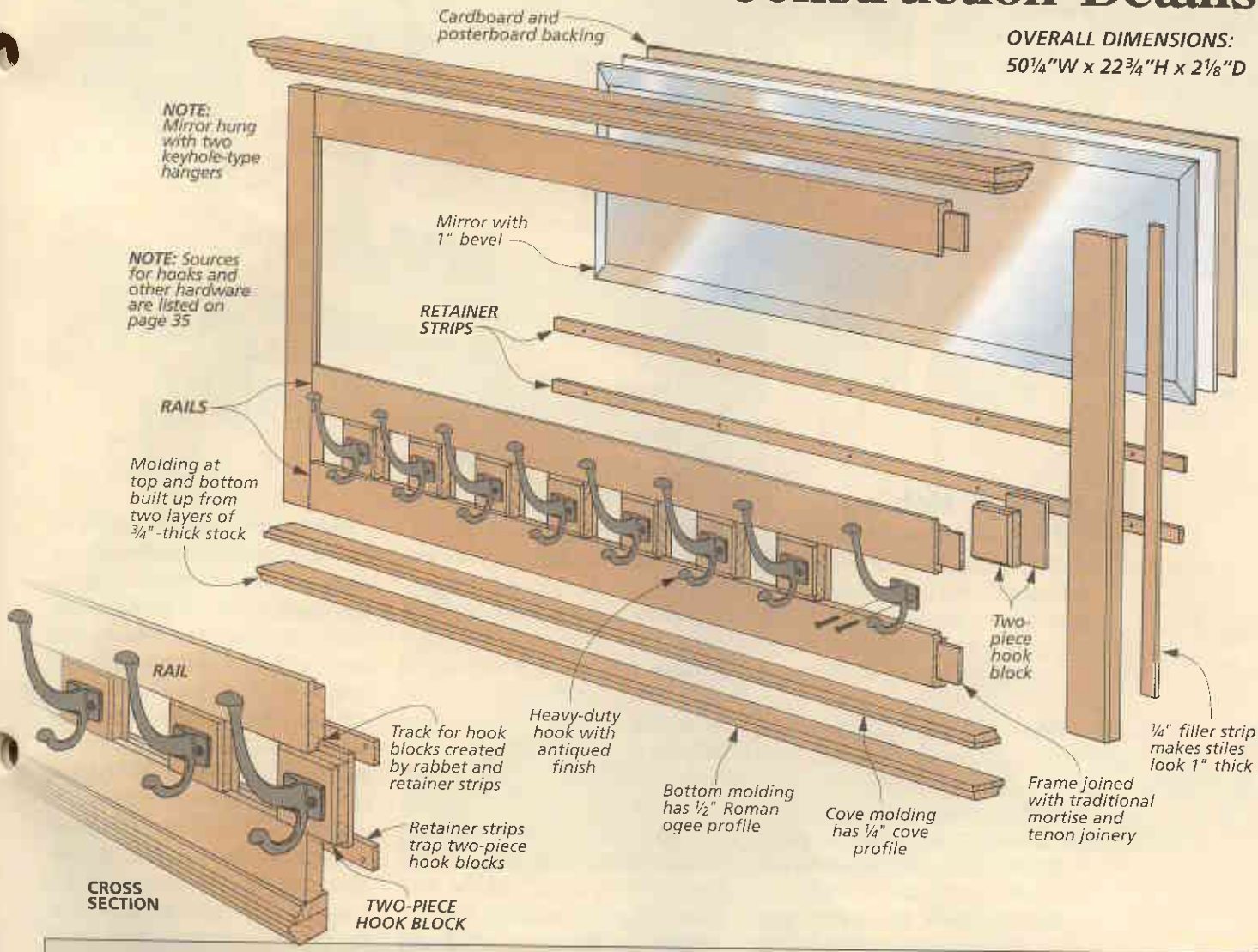
▲ *You can give heavy winter coats more room by adjusting the hooks on this frame. Tongues on the hook blocks slide back and forth in a simple track.*

The frame joinery is equally traditional. With all the weight here (the mirror *and* the winter coats), I decided to assemble the frame with sturdy mortises and tenons.

And one last thing. The number of hooks you add isn't your only choice. You can also choose to fill behind them with a solid back. For more on this, see page 27.

# Construction Details

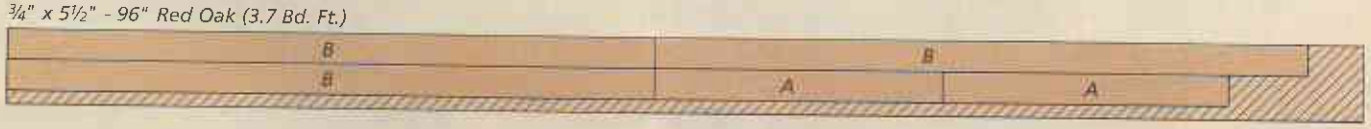
**OVERALL DIMENSIONS:**
**50¼"W x 22¾"H x 2⅛"D**




## MATERIALS, SUPPLIES, & CUTTING DIAGRAM

| | | | | |
|---|---|---|---|---|
| **A** Stiles (2) | ¾ x 2¼ - 20¼ | **G** Hook Block Fronts (8) | ⅝ x 2 7/16 - 2½ | • (14) #4 x ½" Fh Woodscrews |
| **B** Rails (3) | ¾ x 2¼ - 46 | **H** Hook Block Backs (8) | ¼ x 2½ - 2 15/16 | • (1) 11½" x 44" Mirror with 1" Bevel |
| **C** Filler Strips (2) | ¾ x ¼ - 20¼ | **I** Retainer Strips (2) | ¾ x ¼ - 46½ | • (1) 11½" x 44" Cardboard Filler |
| **D** Top Molding (1) | ¾ x 2⅛ - 50¼ | • (8) Coat Hooks w/Screws | | • (1) 11½" x 44" Posterboard Back |
| **E** Bottom Molding (1) | ¾ x 1¾ - 49½ | • (10) #4 x ¾" Fh Woodscrews | | • (2) Keyhole Hangers |
| **F** Cove Molding (2) | ½ x 1½ - 49 | • (14) Plastic Turn Buttons | | • (4) #8 x ⅝" Fh Woodscrews |

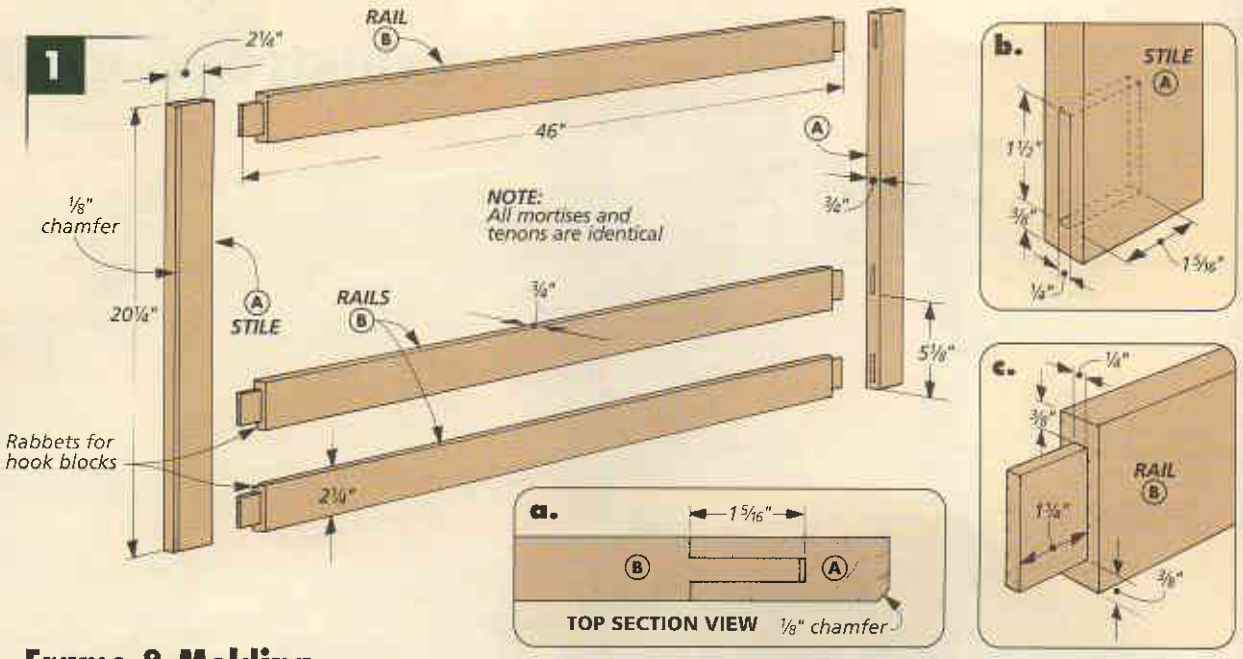
¾" x 5½" - 96" Red Oak (3.7 Bd. Ft.)




¾" x 5½" - 60" Red Oak (2.3 Bd. Ft.)


¾" x 7¼" - 60" Red Oak (3.0 Bd. Ft.)


***NOTE:*** *Parts F, G, and H will need to be resawn or planed to several different thicknesses*




## Frame & Molding

The frame of this project will support both the mirror and the coats that'll be hung on the hooks. So to make sure it was good and strong, I joined the pieces with mortise and tenon joints. There are six of each, and they're all identical.

**FRAME STILES & RAILS.** The first thing to do is cut the *stiles (A)* and *rails (B)* to size from ¾"-thick stock, as shown in Fig. 1 above. The only unusual thing here is that there's an extra rail at the bottom for holding the coat hook blocks (added later).

**MORTISE & TENON.** The first thing to do to these pieces is cut the mortises and tenons (Figs. 1b and 1c). There are a number of ways to cut this joint. I like to start with the mortises, drilling overlapping holes and then cleaning them up with a chisel. To provide room for excess glue, I made the mortises slightly deeper than 1¼" (the length of the tenons), as shown in Fig. 1a. And note that the mortise stops ⅜" (not ¼") from the ends of the stiles (Fig. 1b). This extra ⅛" helps strengthen the bottom of each stile.

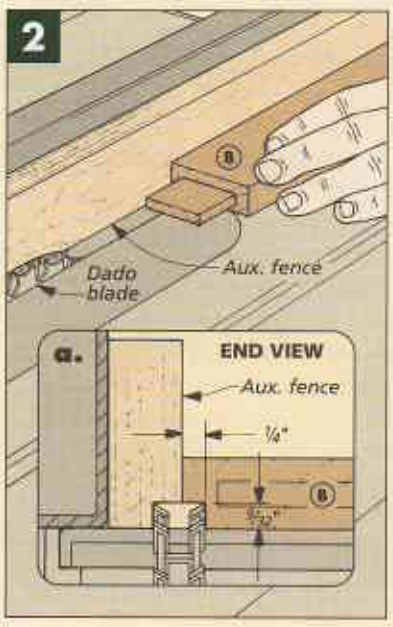
Keep in mind, though, that this extra ⅛" means the shoulders of the tenons won't be ¼" all the way around (Fig. 1c). So after cutting the cheeks of *all* the tenons, you'll need to raise the blade to ⅜" for the shoulders at the top and bottom.

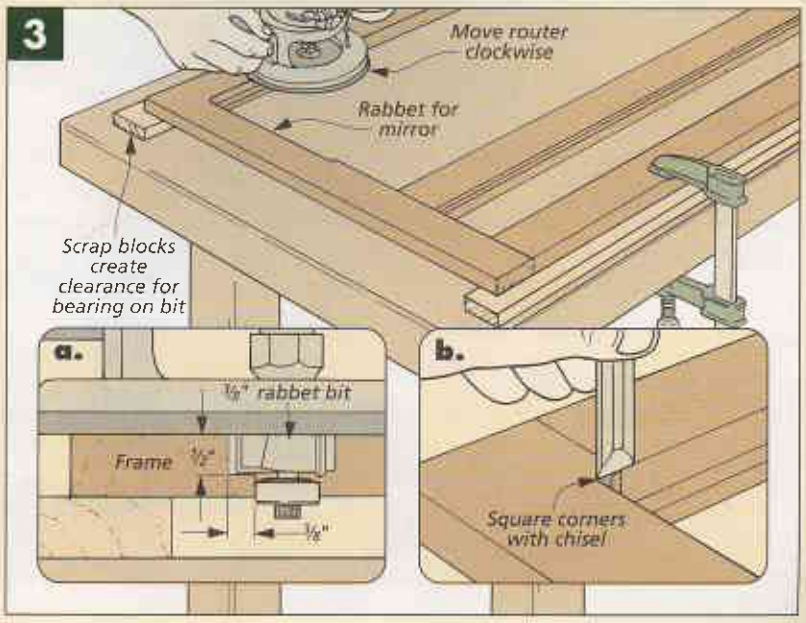
Now to form half of the track for the hook blocks, a small rabbet is cut on the two lower rails (Fig. 2). This track should be slightly oversized so the blocks slide easily. So I cut a 9/32"-deep rabbet to hold the ¼" tongues that'll end up on the blocks.

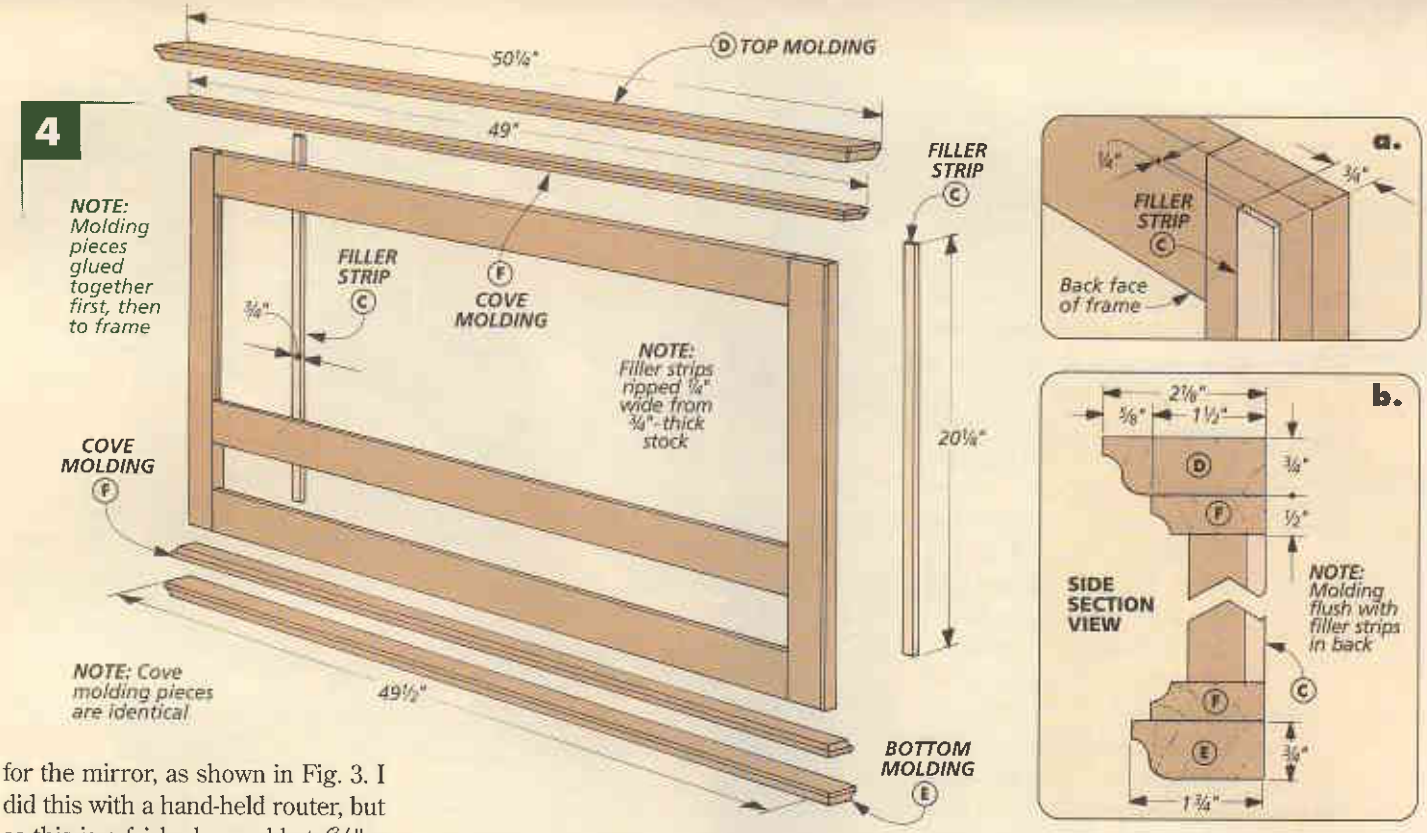
Finally, before assembling the frame, a small ⅛" chamfer needs to be routed along the outside edge of each stile, as shown in Fig. 1a.

**ASSEMBLY.** At this point, the frame can be glued and clamped together. This assembly is about as easy as it gets. Just make sure the rabbets on the lower rails are facing each other.

**RABBET FOR MIRROR.** When the glue has dried, you can rout the rabbet



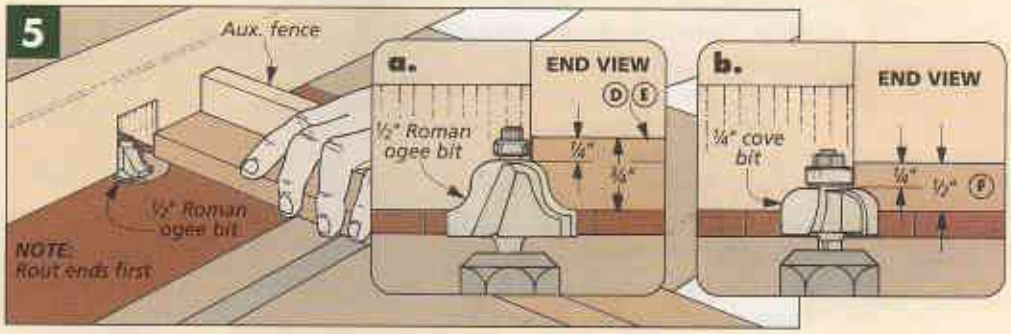



for the mirror, as shown in Fig. 3. I did this with a hand-held router, but as this is a fairly deep rabbet (⅜" x ½"), you'll want to take several light passes so that you avoid tearout. I should also mention that the frame will need to be set on scrap blocks to provide clearance for the bearing on the bit (Fig. 3a). Also, after the last pass has been made, the corners of the rabbet will need to be squared up with a sharp chisel (Fig. 3b).

**FILLER STRIPS.** The first pieces to add to the frame are the filler strips in back, as shown in Fig. 4 above. These thin pieces are glued to the edges of the stiles, which makes the stiles look a little beefier. (They'll also make the frame easier to hang on the wall later on.)

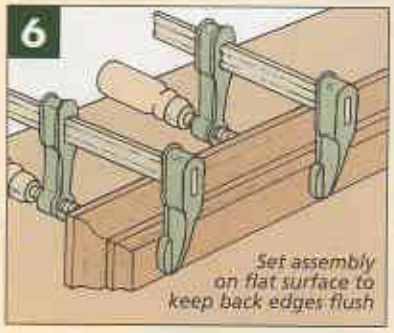
To make the *filler strips (C)*, I ripped ¼"-wide pieces from a ¾"-thick blank and cut them to match the height of the frame (Fig. 4a).

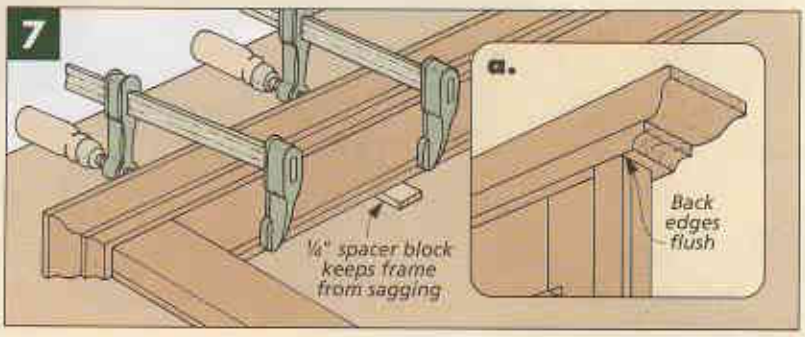
**MOLDING.** With the filler strips in place, I began work on the molding (Figs. 4 and 4b). The *top molding (D)* and *bottom molding (E)* will get the same profile, but the top piece is longer *and* wider. Between these pieces and the frame are ½"-thick pieces of *cove molding (F)*.




**ROUT PROFILE.** Though there are two profiles to rout (a ½" Roman ogee and a ¼"-rad. cove), the technique is the same (Fig. 5). I attached an auxiliary fence to my miter gauge to support the long pieces. And to prevent chipout on the ends (which should be routed first), I made sure the auxiliary fence backed up these pieces completely.

After the profiles have been routed, the molding pieces can be glued together. To keep the back edges flush, I set them on a flat surface (Fig. 6). Then these assemblies can be glued flush with the back of the filler strips (Fig. 7a). But since these fillers are just on the ends, the frame tends to sag at the center. So to correct this, I set ¼"-thick spacers under the frame, as shown in Fig. 7.



## Hook Blocks

At this point, the frame is complete. All that's left to build now are the hook blocks shown in Fig. 8. I experimented with the number of blocks and decided that eight looked about right. But you can make as many or as few as you like.

**HOOK BLOCKS.** Each hook block is made from two thin pieces — a 5/8"-thick front and a 1/4"-thick back. The back pieces are taller than the fronts, creating 1/4" tongues that fit into the rabbets in the back of the frame (Fig. 8b).

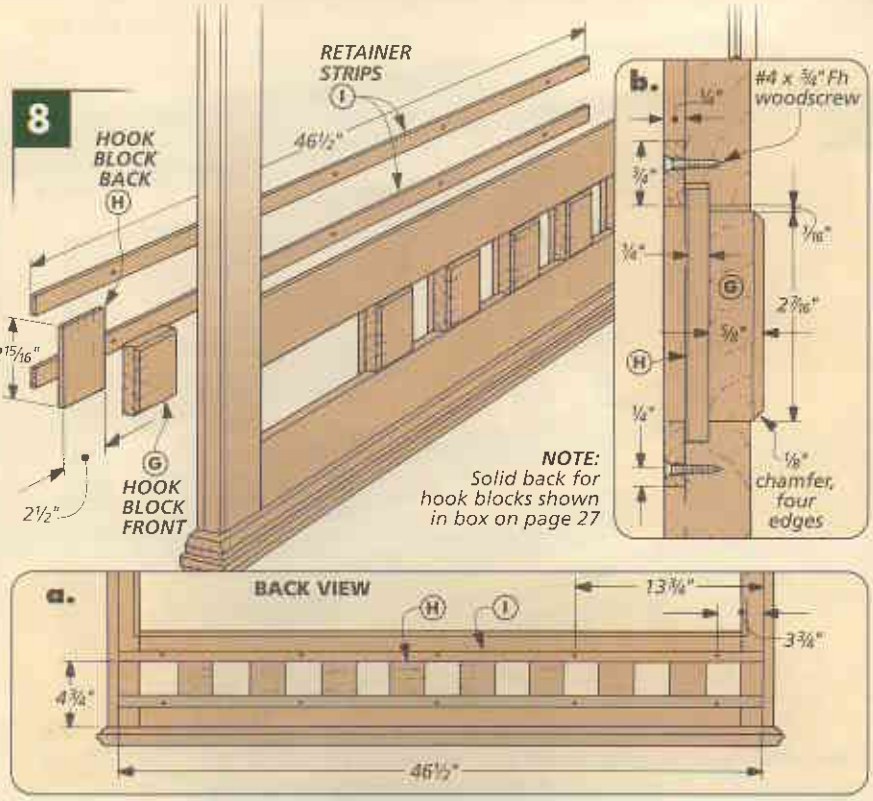
I worked on the *hook block fronts (G)* first. They start off as a long blank that's ripped 1/16" narrower than the opening between the lower rails on the frame. To cut these blocks to length, I used my rip fence, clamping a short stop block to it so the pieces wouldn't be trapped between the fence and the blade (Fig. 9).

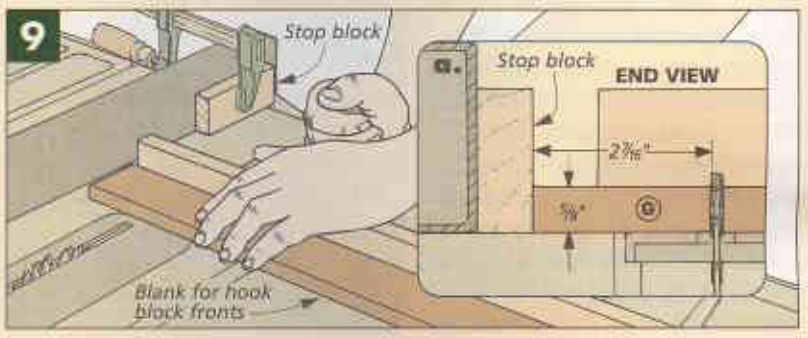
Now the only thing to do to the front blocks is to rout a 1/8" chamfer around the face. To do this, I used a grout float as a push block (Fig. 10). It provides a firm grip while keeping my hands safely away from the bit.

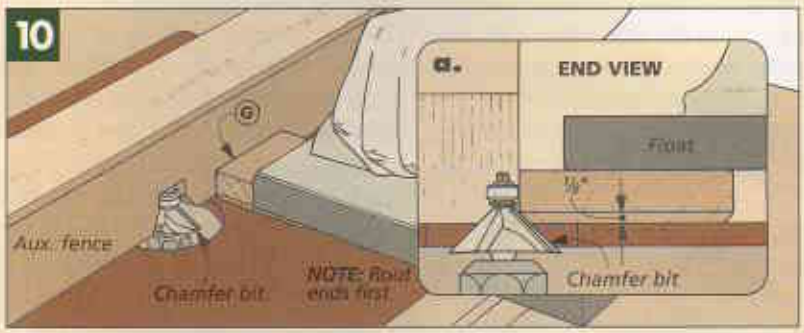
Next, I worked on the *hook block backs (H)*. The unusual thing here is the grain — it runs *across* the grain on the front blocks, as shown in Fig. 8. I typically avoid cross-grain construction. But I wanted the grain on the front pieces to match the rails on the frame *and* the grain on the back pieces to run vertically so the tongues would be plenty strong.

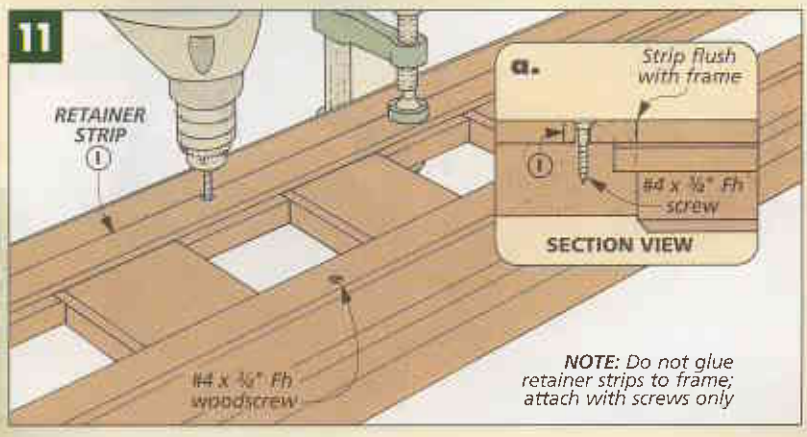
**ASSEMBLE BLOCKS.** Now the block fronts and backs can be glued together. The unusual thing here is

*Staining this project will be much easier if you remove the hook blocks and retainer strips first.*



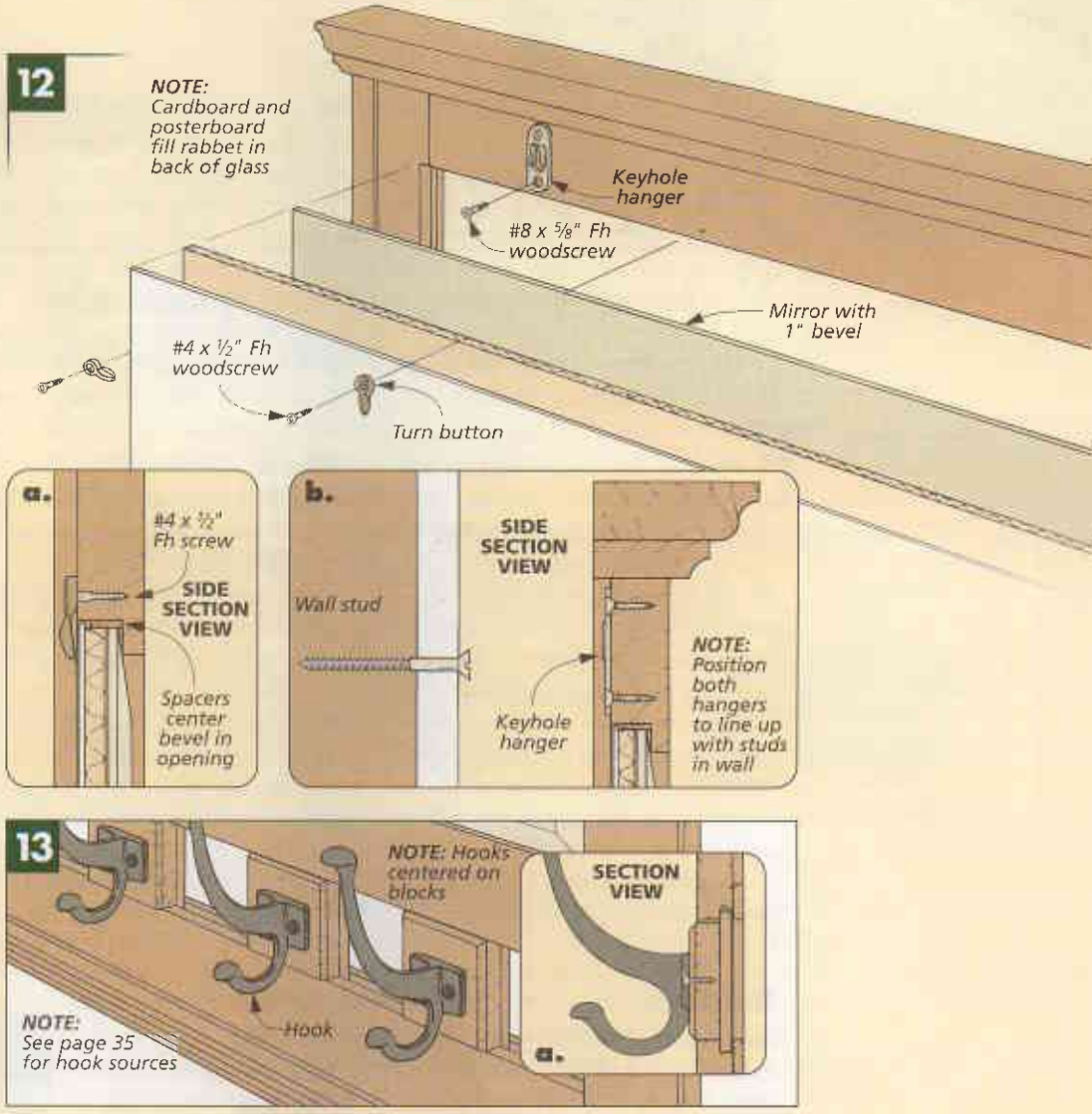
that I didn't use any clamps. I found that tightening the screw on the clamps caused the pieces to twist. Instead I simply pressed each set together by hand for a minute or two, making sure that the tongues at the top and bottom were the same and that the edges were flush.

**MOUNT BLOCKS.** As I've mentioned, the hook blocks fit into the rabbets in the frame. Holding them in place are two *retainer strips (I)*, shown in Figs. 8 and 8a. Except for their length, these strips are just like the filler strips you added to the back of the frame earlier.

Once the retainer strips are cut, you can set the hook blocks into the rabbets and screw (don't glue) the retainer strips to the back, as shown in Fig. 11. The important thing is that these strips are flush with the inside edges of the frame (Fig. 11a).

**FINISH.** At this point, the project is about complete, and now is a good time to apply the finish. I wanted an old fashioned-look, so I stained the oak with a walnut-colored, oil-based stain before applying the top coat. And to get the stain into all the nooks and crannies, it's a good idea to remove both retainer strips and the hook blocks, as you can see in the photo on page 26.

**MIRROR & HARDWARE.** When the finish has dried, you can measure the opening for the mirror. I ordered a 1"-beveled mirror that was ¼" narrower and shorter than the opening. Then to keep the bevels centered when installing the mirror, I made small wood spacers to fit between the mirror and the frame.





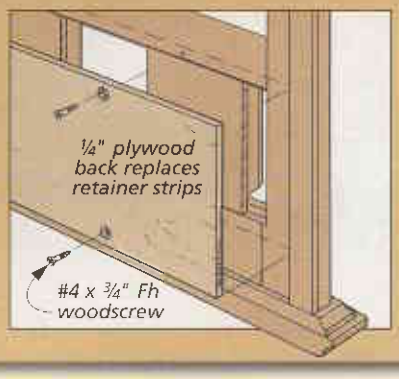


To secure the mirror, I used turn buttons, filling the space behind the mirror with cardboard and posterboard (Fig. 12). You could also use ¼" plywood, but it will scratch the back of the mirror unless something is slid in between them.

Now the metal hooks can be screwed to the blocks, as in Fig. 13. (You can find sources listed on page 35.) Then the frame can be mounted on the wall (Fig. 12b). With the filler strips on the sides, you don't have to drill mortises for the keyhole hangers. And they can be positioned anywhere along the back rail — as long as both hangers line up with the studs in the wall. W

## SOLID HOOK BACK

Instead of an open design (where you can see sections of the wall between the coat hooks), you can build this project with a solid back for the hook blocks, as shown in the photo at left. And it's even less work than the retainer strips. Just cut a piece of ¼" oak plywood to cover the opening and screw it to the back of the frame, as shown in the drawing at right.



# FAST FIXES

*Need to repair a dent, chipout, or a scratch? Check out these quick, project-saving solutions.*

Even now, I'm not sure exactly how it happened. I *thought* the clamp was securely in its holder on the wall. But as my hand let go of it, I realized the clamp was falling. And that it was going to hit the drop-front desk I'd just finished assembling.

It was one of those times when everything slows down, and your muscles just won't respond. As if epoxied to the floor, I stood there watching as the clamp put a long gash into the side of the desk. And nothing puts a scratch into a piece of wood like a five-pound clamp.

Most accidents aren't so drastic, and many projects go together without any mishap. Still, you can expect an accident like this at some point.

Other times, the damage isn't caused by a catastrophe. It's just a "bump" in the building process. Like the chipout that occurs on the last pass around a large glued-up panel.

Then there are those small dents and scratches that seem to appear "mysteriously." It may have been caused by a glob of dried glue that the top of the table was set on. Or a tiny piece of sandpaper grit that did not get cleaned off and then was wiped across the surface.

Fortunately, there's typically a good solution for removing the damage (or at least minimizing it). And remember, people aren't looking for mistakes — sometimes a little camouflaging can go a long way.

In fact, if you do a good job at the repair, you might just find yourself pointing it out to others. After all, you can be as proud of a good repair as a tight joint. Besides, everyone likes to hear "disaster" stories — when they have a happy ending.

## Dents

At the time, a dent can seem like a major disaster. What was a smooth, clean face now has a deep indentation. And of course, if you know the dent is there, your eye will always be drawn to that spot.

You can relax. Most dents can be completely removed or at least minimized a great deal. That's because a dent is just a small area where the wood fibers have been compressed (not broken or severed) by a blunt object, like a clamp.

The trick is to reverse the compression, forcing the wood to swell back to its original level. And the solution comes from an unlikely source — water. Usually I try to keep water away from wood. But here it can be used to force the fibers to expand.

If the dent is a small one, simply place a drop or two of water on it to see if the cells swell back to shape. Sometimes this is all it takes to do the trick.

▲ *With a little steam from a hot iron (see photo at left), the compressed fibers of a dent will swell back into place.*

If this doesn't work or if it's a large dent, you can "help it along" with an iron. To keep the wood from scorching, you'll want to put a damp cotton rag under the iron. (Some synthetic fabrics will melt.) The heat from the iron creates steam that penetrates into the wood, causing it to swell.

Doesn't this raise the grain? Yes. But I take a few precautions to avoid any problems. First I sometimes wet the entire face to raise the grain on the piece. More importantly, you need to be sure to sand the piece to the same grit that the rest of the project has been sanded to.

## Chipout

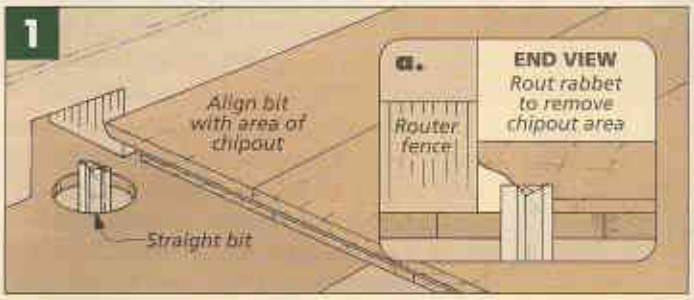
Generally, by the time I start routing a profile along a large panel, there's already been a lot of work that's gone into the piece. Which is why chipout is so frustrating. It can mean a lot of work is ruined. But I've learned that you don't always have to start over.

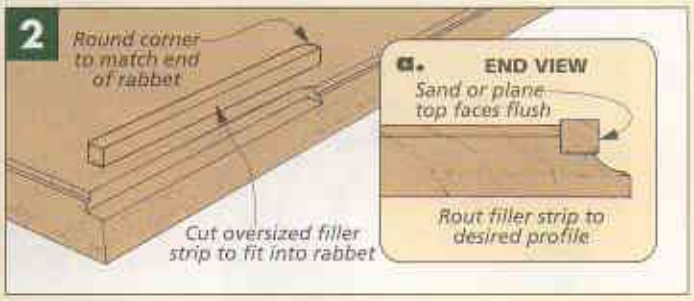
When the chipout is minor, you can sometimes minimize it by sanding it out or by planing the thickness of the entire workpiece. As long as this doesn't affect the joinery, this will often get you by.

When the chipout is a little more extensive, there are still a couple of options. Believe it or not, there have been times when I've actually found the piece that's chipped out and have been able to glue it back into place. But most times, the chip is torn up or sucked into the vacuum.

The last resort is to perform reconstructive surgery. First, to remove the chipout, I use a straight bit in the router table to create a small rabbet, as shown in Fig. 1. This rabbet leaves a straight edge that will accept a filler strip.

To make the filler strip, the important thing is to find a scrap piece that matches the color and grain of the workpiece as closely as possible. I start with the filler strip slightly oversized and glue it into the rabbet (Fig. 2). Now the top surface can be sanded or planed flush, and the original profile can be routed along the edge (Fig. 2a).




## Scratches & Gouges

How many times have you inadvertently dropped a clamp on a project? Or knocked a panel into a sharp corner? Scratches and gouges are probably the most common accidents that occur in the shop. Unfortunately, you can't reverse a scratch or gouge like you can a dent. The wood fibers have been broken or severed, so you have to sand, scrape, or fill the scratch to minimize the damage.

**SAND OR SCRAPE.** The first thing I try to do is sand or scrape the scratch out. Both tools do the same job; the scraper just works a little more quickly than the sandpaper. And although there aren't any special techniques for this process, there are a couple things to keep in mind.

First, even though a scratch is small, you don't want to sand out just the scratch. You can end up with a depression that's still noticeable. Instead, you want to feather out the repair by sanding a much larger area around the scratch.

Second, after you've removed the scratch, you need to make sure to sand the area to the same grit as the rest of the project. Otherwise, it won't accept the stain the same and can end up noticeably different.

**PUTTY.** If I can't sand or scrape out a scratch or gouge, as a last resort I will use putty. Here are two quick tips I use for getting the right color.

First, if you add putty *before* you finish, then you'll want to have a test piece with finish on it to compare it to. (This is especially true if you're planning to stain the project.)

Second, getting a perfect match is nearly impossible. So for darker woods like walnut, I find the patch less noticeable if the putty is a shade darker. And the opposite is true for light woods (like maple). The putty should be slightly lighter. W

### PUTTY TRICK

A little prevention always works better than the best "fix." Once I was filling some nail holes with putty — and smeared the putty around without much thought. But the putty stained lighter than the wood around it, so I was left with large ugly blotches (instead of tiny nail-sized spots). Fortunately, this "accident" can be prevented. Here's how I avoided it on my next project.

▲ *Before picking up the hammer and nails, first apply a strip of masking tape. Then drive and set the nails.*

▲ *Now force putty into the holes and remove the tape. The small "bump" that remains can be sanded away.*

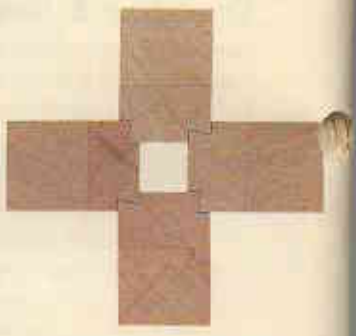
# Craftsman-Style Table Lamp

*To find the secret to building this lamp, you'll have to take a look inside...*

There's a lot more to this lamp than what you can see on the outside. Sure, the four posts that form the column have clean, tapered lines. The small brackets at the top give it an architectural flair, while the curved feet create a sturdy-looking base. And the cherry gives it a rich, elegant feel.

The only problem is that from the outside, there's no way to see the *real* beauty of the lamp — the joinery. But I'll let you in on a little secret. The joint that holds the four posts together is unique — at least it's one I'd never seen before. Plus, it's the perfect joint for creating a wood lamp.

To provide access for the cord, a lamp has to have a channel that runs the length of the column. For this lamp, I did this with the help of a common router bit — a ½" dovetail bit. Half-dovetail profiles are routed along the inside edges of each post. During assembly, these dovetails align the posts automatically, creating a ½"-square opening in the center of the column, as in the cross section photo above.



Okay, I'll admit that this final result does look a little like a wood puzzle. But making this joint couldn't be any simpler. (There's only *one* setup.)

Unfortunately, once the lamp is finished, the joint is completely hidden. So you'll be the only one to know the "secret" of the lamp.

## MATERIALS & SUPPLIES

| | | |
|---|---|---|
| **A** | Posts (4) | 1 x 1½ - 13½ rgh |
| **B** | Brackets (4) | 1 x ⅞ - 4 rgh. |
| **C** | Feet (2) | 1¾ x 1¼ - 8½ |
| **D** | Cap (1) | ½ x 3½ - 3½ |

- (1) Lamp Hardware Kit
- (1) 16"-Long Threaded Lamp Pipe
- (1) Shade (may require different-sized harp)
- (4) Wire Brads
- (4) #8 x 3" Fh Woodscrews

## Column

The heart of this project is the column. It's made up of four identical posts that are joined with the dovetail profile I've already mentioned. But I didn't start on this joint until the rest of the work on the posts was complete. Each is tapered and has a small cove-shaped bracket added to the top, as shown in Fig. 1.

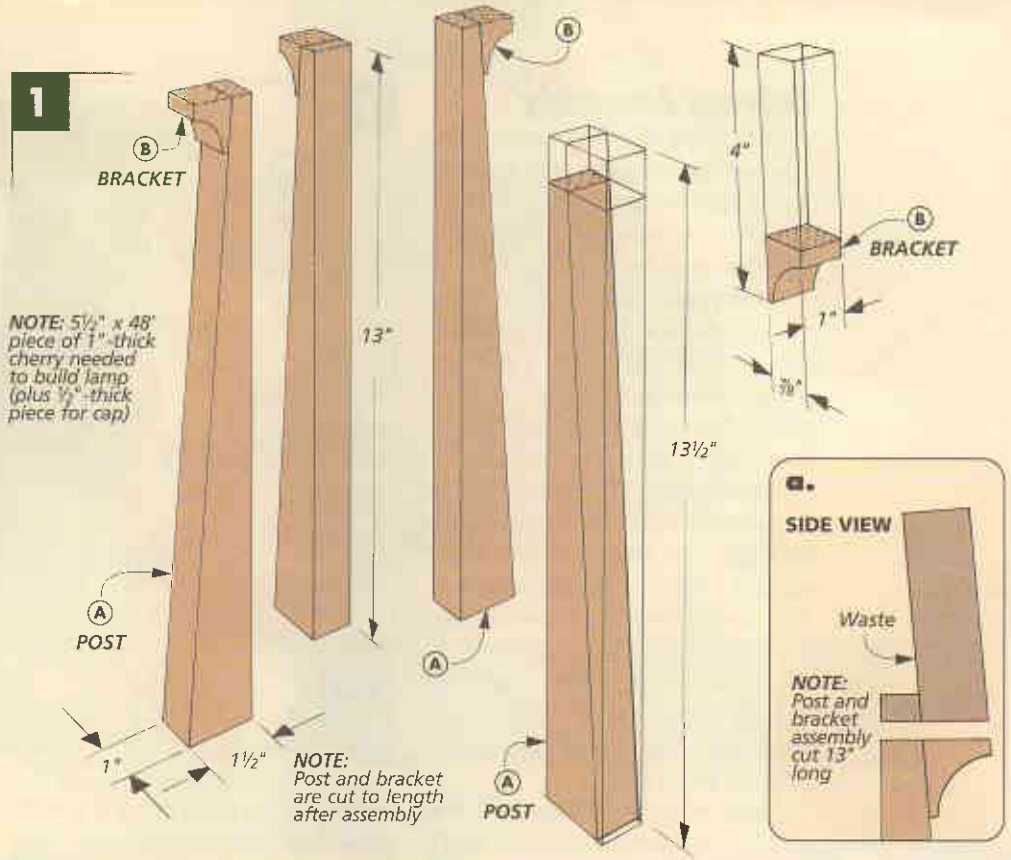
**POSTS.** The first thing to do is cut blanks for the 1"-thick *posts (A)*. I found it easiest to add the brackets if the posts (and brackets) started out extra long. And to make the tapering process a little easier, I cut the post blanks *exactly* 13½" long.

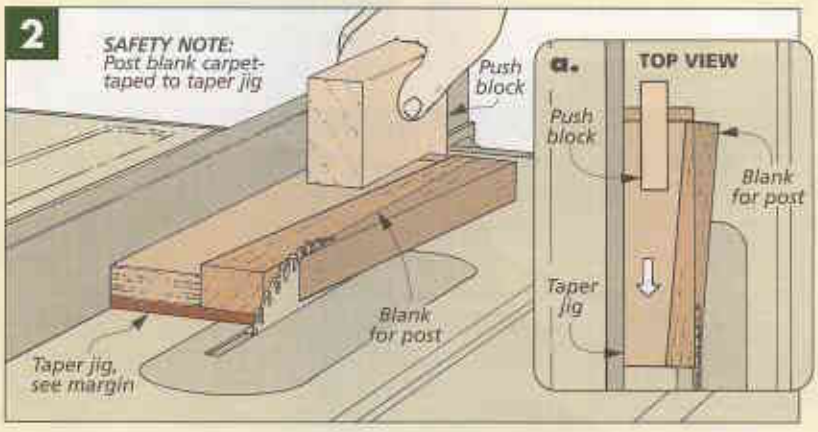
The next step is to taper the posts. Since the posts are short and the taper runs from top to bottom, I wanted more than just an angled guide. Instead, each post rests in a sled that carries the piece across the saw blade, as shown in Fig. 2.

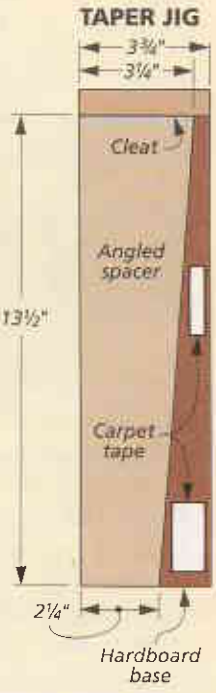
To hold the posts at an angle, I first made an angled spacer with a cleat attached to the back end, as shown in the margin. (The angle can be cut with a band saw or sabre saw.) Then I added a ¼" hardboard base so the posts could be secured to the jig with double-sided tape. This way, the tapers could be cut with my hands safely out of the way.

**BRACKETS.** After the tapers have been cut, the posts can be set aside until the brackets are ready. The blanks for the *brackets (B)* start out extra long (4") just like the posts.

**CUT COVE.** All the brackets require is a cove on one end. First draw a ¾" radius on each blank and rough out the curve with a band saw (Fig. 3a). An easy way to sand up to the lines is to use a 1½"-dia. drum sander mounted in a drill press (Fig. 3).

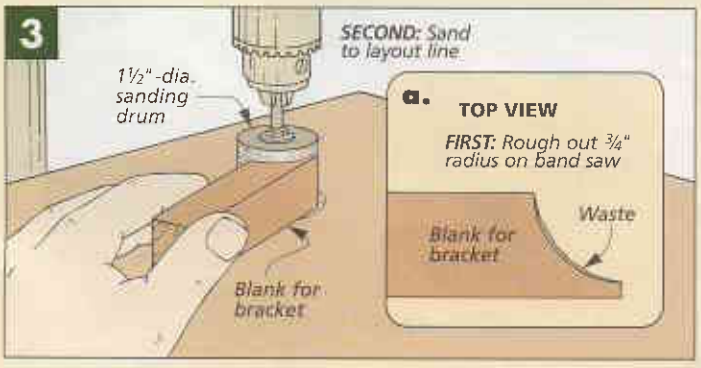


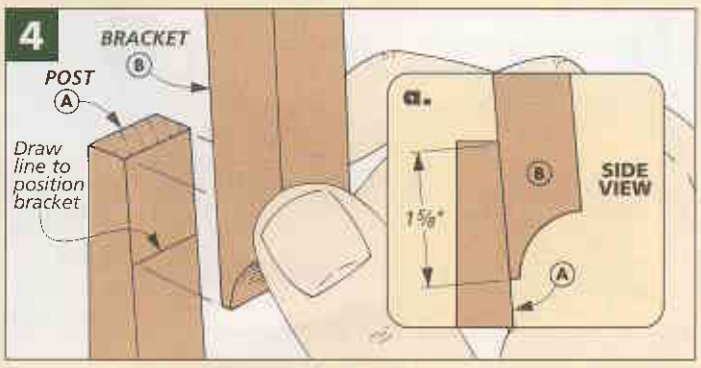




**ATTACH BRACKETS.** Now the brackets can be glued to the posts. I found it easiest to do this without clamps. Just draw a line across the post as shown in Fig. 4, and glue the bracket flush with the line, holding it tight for a minute until the glue sets.

**CUT TO LENGTH.** The last thing to do before working on the dovetails is to trim the top end of each post. And to make sure all four ended up exactly the same length (13"), I clamped a stop block to an auxiliary fence attached to the miter gauge.



## Column Assembly

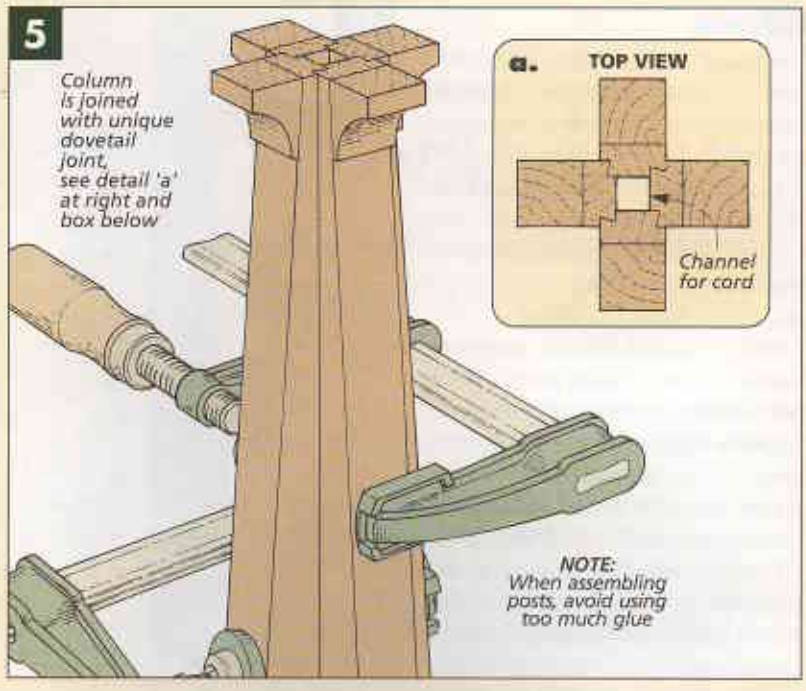
At this point, the posts have been tapered, the brackets glued in place, and the pieces cut to length. All that's left now is to rout the dovetail joint and then glue the posts together.

**CUT DOVETAIL JOINT.** Let me reassure you that there's nothing tricky about this dovetail joint. There's just one simple setup, and the procedure is nearly foolproof. But you can read more about that in the box below.

**ASSEMBLE JOINT.** When you've got all the dovetails routed on the posts, you can glue them together into a column. There really isn't much to this. Even though this dovetail joint looks like a wood puzzle, all four pieces will align automatically. So assembling the column is just a matter of applying a couple clamps, as you can see in Fig. 5.

There *are* some things to watch out for, however. First of all, you'll want to avoid using too much glue. Any excess glue that squeezes out on the inside corners of the column will be hard to clean out. (Or easy to miss altogether — until you're wiping on the finish.) To avoid this, I applied glue to just the very inside corners of each post.

Also, as you apply the clamping pressure, make sure the ends of the posts stay flush. I did this by pressing the assembly down on a flat surface (the top of my table saw).




## LAMP COLUMN DOVETAIL JOINT

This dovetail joint looks a bit confusing, but it is much easier to make than it looks. After all, even though the corners on each post end up looking different, there's just one setup. And when you put it together, the pieces align automatically, forming a perfect ½"-square opening in the center, as you can see in Fig. 5a above.

**SET DOVETAIL BIT.** The first thing to do is set up the dovetail bit. Its height should be ¼" above the router table. And the bit should stick past the fence 5/32". (If you can't get it exact, you'll want the setting a hair *less* than 5/32".)

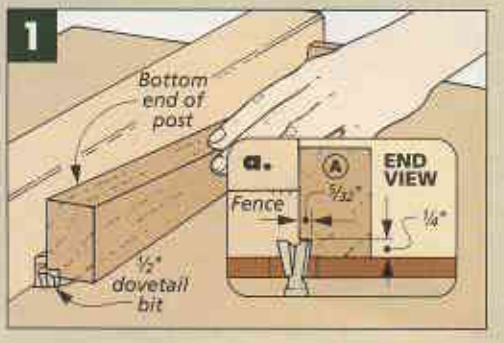
**CUT DOVETAILS.** With the bit set up, the dovetails can be routed on the inside edges of the posts. The thing you want to avoid here is chipout. So with each pass, I fed the posts across the bit at a snail's pace.

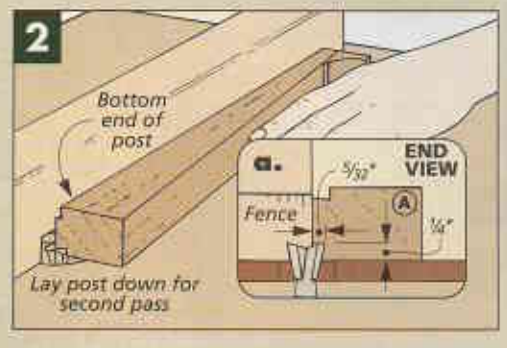
For the first pass, set each post on edge, running the bottom end across the bit first, as shown below in Fig. 1.

The second profile is routed on each post with the piece facedown on the table (Fig. 2). Again, orient the piece so the bottom end of the post is routed first.

**TEST FIT.** When all four posts are routed, put them together to test the fit, as shown in the photo below. What you're looking for here is to see if the posts line up directly across from each other. (I used a square to do this.)

If the posts do line up, then they're ready to be assembled (Fig. 5 above). If not, you'll want to nudge the fence over a hair to expose a little more of the bit. Then make another pass on each edge.




*A square will quickly show you whether the posts line up across from each other.*

## Base

With the column glued together, I began work on the base of the lamp (Fig. 6). It's just a couple of foot pieces that interlock with a half lap joint.

**GLUE UP BLANKS.** The blank for each *foot (C)* ends up 1¾"-thick, but you can use the same 1"-thick stock that was used to build the posts. An easy way to do this is to glue two 1¼"-wide pieces together for each foot blank. Then rip ¼" off the bottom edge of each, as indicated in Fig. 6a.

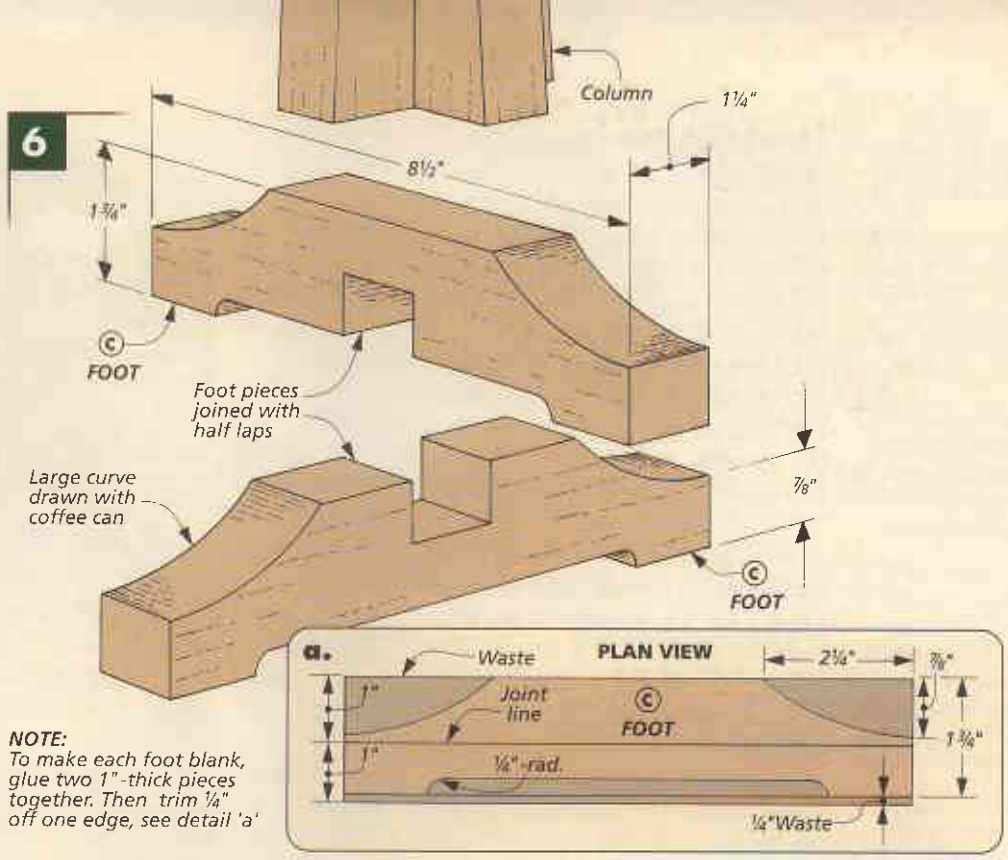
**CREATE FOOT PROFILE.** When the blanks have been cut to finished length, the next step is to create the "pads" for the feet. By clamping the two blanks together, you can drill a ½"-dia. starter hole right on the "joint" line, as shown in Fig. 7. This way, there will be a perfect ¼"-rad. at each end of the profile.

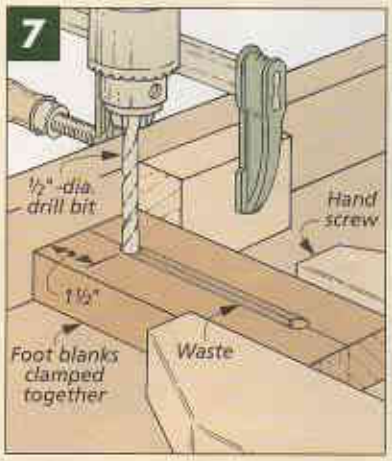
To remove the waste between the starter holes, I used the router table with a straight bit (Figs. 8 and 8a). (To help you "see," you'll need to mark the position of the bit on the router fence.) Working in light passes, feed the blank from one hole to the other. However to remove all the waste, you'll need to flip the blanks over and make another pass.

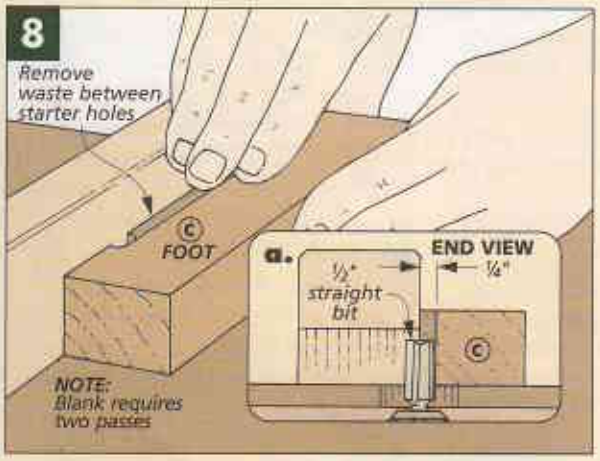
**HALF LAPS.** Next I cut the half laps that join the two blanks together. Because of the foot profile, you can't cut both notches with the same setup. The first half lap is cut on the *bottom* of the piece, so the dado blade needs to be set 1" high (Figs. 9 and 9a). You can center the notch automatically, by flipping it between passes. But sneak up on its final width so the two foot pieces fit together snug. (The rip fence can be used as a stop, and its final setting will work for both foot blanks.)

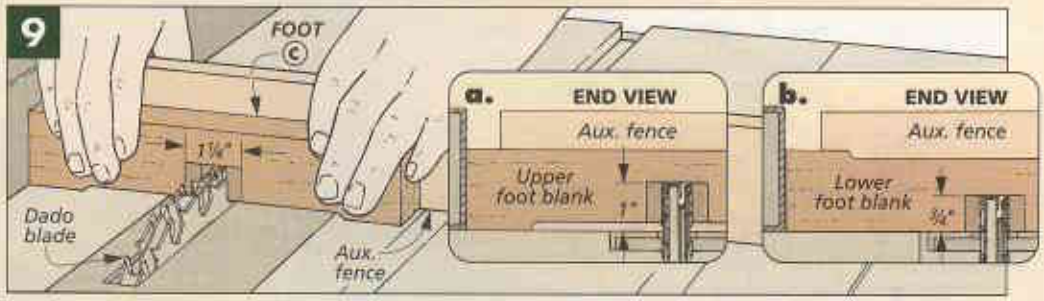
The second half lap is cut on the *top* of the other foot blank. This time the blade will end up ¾" high. But sneak up on the final height of the blade until the blanks fit together so their top edges are flush.

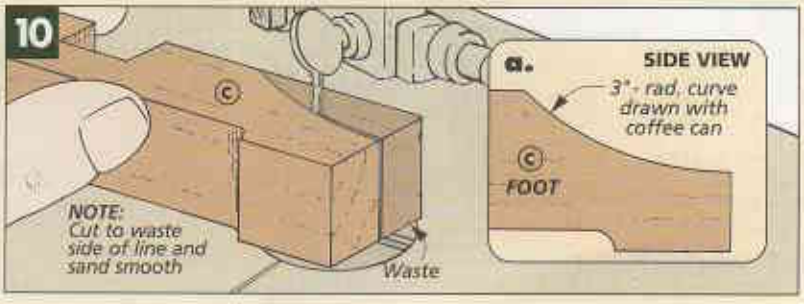
The last thing to do before gluing the base together is to lay out and cut the curve on the top of each blank (Fig. 10). The radius of this curve is 3", so a large coffee can works great as a template.



## Final Assembly

At this point, both the column and the base are ready to be attached, as shown at the bottom of the drawing at right. Then before adding the lamp hardware, a simple cap will be added to the top of the column.

**COLUMN & BASE ASSEMBLY.** The base and column are attached with glue and long woodscrews, as shown in the drawing and detail 'b.' While you're drilling the shank holes for these screws, you can also drill a counterbored hole for the lamp pipe that feeds the cord through the column. (The counterbore hides the lock nut at the bottom.)

After the holes have been drilled, the base can be attached to the column. I first spot glued the base, centering the column so there was an equal shoulder on each side. Then the long screws can be added.

**CAP.** The last piece to work on is a ½"-thick *cap (D)* at the top of the column. There's no profile or joinery here. But to help position this piece when gluing it in place, I used brads with the heads snipped off.

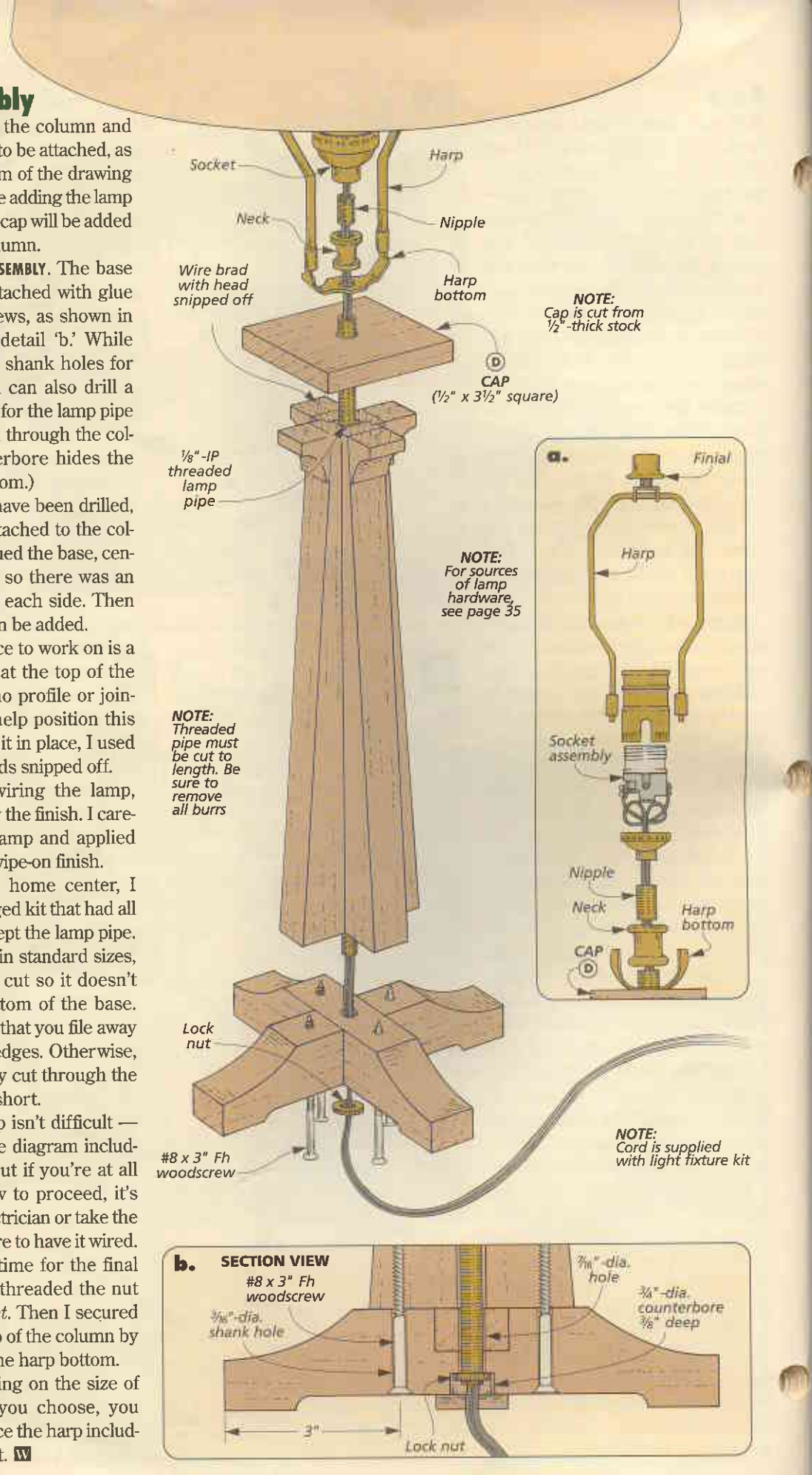
**FINISH.** Before wiring the lamp, you'll want to apply the finish. I carefully sanded the lamp and applied several coats of a wipe-on finish.

**WIRE LAMP.** At a home center, I found a pre-packaged kit that had all the hardware, except the lamp pipe. Lamp pipes come in standard sizes, so it'll need to be cut so it doesn't stick past the bottom of the base. And it's important that you file away any burrs on the edges. Otherwise, they can eventually cut through the cord and create a short.

Wiring the lamp isn't difficult — there was a simple diagram included with the kit. But if you're at all unsure about how to proceed, it's best to hire an electrician or take the lamp to a lamp store to have it wired.

Also when it's time for the final lamp assembly, I threaded the nut on the bottom *first*. Then I secured the lamp at the top of the column by tightening down the harp bottom.

Finally, depending on the size of the lamp shade you choose, you may need to replace the harp included in your lamp kit. W



# SOURCES

Most of the hardware and supplies you need to build the projects in this issue are available from local hardware stores, woodworking stores, home centers, or from the mail order sources listed at right. To find out exactly what supplies are needed for a project, check out the detailed list included in each article.

### WORKBENCH & STORAGE UNITS

Much of the hardware for the workbench and its storage units is quite common and can be found at your local hardware store or home center. You should be able to find the screws, nails, washers, bolts, shelf pins, hinges, and magnetic catches. The pulls are 4⅞" pulls made by *Stanley*, model number SP479. We chose black to match the color of the drawer slides and vise, but the pulls are also made in zinc (silver color) and bronze.

Some of the items you may need to order are the vise, drawer slides, and the bench dogs and holddowns. Check the companies listed at right. We selected a *Jorgensen* vise (4" x 10"), Model 41012. The 20" full-extension drawer slides we used are made by *Accu-ride*. And the bench dogs, holddowns, and *Wonder Pups* are made by *Veritas*.

### COAT RACK

For the most part, the hardware for the coat rack is readily available. The screws, turnbuttons, and keyhole hangers can be found at most hardware stores. Or you can check for them at a framing shop.

When it comes to the coat hooks, there are a lot of choices. You can find a pretty good selection at larger hardware stores and home centers. But for an even bigger variety, look through the catalogs of the companies listed at right. You'll find dozens to choose from. The hooks we used are a Mission-style double hook in burnished bronze from *Woodcraft*. The part number is 123877.

**MIRROR.** The mirror will need to be ordered from a local glass shop. When you measure for your mirror, measure the inside dimensions of the frame, including the width of the rabbets. Then subtract ¼" from each measurement to allow for a ⅛" gap around each side of the mirror. We ordered ours with a 1" bevel around the edges.

The corrugated cardboard and posterboard that hold the mirror in place can be purchased at an office supply store or an art supply store. You can even cut a section of corrugated cardboard from an old box if you have one large enough.

### LAMP

One of the nice things about the Craftsman-style table lamp on page 30 is that your choices in shades is almost endless. But one thing you should be aware of is that the size of the harp (the wire frame that the shade attaches to) depends on the size of the shade you select. (I found this out the hard way.) So find the shade you like first, then buy a harp to fit it.

Home centers and some hardware stores carry lamp kits with the hardware you'll need. These kits usually include a length of cord with a plug, a bulb socket, and harp. The lamp rod is not always sold as part of a kit, but I found several lengths right next to the lamp kits at the home center. The rod is threaded from top to bottom so it can be cut to whatever length you need.

These items can also be purchased separately at full-service lamp and lighting stores and some electrical supply companies. If you want a bulb socket with a built-in dimmer switch or one that's meant for use with a three-way light bulb, these stores may be your best route.

Many of these supplies and accessories are also available from the mail order sources at right.



## MAIL ORDER SOURCES

*Similar project supplies and hardware may be ordered from the following companies:*

**Constantine's**
**800-223-8087**
**www.constantines.com**
*Drawer slides, Veritas bench dogs, Coat hooks*

**Lee Valley**
**800-871-8158**
**www.leevalley.com**
*Bench dogs, Wonder Pups, Veritas holddowns, Vises, Shelf pins, Drawer slides, Coat hooks, Lamp hardware*

**Rockler Woodworking**
**800-279-4441**
**www.rockler.com**
*Drawer slides, Shelf pins, Veritas bench dogs, Wonder Pups, Vises*

**VanDyke's Restorers**
**800-558-1234**
**www.vandykes.com**
*Coat hooks, Lamp hardware & shades*

**Woodcraft**
**800-225-1153**
**www.woodcraft.com**
*Drawer slides, Shelf pins, Vises, Veritas bench dogs, Wonder Pups, Coat hooks*

**Woodworker's Supply**
**800-645-9292**
*Shelf pins, Bench vises, Drawer slides*

# Final Details

▲ **Heavy-Duty Workbench.** *Modern materials meet traditional construction in this bedrock-solid bench. Three storage options include slide-in cabinets that can hold a shopful of tools. Step-by-step instructions begin on page 6.*

▲ **Hall Mirror & Coat Rack.** *Here's a classic looking project with a twist — hooks that slide. Now you can always find room for another bulky coat. Instructions begin on page 22.*

**Craftsman-Style Lamp.** ► *The elegant, simple lines of this project hide a secret on the inside — an easy-to-make dovetail joint you've probably never seen before. Find out how it works beginning on page 30.*