The Woodworker's Journal
Vol. 15, No. 3 $3.95 (Canada $4.50)

Hollow Chisel Mortising
With Your Drill Press

- Mess-Free Finishing
- Resawing
- 2 Inlay Techniques

Tool Review:
Low-Cost Dust Collection Systems

0 73361 64856 3 05

Plus 8 Project Plans: **Eli Terry Shelf Clock • Oak Music Stand Pennsylvania Small Chest • Toy • Pierced Tin Spice Cabinet Router Storage Cabinet • Adirondack Rocker • Coin Bank**

May/June 1991

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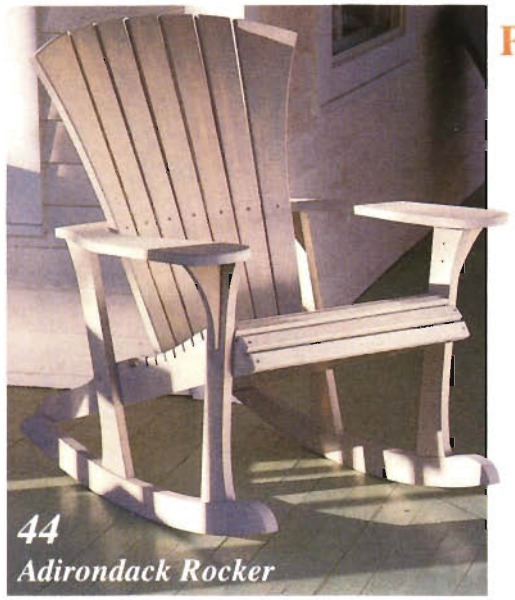

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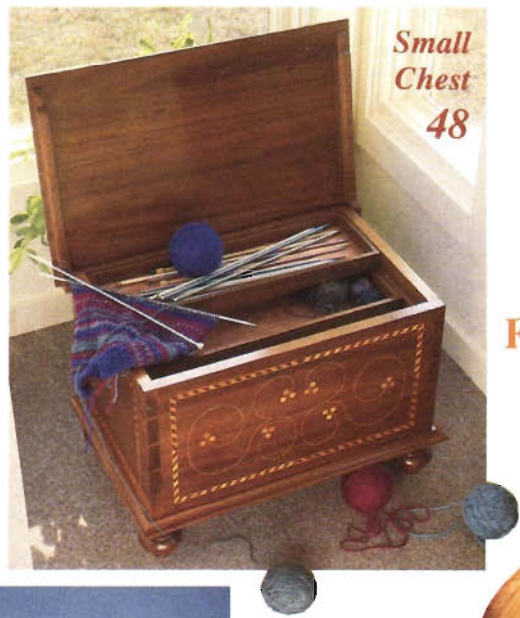

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Shoptalk

In those sad and anxious days immediately after the assassination of President Kennedy, I numbly retreated to my basement workshop where I spent that long weekend building a hooded cradle. I've never felt comfortable working with power tools while upset, so I elected to use only hand tools.

Within a short time I became totally absorbed in those traditional procedures necessary to square up, plane true and dimension the pine stock. One sometimes needs the comfort of a logical routine in a suddenly illogical world. Building that little cradle in a tranquil environment helped me to cope with a distressing situation that otherwise was beyond my control.

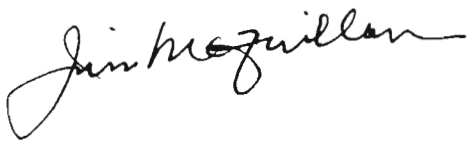
A couple of days into the Persian Gulf war, I finally turned off the TV which had held me captive and went out to the garage shop. It was a tactical withdrawal from the anxiety induced by wailing air raid sirens and the endless speculations of war correspondents and military experts. This time the project was a special case for holding pre-rigged lures for tarpon fishing. A few hours of woodworking didn't transform me into Mr. Sunshine, but it did help get me out of a dismal slump.

We don't often dwell on the psychological benefits of woodworking but they are real and substantial. There are times when it seems that, as individuals, we have little control over our own destinies. That's when the sense of self-sufficiency that woodworking engenders is of real value in revitalizing our spiritual batteries.

For most of us, 1991 began as a worrisome year, but now the war has ended and perhaps the economy will soon start its inevitable upswing . . . and it's spring, which is always a new beginning. In this spring issue we've got a great line-up of projects and articles that I hope will jump-start your own batteries if they've run down over the course of this winter.

* * *

My thanks to all those who took the time to complete the survey card from the January/February issue. We were pleasantly surprised by the number of responses. You've been a real help in determining how we can best serve the needs of all readers. And speaking of needs, one of the most requested projects lately has been a gun cabinet. I'm happy to announce that we now have one almost completed and it's slated for the September/October issue this year.



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Letters

I'm making the Christmas Angel Folk Carving that was featured in your November/December 1990 issue, but I'm not sure how to carve the eye. Also, can you tell me if the angel is carved on both sides of the board, or just one.

Steve Gruber
Spring Hill, Fla.

Rick Butz replies: *I used a 6 mm no. 11 gouge to make a shallow rounded notch where the eye will be located as shown in (Photo 13). Then, I used a 3 mm no. 12 V-gouge to carve a shallow line for both the upper and lower eyelids, as shown in photo 15. The space between these cuts was painted white—to indicate the eyeball—then a small dot of blue was painted in the center to show the pupil.*

For this project, I carved just one side of the wood because it was intended to be hung against a wall. However, you could paint and carve both sides if you choose.

With the onset of colder weather, my jointer developed a vibration on startup. After some investigation, the fault was traced to the drive belt. It seemed that when the jointer went unused for several days in the cold shop, the drive belt would stiffen. Since the drive belt goes around a small pully, the belt tended to maintain some of that bend—even after the machine started up. After the machine ran for a few minutes, the belt warmed up and became more pliable, and the vibration would disappear.

To solve the problem, I replaced the solid V-belt with a notched type V-belt. Not only did the startup vibration cease, the new belt resulted in .08 amps less motor current. And since the notches conform better to the pully diameter, it's less likely to slip. You can find these belts at industrial bearing and transmission supply houses.

Peter J. Bertini
Somers, Conn.

I've heard there is a source for ready-made Queen Ann legs. Any idea where they can be found?

John Williams
Sacramento, Calif.

Adams Wood Products, 974 Forest Drive, Morristown, TN 37814; tel. (615) 587-2942, sells Queen Ann style legs made from walnut, mahogany, cherry or oak. A variety of sizes and shapes are available.

I've been unable to find hardware for making an old-fashioned hoosier cabinet. Do you know of a source?

M. F. Kelly
Sacramento, Calif.

Various hoosier cabinet parts, including the flour bin, sifter bowl, and brackets, are available from the Van Dyke Supply Company, 4th Avenue and

6th Street, P.O. Box 278, Woonsocket, SD 57385; tel. (605) 796-4425.

I made the Perpetual Calendar project from your November/December 1990 issue and it turned out beautifully. I made a slight change, though, and I thought some of your readers might find it of interest.

I cut seven plywood disks—one for each of my grandchildren—with the disks measuring 1 5/8 in. diameter by 1/4 in. thick. I glued a picture of each grandchild to one side of each disk. Then, I cut seven 5/8 in. diameter by 5/8 in. long dowel pins and glued one end of each pin to a disk and the other end to a mount (part H in the drawing). Now, when a grandchild's birthdate comes up, I eliminate the date mount and substitute the "birthday kid" mount.

Robert O. Wendel
Marlboro, N.J.

I would like to see more jigs, fixtures, and woodworking shop ideas. The Clamp Rack project in your January/February 1991 issue was a real good idea. I've already made one. Keep them coming.

Don Greenfield
Crofton, KY

Odds and Ends

Readers in and around San Diego, California, may be interested to learn of The San Diego Fine Woodworkers' Association. If you think you might like to join the more than 600 club members, write to the Association at P.O. Box 99656, San Diego, CA 92169.

The Alaska Creative Woodworkers Association meets regularly through the year. For membership information write to: A.C.W.A., P.O. Box 201796, Anchorage, AK 99520-1796; tel. (907) 345-8135.

The Central Texas Woodcarvers get together on the second Tuesday of each month at Paxton's Beautiful Woods, 3907 South Industrial Drive in Austin, Texas. Meeting time is 7:30 p.m.

In Middletown, Ohio, the Miami Valley Woodcarver's Club meets on the second Tuesday of each month at the St. Paul's church on Broad Street.

*We welcome opinions and comments (both pro and con) from our readers. Address correspondence to: Letters Department, **The Woodworker's Journal,** P.O. Box 1629, New Milford, CT 06776.*

Readers' Information Exchange

Looking for an owner's manual for an old band saw? Need a bearing for a hand-me-down table saw? Can't find a source of supply for an odd piece of hardware? Maybe our readers can help. Send along your request and we'll try to list it here—and perhaps one of our readers will have an answer for you. Due to space limitations, we'll be unable to list all requests, but we'll include as many as possible.

I have a scroll saw that I understand has been around for a while. The numbers on it are NPN 62D 413 6CW, Rockwell Mfg. Co., Milwaukee, Wis; Ser. 29-7906. Can anyone tell me where to go for parts and service for this unit?

John R. Doss
246 Albright Lane
Gallatin, TN 37066

I inherited some tools from my grandfather and I need an owner's manual and parts list for them. One is a Sears Craftsman jigsaw (no model number, but it has a 24 in. neck and it's approximately 30 years old). Second, a Craftsman band saw, model no. 103-24280. I also need a fence for a 30-year-old Craftsman 6 in. jointer/planer.

Larry Lowery
5861 Hunter's Court
Milford, OH 45150

I have a model 72 Sunbeam circular saw and cannot find a replacement blade due to the oval center hole. It's a 6½ in. blade and I need a crosscut blade 72-5683 and a planer blade 72-5684. Can anyone tell me where to purchase these blades?

Dale Wax
849 E. Water St.
Woodville, OH 43469

I have a Power King band saw, model no. 912, serial no. 5995, made in Warsaw, Indiana, and am in need of the upper drive pulley B12A-12. I'm unable to find out where Power King moved to or if they're out of business.

R.E. Bayer
32 Duncott Rd.
Fairport, NY 14450

Events

We will gladly list as many events of interest to woodworkers as space permits. Listings are free and may include shows, fairs, competitions, workshops and demonstrations. The deadline is eight weeks before publication—May 1 for the July/August issue. Please address announcements to the Events department. Readers planning on attending events should call ahead if possible. Scheduled dates and locations sometimes change between publication and the date of the event.

California: The Woodworking Shows, Southern California, May 3–5, Pasadena Center, Pasadena. For information, call 1-800-826-8257.

"Design in Wood" show sponsored by The San Diego Fine Woodworkers' Association, June 18–July 7, Del Mar Fair, San Diego. For information, call (619) 563-5894.

Colorado: For information on the Anderson Ranch Arts Center 1991 woodworking workshops, write to P.O. Box 5598, Snowmass Village, CO 81615, or call (303) 923-3181.

Connecticut: Brookfield Craft Center workshops: Turning Between Centers, May 4–5; Bandsaw Techniques, May 18. For information, call (203) 775-4526.

The deadline for slide submissions for the 23rd Annual Celebration of American Crafts, sponsored by the Creative Arts Workshop, is June 15. For prospectus, send SASE to The Celebration, Creative Arts Workshop, 80 Audubon St., New Haven, CT 06510; tel. (203) 562-4927.

Iowa: 25th Annual International Woodcarving Congress, June 20–23, Putnam Museum, Davenport. For information, call (319) 359-9684.

Kentucky: Woodturning and joinery workshops. Contact Jim Hall (606) 986-8083.

Massachusetts: 21st Annual May Craft Fair, Worcester Center for Crafts, May 17–19, Worcester. For info, call (508) 753-8183.

Minnesota: ACC Craft Fair, May 10–12, Minneapolis Convention Center, Minneapolis. For information, call 1-800-836-3470.

North Carolina: For information on Country Workshops' spring and summer woodworking classes, contact Drew Langsner at Country Workshops, 90 Mill Creek Rd., Marshall, NC 28753; tel. (704) 656-2280.

Oregon: For information on workshops at the Oregon School of Arts and Crafts, write to the school at 8245 SW Barnes Rd., Portland, OR 97225, or call (503) 297-5544.

Tennessee: Entry deadline for the national juried exhibition "From All Directions" sponsored by the Arrowmont School of Arts and Crafts is July 6. For a prospectus write to the Arrowmont School of Arts and Crafts, P.O. Box 567, Gatlinburg, TN 37738 or call (615) 436-5860.

Texas: 5th Annual Symposium, The American Association of Woodturners, June 14–16, North Texas State University, Denton. For information, call (612) 484-9094.

Vermont: For a schedule of summer woodworking classes at the Yestermorrow Design/Build School, write to P.O. Box 76A, Warren, VT 05674 or call (802) 496-5545.

Washington: Whatcom Museum of History and Art, "From the Woods" exhibition, May 25–Aug. 18, Bellingham. For information, call (206) 676-6981.

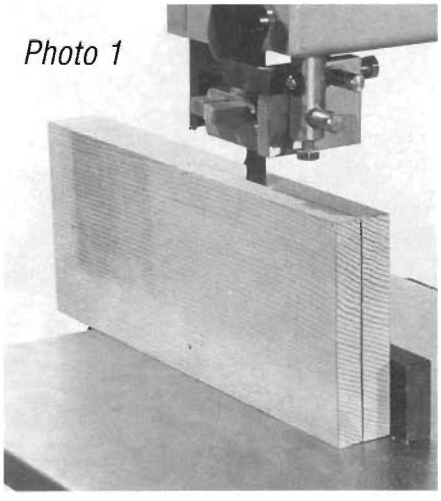
Wisconsin: Furniture Restoration Workshop, Minuteman Institute, Waterloo. Free 2-day workshop. For information, call 1-800-733-1776.

Resawing:

How to Get Thin Boards from Thick Stock

by R.J. DeCristoforo

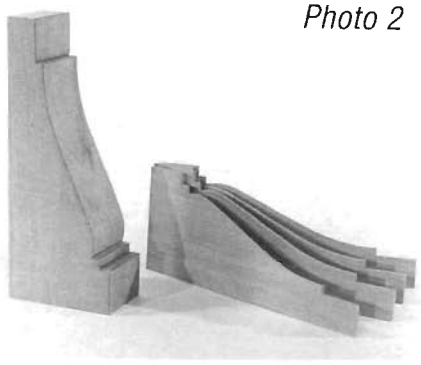
Photo 1



Additional ripping of lumber to reduce its thickness or to produce boards that are thinner than the parent stock is called resawing (Photo 1). Most times, the application is described as ripping thick boards into thinner ones, but since any job of sawing again is resawing, the application has a broader scope. With correct techniques, and sometimes with a special jig or work holder, the application can, for example, be used to halve a round, or a turning, or to produce multiple, similar units from a preshaped blank (Photo 2).

Since resawing is usually done on wide material, the band saw is justifiably

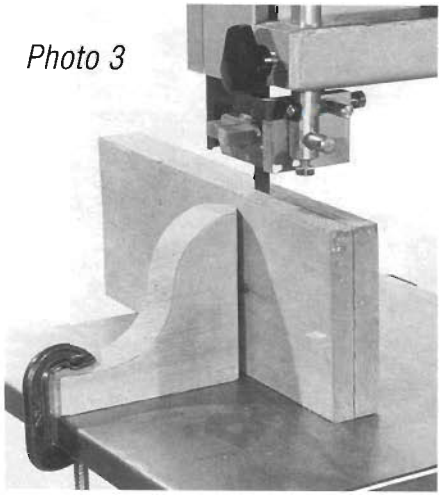
Photo 2

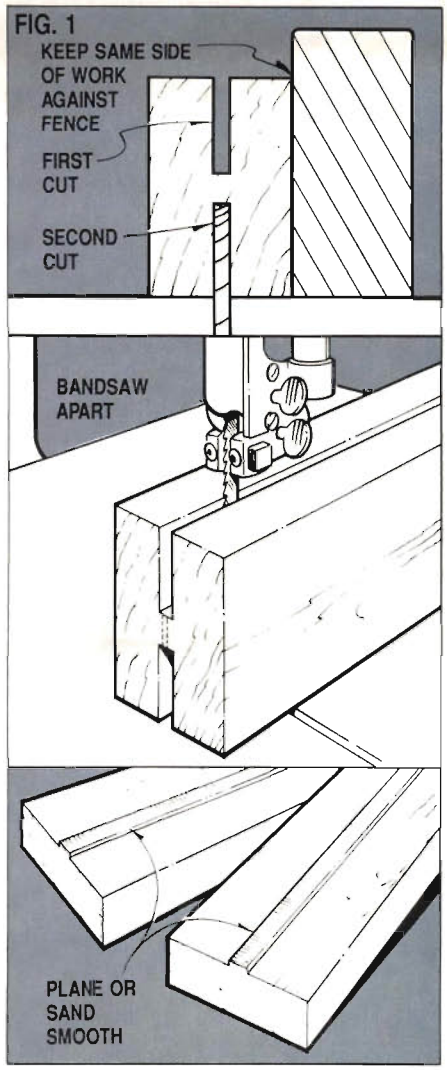


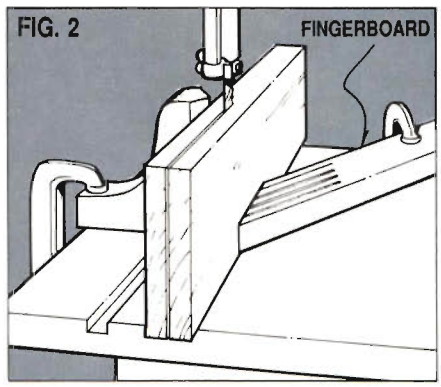
touted as the tool to use. It cuts fast, has greater depth of cut than other machines, and does the work with reasonable power requirements. Despite these factors, a prevailing procedure is to relieve the band saw of the total job by first kerfing the stock on a table saw (Fig. 1). Make the first cut slightly less than one-half the stock's width, then flip the stock over and make a second pass. For safety's sake, use the band saw to complete the cut—don't use the table saw. As shown, a thin strip of rough material will remain. It can be smoothed with a hand plane or sandpaper.

Resawing on the band saw is most efficient when a special guide or a fence is used to help maintain the correct relationship between work and blade. A recommended guide is the pivot-type that is shown in Photo 3. The guide is

Photo 3



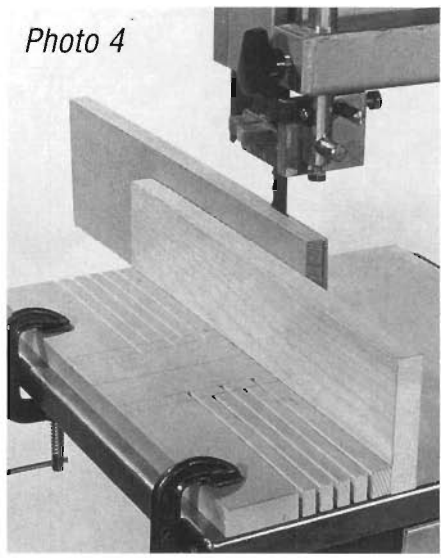




clamped to the table so its rounded edge is opposite the leading edge of the blade; its distance from the blade determines the thickness of the part being sawed. The purpose of the guide's rounded edge is to allow some flexibility when feeding the stock. In practice, assuming you are right-handed, the left hand is used to hold the relationship between work and guide while the right hand moves the material forward. The idea allows a degree of pivoting action so you can compensate for any lead that the blade may have. Pencil-marking the cut-line will provide a visual guide, but with a little practice you will be able to gauge the line by eye alone.

Although the band saw cuts fairly fast, it's still a good idea to start with a slow feed until you are sure the work is going correctly. Then you can feed more quickly, allowing the blade to cut as fast as it will.

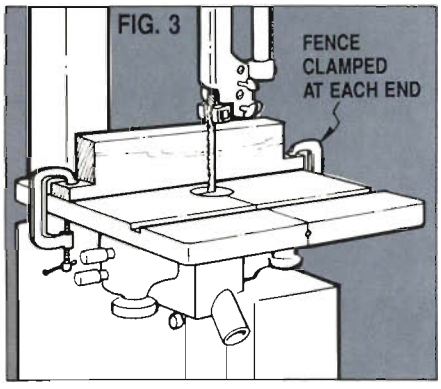
You can use a homemade fingerboard, or springboard as they are sometimes called, for help when using the pivot guide (fig. 2). This will eliminate using your left hand to keep the work in place so both hands can be used for feeding the stock. Clamp the fingerboard so its pressure point is in line with the teeth of the blade. A fingerboard with a slightly rounded end enables you to have a specific pressure point. If the pressure point is placed behind the blade, it will tend to close the kerf. If you use the pressure in front of the blade, it may push the work out of line.



Another type of fingerboard is shown in use in Photo 4. This design incorporates a kerfed base with a high fence that is secured to the base at its midpoint. The kerfs supply some spring action that allows a moderate amount of flexibility so feed can be adjusted for any blade-lead. An excellent way to work is to

make two of these, using one on each side of the work. This idea is helpful when doing production resawing.

Resawing with a straight fence is a common practice, but one that does not allow compensation for lead. A regular fence, if one is available for the machine, can be used, preferably with an attached, high, wood facing. If a standard fence is lacking, it's a simple matter to supply



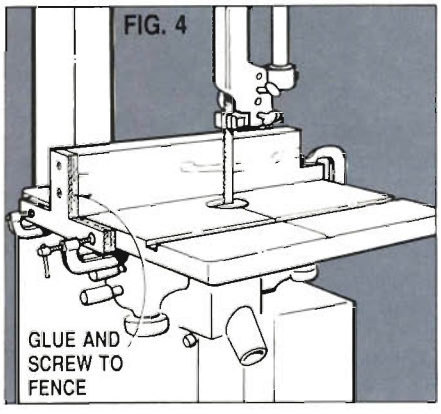
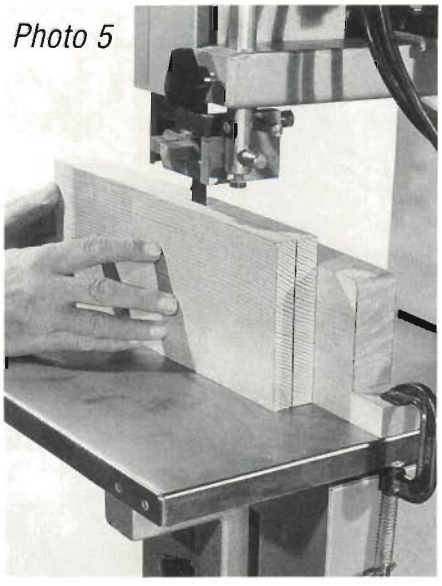


Photo 5

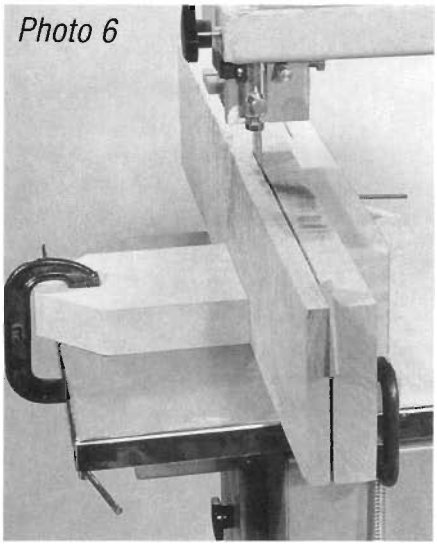


one along the lines demonstrated in Photo 5 and detailed in Fig. 3. Additional help for guiding the work can be supplied with a guideblock clamped to the table as shown in Photo 6. Also note in the same photograph that a wooden shim is used in the kerf to keep it from closing and binding the blade. Fig. 4 suggests another way that an auxiliary wooden fence can be made and secured to the machine.

Blade Talk

The ideal blade for resawing is the widest one the machine can handle. On the average band saw this means working with a 1/2 in. or 3/4 in. blade. A wide

Photo 6



blade has a lot of backup behind the teeth, and that makes it easier than a narrow blade to follow a straight line. A minimum of teeth per inch with maximum set will help ensure that the blade will cut without clogging. Skip-tooth or hook-tooth blades, with preferably not more than three or four teeth per inch, work well. Since softwoods are more likely to clog the blade than hardwoods, we recommend a hook-tooth blade with no more than three teeth per inch for them. In all cases, a generous amount of set is fairly essential.

The question of which blade is best for resawing often poses a dilemma. Few teeth and heavy set means rough cuts. Generally, this is accepted, but suppose you would appreciate a little more smoothness? Well, as I often do, ignore

the general rule and try a narrower blade with less set. To minimize if not eliminate the clogging potential, use a wooden shim to keep the kerf open as soon as the work passes the blade. Take it easy with the feed-rate; let the blade cut at its own pace. Keep in mind that a narrow blade, especially on wide stock, might bow in the cut. This produces a slightly convex surface, but the deviation is often slight enough so it can be removed with some sanding.

Finally, if you are resawing comparatively narrow stock on the band saw, you can usually work efficiently and with smooth results by using a narrow blade with little set.

Today, of course, in addition to the size blade you select, you have the option of using a bi-metal or carbide-tipped blade. For more on this, see "Bi-metal and Carbide-tipped Blades: Are They Really Better?"

Sources

Woodworker's Supply
5604 Alameda Place, NE
Albuquerque, NM 87113
Tel. 1-800-645-9292
For regular, bi-metal, carbide-impregnated and carbide bandsaw blades; blade-saver blocks

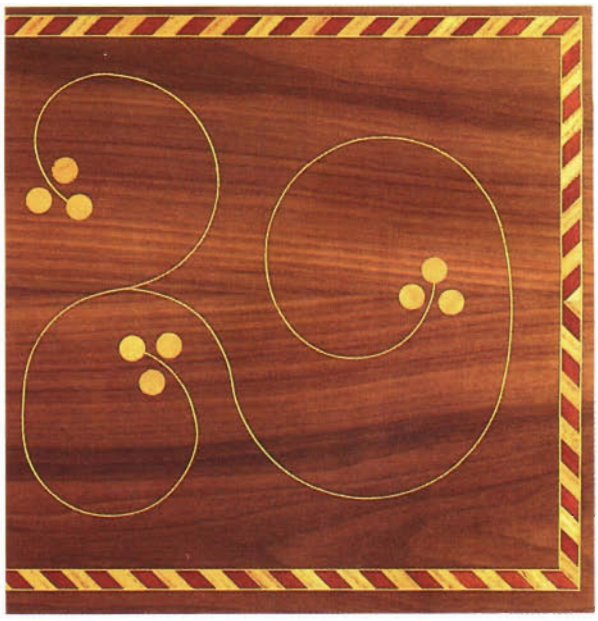
Trend-lines
375 Beacham St.
Chelsea, MA 02150
Tel. 1-800-767-9999
For regular, bi-metal and carbide-impregnated band saw blades

Bi-Metal & Carbide-Tipped:
Are They Really Better?

In addition to your regular band saw blades, several other versions are available. Bi-metal blades aren't new, but their special cobalt high-speed steel teeth, welded with an electron beam to a heat-treated carbon alloy steel back, are an option to consider. The teeth can withstand heat to 1,200°F, where most carbon steel dulls at a little over 400°F. Since resawing builds up a lot of heat, the advantage is obvious. The newer carbide-tipped resaw blades use a solid carbide tip, and a still newer version, touted as a wood saver blade, uses a carbide-impregnated tooth for longer life. Impregnating the blade with carbide enables a thin kerf of only .046 inches, making this blade especially good for costly hardwoods.The carbide and carbide-impregnated blades are touted as being specifically designed for resawing.

Your choice for a resaw blade—at least dollar-wise—can be likened to the choice between a Volkswagen, a Ford, an Acura and a Mercedes. But I'd make a decision based on the amount of resaw work you plan on doing. Where your basic $10 three-tooth-per-inch skip-tooth blade is fine for occasional resaw work, the bi-metal blade promises both faster cutting and a longer life, though at more than twice the price. If you do more than occasional resaw work, then this blade—at about $22–30 for a 1/2 in. wide skip-tooth blade with three teeth per inch, is a good choice. If you plan on doing some serious resaw work, especially in hardwoods, I suggest the carbide-tipped blade. The price is about $85–100, or nearly ten times the price for a plain blade, but this top-of-the-line model promises 50 times the life, and that alone makes it well worth the money. The carbide-impregnated blades—at about $40–55 each—fall somewhere in between, though they are just too new to offer any long-term data on. Note also that graphite/phenolic laminate blade-saver blocks are suggested instead of your saw's standard metal guide blocks for use with the carbide-impregnated blades.

Two Traditional Inlay Methods: The Line & Berry and Banding



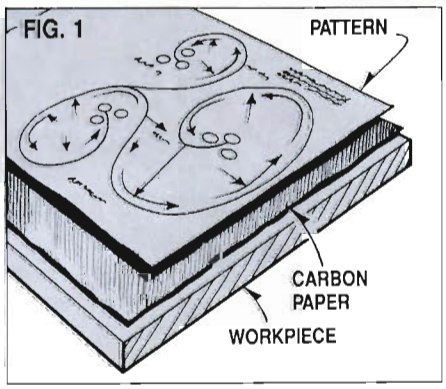
by Paula Garbarino

The line-and-berry and banding inlays we show here are used on the Small Chest project on page 48. Paula Garbarino tells us that the techniques shown here were passed on to her while she studied at the North Bennet Street School, in Boston, Massachusetts.

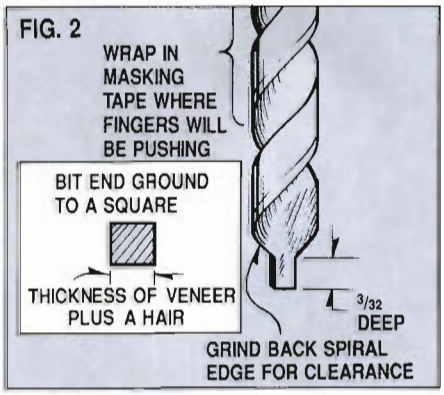
The Line-and-Berry

Line-and-berry inlays were traditionally laid out with a compass. Feel free to use the compass to come up with your own line-and-berry design, or you can use our full-size pattern and some carbon paper (Fig. 1) to trace the pattern shown to your stock. In either case, note that the inlay work is completed before the dovetail work on the box begins.

The lines in the line-and-berry inlay are formed by scratching out the various curved channels, and then inlaying these channels with strips of veneer placed on edge. Tools needed for making the lines

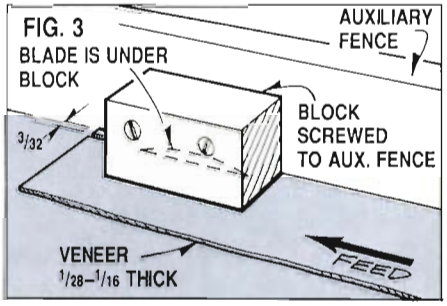


are a good quality compass (approximately 6–8 in. long) and a 1/4 in. or 5/16 in. (whichever best fits in your compass) drill bit. You'll need the type of compass shown, which is sized to accept a pencil. Most stationery stores carry this type of compass. Grind the tip of the drill bit flat and square to a length of 3/32 in., as shown (Fig. 2). The thickness of the protruding square section should be equal to the thickness of the inlay veneer plus a hair to account for expansion when glue is added. Use anything from a

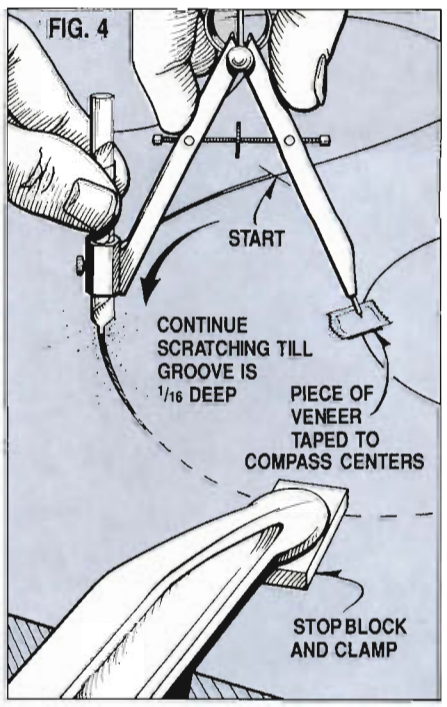


1/28 in. to a 1/16 in. thick maple or holly veneer. To make sure that your scratch cutter is properly sized, make a test channel in some scrap to fit a test piece of the veneer. You should start with the scratch cutter a little larger than necessary, and then grind it back until it's just a little wider than the veneer is thick.

The veneer is now cut into 3/32 in. wide strips (Fig. 3). Be sure to select veneer that has a consistent straight grain, or it will have trouble making the tighter curves without splitting out. Make a fresh table saw insert, raise the blade up through the insert, and clamp an auxiliary wood fence tight to the saw table. A wooden guideblock screwed to the fence directly above the blade holds the veneer down and prevents its shattering. The use of a fresh insert insures that the narrow strips don't get caught in the gap between the blade and your regular insert, and the auxiliary fence prevents the veneer from accidentally sliding



under the regular fence. A fine-tooth blade is best for cutting the veneer to the 3/32 in. width, since it's less likely to catch and perhaps shatter the delicate veneer. You can also resaw your own inlay veneer from some holly or maple stock. Just make sure that the strips you



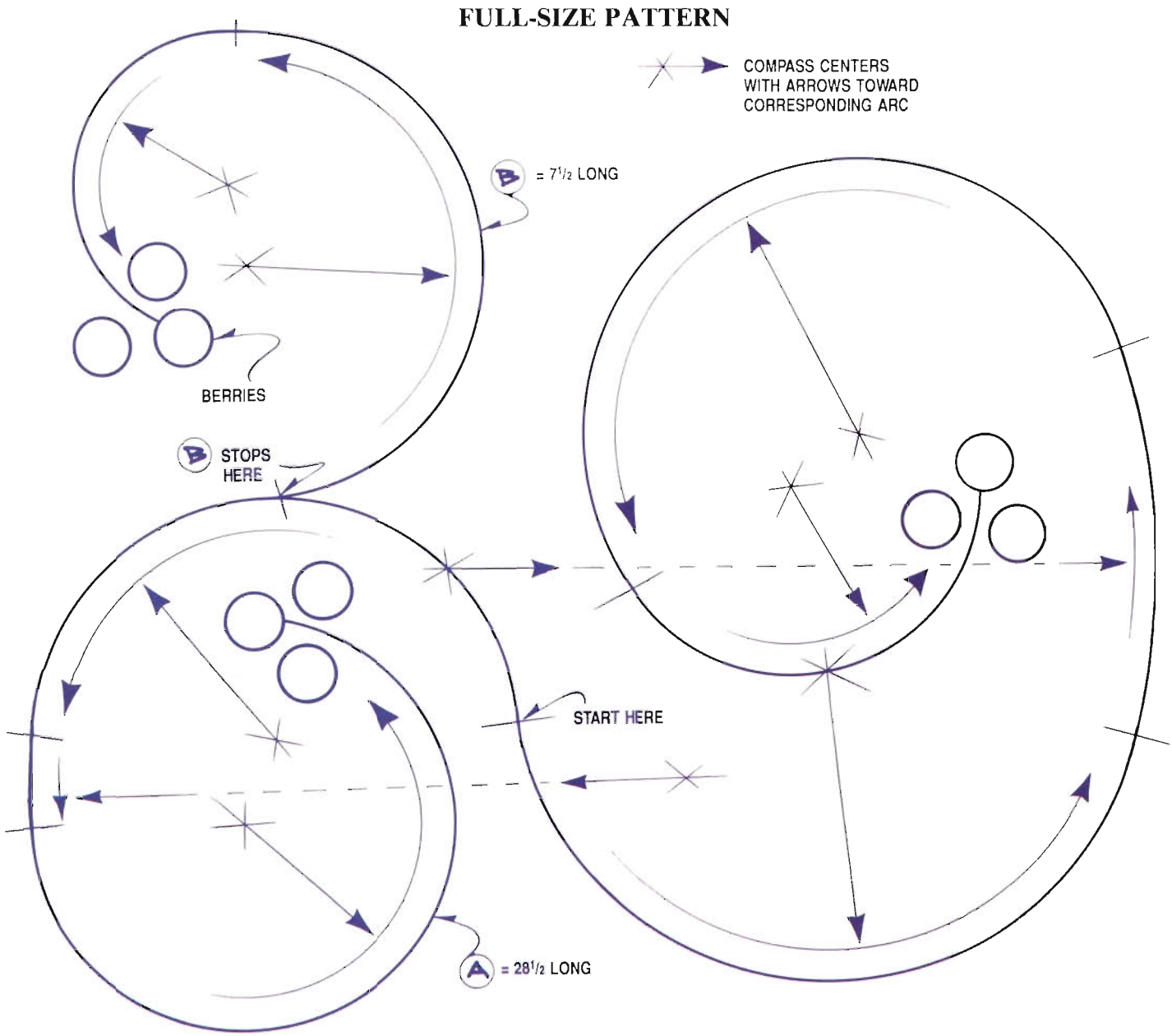
cut are flat-sawn so, when on edge, the veneer is best able to make the various curves without splitting.

Now get to work scratching out the inlay channels. As shown (Fig. 4), you'll need to locate stopblocks at the end of each channel as you work. The blocks—located at the termination point of each arc—prevent you from overswinging your mark and gouging the surface where you don't want a channel. When moving *from* one arc to another, start the scratch cutter in the end of the channel that you just cut. This insures a smooth transition from one arc to the next. Don't try to get two arcs to meet coming from opposite directions; most likely one of the arcs will be a little off and you'll get a step instead of the smooth transition.

The arrows on the full-size pattern indicate the direction of the scratch motion. Note the starting point for the scratch work is the spot where the S-curve reverses.

For best results, position the compass so the drill bit is held perpendicular to the work surface. When changing from one radius arc to another, you may need to readjust the length of the bit in the compass to maintain this perpendicularity. As you cut into the wood, make the channel by repeatedly scratching over the same arc line. As shown in the full-size pattern, each inlay is just a combination of several different radius arcs. You'll be scratching out one arc at a time. Set the compass directly from the pattern on your stock, then keep scratching until you've achieved the desired 1/16 in. channel depth. The 1/16 in. channel depth will leave the inlay veneer standing just a little proud of the surface, so it can later be sanded flush. Note that for best results you should scratch in one direction only, rather than going back and forth. If you attempt to scratch in the opposite direction, the scratch cutter will be prone to jumping out of the channel. Scratching across end grain is more difficult, so go slowly in these sections.

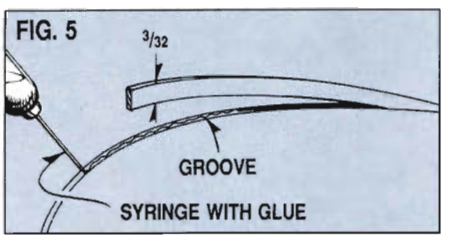
The center point of the compass leaves a small hole. These holes can be found on some of the original pieces with compass inlay, but by steaming with an iron the holes can be made to almost disappear. If you'd rather not have any holes, just tape a small scrap of



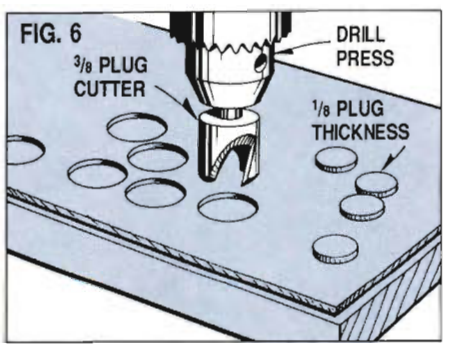
veneer over the compass center points to serve as protection.

Don't be concerned with the end point of your lines, since the berry that the lines terminate in will cover any small error. Once your scratch work is complete, cut the veneer strips that you made earlier to length and dry-fit them. Start with the long strip (A), cut it a little longer than the 28 1/2 in. indicated, dry fit it, final trim the length, and then glue it in place. Cut and fit the short strip (B), again starting with the veneer a little longer than the 7 1/2 in. length shown.

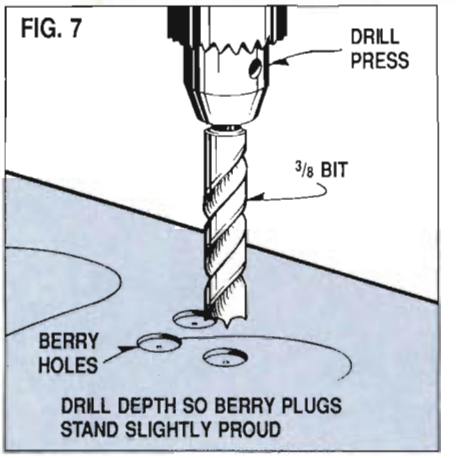
The gluing procedure is to first use a syringe glue applicator with a needle tip to squeeze a line of glue into the channel, and then press the veneer into place (Fig. 5). Don't be afraid of excess glue squeezing out; that will be cleaned up later. Use a small roller or the back of a spoon to apply a gentle, even pressure to firmly seat the veneer. Remember, too much pressure risks crushing the inlay. Once seated, wipe away excess glue, let dry, then carefully plane, scrape or sand the veneer flush.

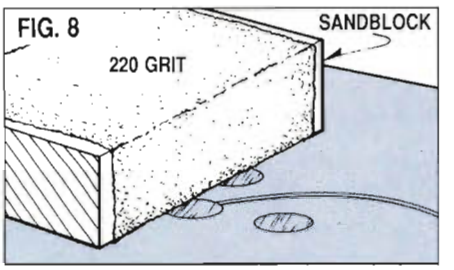


The berries are made with a 3/8 in. diameter plug cutter (Fig. 6), and should fit neatly into a hole drilled with a 3/8 in.



diameter brad-point drill bit (Fig. 7). But it's a good idea to first confirm that this is the case, since occasionally there's a frustratingly poor match between a particular bit and plug cutter. I used maple for the berries, but a nice alternate choice would be a mixture of contrasting colors such as maple, cherry, cedar and mahogany. The berries need not be any thicker than about 1/8 in., but there's nothing





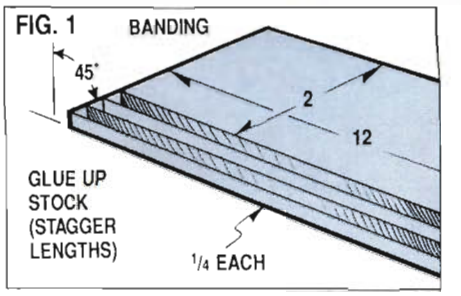
wrong with cutting them from heavier stock—up to about 3/8 in. Whatever the thickness of the berries, set the depth stop on your drill press to drill a hole that will leave the berries, like the veneer inlay, standing a little proud of the surface. Glue the berries in place, let dry, then sand flush (Fig. 8).

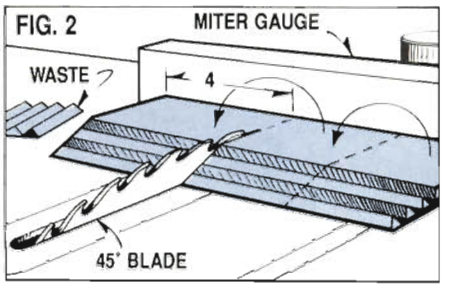
The Banding

Each side of the chest has an outline of banding that's made from several contrasting woods. The woods I used here are elm and purpleheart with a maple outline, but combinations of ash and padauk or white oak and mahogany would also work nicely, either with the maple or perhaps a holly outline instead. Similar bandings can also be purchased.

This banding uses the traditional technique of stacking, cutting, restacking and cutting to create usable lengths of finished banding. Start with 1/4 in. thick by 2 in. wide by 12 in. lengths of stock. You'll need two pieces each of the light and dark woods. Glue them face to face, alternating the light and dark woods and staggering the ends at a 45-degree angle as shown (Fig. 1) to create a 1 in. thick lamination.

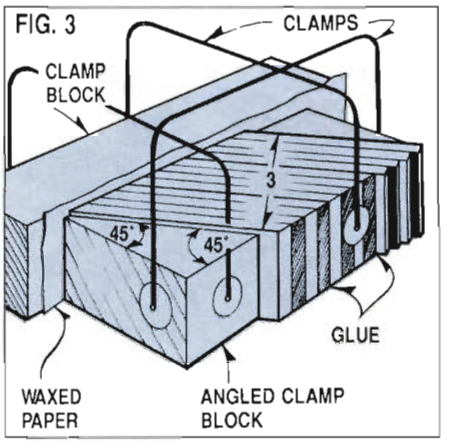
When the four-piece lamination is dry, use the table saw with the miter gauge, angle the blade 45 degrees, and cut the lamination into three 4 in. lengths (Fig. 2). Be sure to use a good quality hollow-ground combination blade, since it's important that your cuts produce a





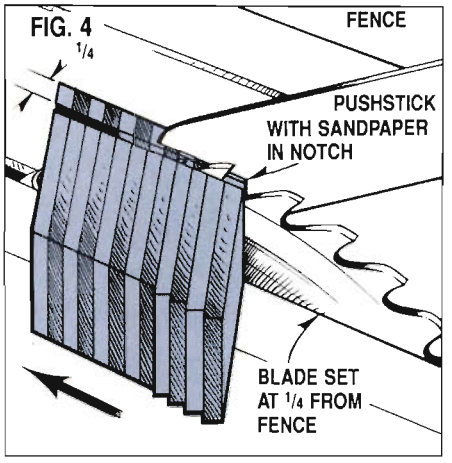
smooth, clean surface.

Now glue and stack the three lengths one atop the other to create a 3 in. thick lamination (Fig. 3). The important thing with this glue-up is to keep the three 45-degree edges perfectly flush to maintain a true 45-degree angle. As shown, clamping against a block with wax paper will help accomplish this. You'll also need two 45-degree angle clamp blocks (one on each end) to hold the lamination together.

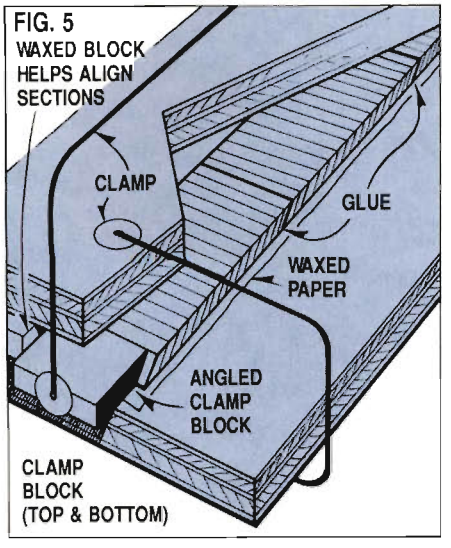


When this lamination is dry, clean any glue squeeze-out off the 45-degree surface that faced the wax paper, and from the two sides, and use the table saw to slice off a series of 1/4 in. thick strips (Fig. 4). Make a notched pushstick, and glue some fine sandpaper in the notch to help the pushstick control the 1/4 in. thick sections after they've been severed. The pushstick is needed to push the sections clear of the blade. Use either the hollow-ground combination blade or a good thin-kerf blade to yield a smooth surface.

Next, glue and stack four of the sections that you just cut end-to-end to yield a total length of about 12 in. The easiest way to make this assembly is to lay some wax paper on a piece of 3/4 in. thick plywood that's at least 12 in. long and then assemble the four sections end-to-end on the wax paper (Fig. 5). A

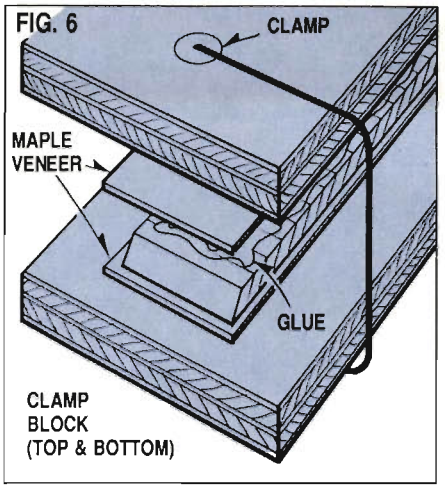


1/4 in. thick waxed block on one edge will serve to help line the four sections up evenly, and you'll need an angled clamp block on each end to provide end-to-end pressure with a pipe or bar clamp. Finally, add some more wax

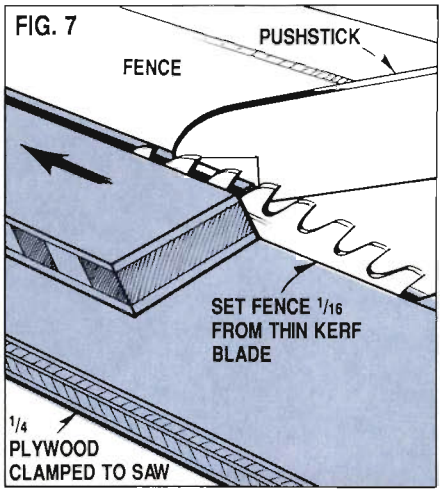


paper topped by another piece of plywood—or a waxed clamp block instead—over the glued-up sections. Several C-clamps will provide top-to-bottom pressure on the assembly until the glue dries.

With the assembly out of the clamp blocks, clean any glue squeeze-out from the top and bottom faces, and add a layer of maple or holly veneer both top and bottom (Fig. 6). Use the same clamping system of wax paper and plywood, but there's no need for the alignment or end blocks. Once that assembly is dry and out of clamps, trim the excess veneer both top and bottom.

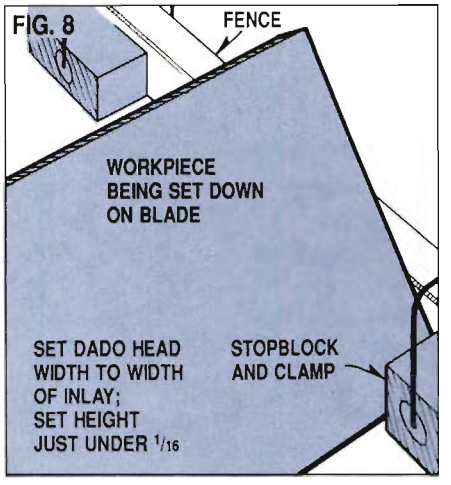


Now move once more to the table saw, and again using a thin-kerf or a hollow-ground combination blade, rip the 1/16 in. thick banding strips (Fig. 7). Use either a new insert or clamp a section of plywood to the saw table and raise the blade up through the plywood.

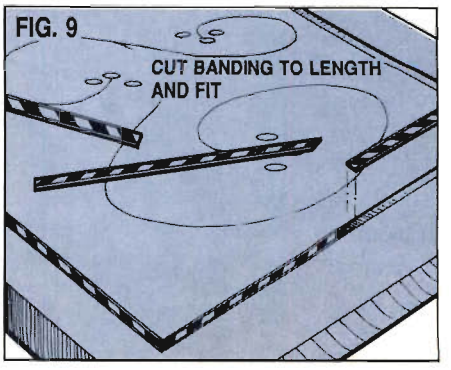


In either case, the idea is to end up with a blade without any gaps on either side into which the thin strips of banding could slip. Cut enough banding to satisfy your needs for the chest. The lamination shown should yield sufficient banding for our chest.

The banding recesses are cut using the table saw dado head. Set the dado head width to equal the width of the banding that you just cut. The dimension should be about 5/16 in., but will vary depending on the thickness of the holly or maple veneer that you sandwiched the banding between. To insure that the dado head is set properly, cut a recess in a scrap board and test-fit a piece of banding. If the fit is proper, move on to the chest parts. The height of the dado head should be a little less than 1/16 in., which should produce a recess that will leave the banding just slightly proud of the surrounding surface. The fence will be located 3/4 in. from the dado head for the horizontal bandings, and 1 1/2 in. from the dado head for the vertical bandings. Set up stopblocks to limit the length of cut, and lower the stock down over the cutter (Fig. 8). You'll need two different stopblock setups, one for the horizontal banding recesses, and another for the vertical cuts. Use a chisel to square the corners of the banding recesses.



Once all the recesses have been cut, all that remains is to cut and fit the banding (Fig. 9). You can arrange the banding as I did, or try your own design. The banding is cut to length using a sharp chisel, a mallet and a combination square. Glue and clamp the banding, using clamping blocks to seat the banding in the recesses. Then immediately remove the clamping blocks, wipe away any excess glue, and re-clamp. Wax paper between the clamping blocks and the banding will prevent the blocks from being accidentally glued to the work. When dry, scrape or sand the banding flush.



Tips for Mess-Free Finishing

by Jim Barrett

Woodworkers all develop their own set of work habits and procedures for applying finishes. Some of us are fastidious to a fault—taking plenty of time to provide and maintain the cleanest work environment possible, rarely spilling a drop of finish, and keeping our brushes and other tools in tip-top shape. Others of us just want to get the job done quickly, and don't mind slopping a bit of finish here and there, or occasionally having to toss out a brush because we forgot to clean it properly after the last job.

While no finishing project is absolutely 100 percent mess-free, you can take a variety of measures to keep messes and cleanup to a minimum, and to avoid accidents that can ruin the finish on your project. A lot is just common sense, of course, such as working in a dust-free environment, protecting work surfaces, avoiding contamination of the finish, wiping up spills as you go, and cleaning your tools as soon as you're done. But within these basic guidelines lie numerous tips and techniques that you can put into practice—before you start, while you're working, and after you're done. For this article, we've collected a bunch and organized them into a program that will make your next finishing project neat and easy. Perhaps you already know and practice many of these tips, along with some we haven't thought of, but we hope you'll find a few new ones here that you can add to your collection.

Start with a Clean Work Area

No one will argue the fact that a shop covered with sawdust is an unhealthy environment for finishing (and the finisher). But no matter how well you clean the shop floor, work surfaces and equipment, sawdust can still spell doom for a freshly applied finish if you don't clean the air as well. Vacuuming the floor, work surfaces, and the project itself (rather than blowing or sweeping) keeps airborne dust to a minimum. And after you're done vacuuming, allow at least 2 hours for any remaining airborne dust to settle before starting your finishing project. Some woodworkers like to damp-mop the floor before they start, to further reduce airborne dust.

While the safety precautions for most finishes tell us to provide adequate ventilation during application, too much air movement can stir up dust or cause the finish to dry unevenly. Avoid placing fans near floor level or where they will blow air directly at the project. Consider installing a through-the-wall exhaust fan located in or near the ceiling. Portable fans can be placed near a window or doorway, positioned so they exhaust room air outdoors. Only use fans with sparkproof motors.

The best solution is to work outdoors, if weather permits. Choose a calm, wind-free day, with fairly consistent outdoor temperatures in keeping with the finish you're applying (per label instructions). The area should be relatively clean and dust-free, such as a clean patio or concrete driveway. You may run into problems if the air contains large amounts of pollen, dust, bugs, or other airborne particles that could stick to a wet finish. Run a simple test by applying the finish to a sample piece of wood, placing it outdoors, then waiting one-half hour or so to see how much of what sticks to it. Generally, small amounts of fine contaminants can't be avoided, but these can be sanded off between coats. Remove any sawdust from the project with a tack cloth or vacuum before applying the next coat of finish.

Allow Plenty of Elbow Room

Place the project at comfortable working height with plenty of workspace around it, so you're not working in cramped quarters. It's usually best to raise the project several feet above floor height—on a bench, sawhorses, or blocks, since more dust tends to swirl around at or near floor level. You'll also want the

project at a comfortable height to avoid stooping, overreaching, and unnatural body positions that can cramp your brushing style and lead to accidents. Also allow enough free bench space around the project to set down finish containers, brushes, rags, and other tools and supplies. You'll want these items within easy reach, but not in the way, or perched precariously close to the edge of the bench or work surface. (The floor is not a good place to put brushes or finish containers, for obvious reasons.) If you're using sawhorses to support the project, set them up about 3–4 feet away from a bench or table on which you can set your finishes and tools. Clear the surrounding area of all tools, materials, and other items not related to the task at hand.

For large projects, provide several convenient locations around the workpiece where you can set down the finish container within easy reach. If you're cramped for working space, you may need to finish the project in stages by finishing one side or surface, letting the finish dry, repositioning the project, finishing that side, and so on. It's better to take a bit more time doing this than to squeeze yourself into tight areas or get caught in awkward positions.

One handy device you can make is a spray painter's turntable or lazy Susan, which enables you to rotate the project while spraying or brushing from one position. The one shown in the drawing (see Fig. 1) is for larger projects; the casters, carriage bolt and 1 by 4's can be replaced with a lazy Susan swivel for a turntable for smaller projects.

Along the same lines, plan ahead of time the different ways you'll need to position the workpiece (and your body) to finish the various surfaces. Decide which surfaces you want to finish first, and position the project accordingly. Depending on the project, it might be more convenient to finish some components, such as shelves or doors, before assembly, then touch up afterward. Of course, the project and the tools you're using will dictate the finish application sequence, but thinking the sequence through ahead of time often saves a lot of frustration from trying to finish hard-to-reach nooks and crannies, or from dripping material on previously finished surfaces.

Protect Work Surfaces

Laying down a drop cloth or protective paper on the work surface not only protects it, but also makes cleanup easier and prevents spills from spreading. For smaller projects, a few sheets of newspaper usually suffice. But when you cover a large area with newspaper, you increase the chance that individual sheets will accidently get blown or kicked against the wet finish around the base of the project.

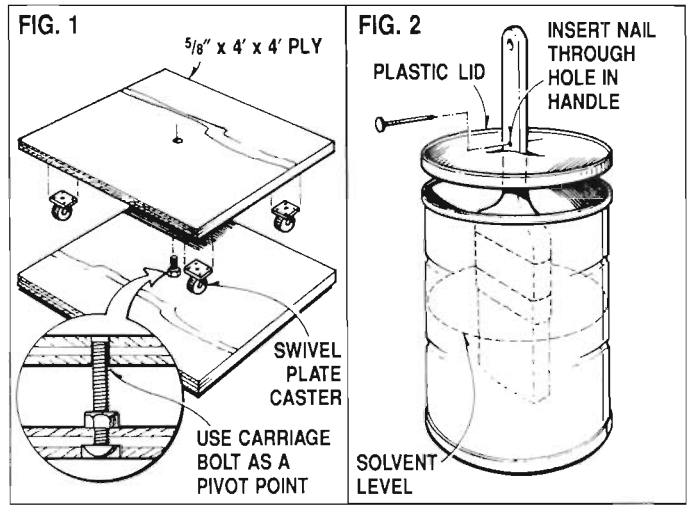
We prefer to use large sheets of kraft paper or absorbent paper drop cloths (available at paint and hardware stores), taped to the work surface at each corner. The paper sheet should be large enough to provide at least a 2-foot margin around the base of the project. Canvas drop cloths are another option for large projects. We prefer not to use plastic (polyethylene) drop cloths because they're slippery, nonabsorbent, and usually can't be reused.

Keep plenty of clean, lint-free rags or absorbent paper towels within easy reach to mop up any spills as they happen.

Protecting surrounding surfaces from overspray while spray painting is a bit more difficult. Unless your shop includes a spray booth, we suggest doing all spray painting outdoors. If you spray in an enclosed area, the fumes pose a health hazard and the overspray will settle on work surfaces, tools, and equipment. When spraying outdoors, make sure you choose a calm, wind-free day, and set up the project well away from surfaces or objects you don't want "finished." You'll need to cover a large area beneath the project to protect the surface on which you've placed it.

Propping the Project

Prop the project securely on blocks so the bottom edges are suspended an inch or two above the work surface. This enables you to brush or spray right up to the bottom edges without having to turn the workpiece over. Short lengths of scrap wood can be used to prop projects with solid bases; small objects such as bottle caps can be used to raise the legs on legged furniture. Woodworkers have devised numerous ways of propping or suspending projects for painting all the surfaces at once without having to reposition the project. To prop smaller projects for spraying, insert 8d finish nails into a small block of scrap wood,



then use the blocks to support the project. This arrangement supports the work above the work surface, enabling you to spray the finish evenly around the bottom edges of the project. It also lessens the chance of the spray can or gun blowing contaminants from the work surface onto the sides of the project.

Keeping Yourself Clean

Wearing gloves, goggles, a hat, and a long sleeved shirt makes good sense, especially when spray painting. A thin coat of cold cream or petroleum jelly on remaining exposed areas will prevent most finishes from sticking to or penetrating your skin, and make cleanup easy. Don't use solvents such as paint thinner, lacquer thinner or acetone to wash up. Commercial hand cleaners are available for this purpose.

Application Tips

You can avoid contaminating the finish in the original container by decanting just what you need into another clean container.

Just be aware that certain finishes can interact with the container material. For example, lacquers and some epoxy finishes will soften or melt some plastics; aniline dyes and certain other finishes can be affected by metal. Check label precautions.

After decanting, remove excess finish from the lip of the can with the tip of your brush, put the lid on immediately, and store the original can in a safe place away from the work area. Several types of pouring spouts for gallon containers are available at local paint stores. These enable you to pour finish from the original container into smaller ones without dribbling finish down the side of the can or capturing it in the rim. If you are working directly from the original container, use a hammer and nail to punch several holes around the rim so any finish trapped in the lip will drain back into the can. Never pour unused finish from your working container back into the original can.

While actual brushing techniques vary with the type of finish you're using, the following tips will keep messes to a minimum and extend brush life: First, an overloaded brush is an invitation to runs and drips, and makes the brush harder to clean afterward. Typically, you should dip only the bottom third of the bristles into the finish. Then tap the brush lightly against the side of the container, or wipe it across a strike wire placed over the can, to remove excess finish. Scraping the brush against the rim of the can will eventually wear out or deform the bristles and cause finish to load up in the rim of the can.

Plan ahead of time where you'll set down the wet brush when not in use. We prefer a clean plastic coffee can lid. While you might be tempted to use the original can lid as a brush rest, this is an invitation to finish contamination (the original lid should be put in a clean spot away from the work area or back on the can).

If you're applying several coats of a fast-dry finish, such as lacquer, shellac, or a water-based finish, the finish is likely to dry on the brush just as quickly as on the project. With water-based finishes, it takes only a few minutes to rinse the brush in warm water; fast-dry solvent-based finishes are a different story. Rather than cleaning the brush with solvent between each use, suspend it in the appropriate solvent or a chemical "brush keeper" between uses. The drawing (Fig. 2) shows the correct way to do this. Use a can with a plastic lid. Slit the lid and insert the brush handle through it, as shown, so the tip of the brush is positioned slightly above the bottom of the container. A nail inserted through a hole in the handle helps support the brush. This not only keeps bristles from deforming, but also prevents the solvent from evaporating, keeping dangerous fumes to a minimum. Add just enough solvent to cover the bristles, then store in a well ventilated area, away from sparks or open flame.

For oil varnishes, polyurethanes, and other slow-dry finishes, you can wrap the brush in aluminum foil or a plastic sandwich bag. Wrap it tightly, being careful not to deform the bristles, then hang the brush on a nail, bristles down.

No matter what finish you're using, though, do not store the brush in solvents or keep it wrapped for long periods of time or for permanent storage. Especially do not keep wood-handled brushes immersed in water for long periods—the wood will swell, loosening the ferrule, and result in a loose handle.

Cleanup Tips

Inexpensive throw-away brushes and rollers can save time and money, especially when applying finishes that require solvent cleanup. But many woodworkers consider it a worthwhile investment to buy a few top quality brushes for their work. A good brush, either natural or synthetic bristle, is easier to use and provides better results. Often, the time you save applying a finish with a good brush will more than make up for the time spent cleaning it.

The cardinal rule is to clean your brushes (and other equipment) immediately after use. When using solvent-based finishes, clean the brush thoroughly in the appropriate solvent or a brush cleaner, followed by warm, soapy water, and then clear water. For water-based finishes, use soapy water and clear water only. Spin the brush between your hands, or use a commercial brush spinner to remove excess moisture. Spin the brush inside a large bucket or other container to avoid splattering. Don't wring the brush or slap it against a hard surface to dry it, as this will damage the bristles. Brush combs or wire brushes should only be used to remove dried, hardened paint or finish. After final rinsing, while the brush is still damp, replace the original cardboard or plastic sleeve, or wrap the brush neatly in kraft paper to maintain the original bristle shape. Then hang it on a nail or hook, bristles down, for storage.

After you've cleaned up your brushes and other tools, double-check to make sure all containers are sealed tightly. Finish can lids won't seal tightly if finish is trapped in the rim. Remember to punch a few holes in the rim so the finish will drain back inside the can. After replacing the lid, drape a rag over it and tap lightly around the perimeter with a mallet. Many finish containers now come with small metal clips to hold the lid in place; we like to save and reuse these for an added measure of protection.

Finally, you'll need to safely dispose of used rags, newspaper, disposable drop cloths and the like. To avoid the danger of spontaneous combustion, never put solvent-soaked rags or drop cloths in an enclosed container or pile them in a corner of the shop. Cloth rags and drop cloths should be rinsed in water, then spread out in the sun outdoors to dry before reuse or disposal. Finish-soaked paper drop cloths and newspapers should be allowed to dry completely before tossing them in the trash.

Strip Tip

If there's anything messier than applying a finish, it's removing one. When stripping furniture with chemical strippers, keep a coffee can handy to put the sludge into as you scrape. Cover the work surface with several layers of kraft paper or absorbent paper drop cloths. When stripping the legs of furniture, place aluminum pie tins or shallow cans under feet to catch drips. After you're done, place all cans of sludge and used drop cloths outdoors in a safe place away from kids and pets, and allow the sludge to dry completely before disposal.

Boring Square Holes

By Roger Holmes

Hollow-Chisel Mortising with Your Drill Press

The mortise-and-tenon is the workhorse of wood joints, used in everything from delicate jewelry boxes to massive timber-frame buildings. There's no better way to learn some of the basic woodworking skills than to practice cutting these joints by hand. Slipping a tenon straight from the backsaw snugly into a cleanly chiseled mortise can be very satisfying.

For as little as $30 you can transform your drill press into a hollow-chisel mortising machine.

But rewarding as handwork is, it is also time consuming. Faced with the prospect of mortising and tenoning a dozen frame-and-panel doors, most of us turn to machines for assistance. Tenons can be accurately cut on common shop machines—band saw, table saw or radial-arm saw. But cutting rectangular holes in wood is beyond the capabilities of these and most other machines in the average shop. Fortunately, for as little as about $30 you can convert one of the humblest shop machines, the drill press, into an effective mortising machine.

How it Works

For centuries, mortises have been made by boring out much of the waste with an auger bit, then paring the sides flat with a chisel. A hollow-chisel mortiser combines the two tools, and the two steps. Spinning inside a hollow, four-sided chisel, an auger bit removes the waste. Then, following close behind, cutting edges on each face of the chisel square the hole. A row of these square holes makes a mortise.

A number of suppliers offer mortising attachments, hollow chisels and bits. They're all basically the same as the one shown in Fig. 1. A heavy, cast-steel yoke slips over the quill, its split collar tightened by turning a bolt. Depending on your drill press, you may have to remove the chuck temporarily to install the yoke. A hollow chisel slides into the yoke, fixed in place with a thumbscrew. Shoulders on the chisel butt against the bottom of the yoke, preventing the chisel from sliding up during the cut. The bit fits up into the chisel from the bottom, and the chuck is then tightened to hold it in place.

The fence and hold-downs are as important, in their own way, as the yoke, chisel and bit. The fence, which consists of a metal frame and wooden body, bolts to the drill-press table. The hold-downs—two large hooks and a heavy, cast foot—fasten to the fence frame. Without the foot holding the work in place, it is very difficult to withdraw the chisel. The hooks are meant to push the work against the fence, but I usually use my free hand instead. If the work needs to be fixed firmly, I'll use clamps.

I attached a yoke to a benchtop drill press and quickly found out why manufacturers specify a floor model for mortising. Even at the drill-press table's lowest setting, there was little room for a workpiece between it and the chisel. Other limitations are easier to live with. Chisels and bits commonly range from 1/4 in. to 1/2 in., though bits up to 1 in. are available. Some makes increase in size by 1/16 in. increments, others by 1/8 in. increments; these sizes are adequate for most cabinetwork. Chisel length varies; the 1/4 in. chisel I have can mortise about 2 in. deep, the 1/2 in. about 3 in.

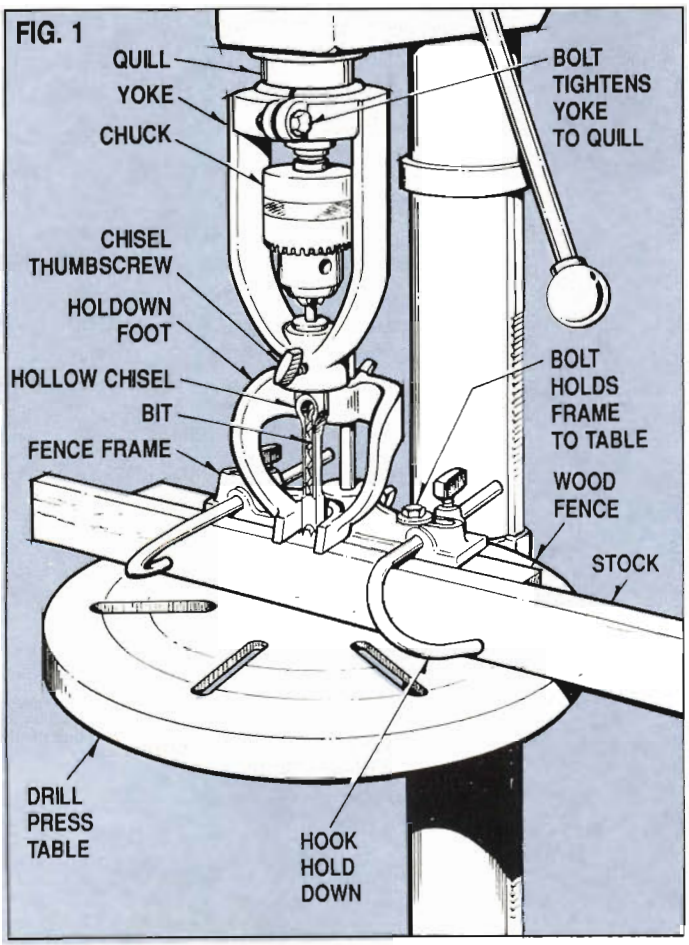
Chisels and bits have been improved from the ones I first used 20 years ago. To reduce drag through the wood, the corners of the chisel have been chamfered along much of their length. The openings for ejecting chips are also much larger. The most striking changes, though, have been made to the bits.

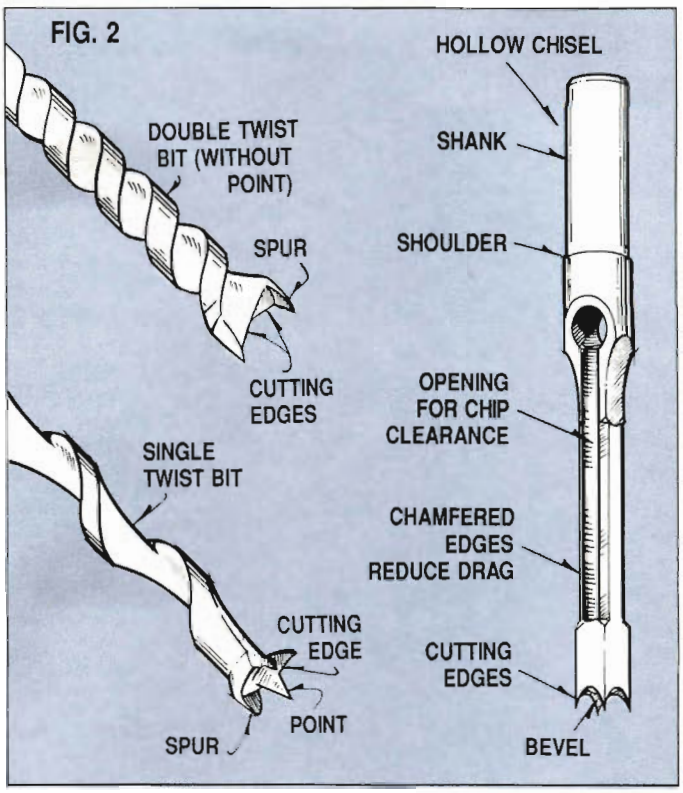
The old bits were essentially double-twist augur bits, with two cutting edges, two spurs, and no lead point (Fig. 2). Today's bits have a single spur and cutting edge and a lead point. David Wilke, of Wilke Machinery, told me that this design permits the bit to "wobble" slightly in the chisel, clearing more waste than it would were it to bore a clean, straight hole. Wilke also explained that the narrow, elongated body of the single twist bit is intended to clear chips faster and clog less frequently.

As usual, critical dimensions of the various components differ from manufacturer to manufacturer, so you have to keep your wits about you when ordering. First, make sure the yoke fits the quill on your drill press. Some manufacturers offer a range of sizes; others provide adapter bushings. Then, make sure the chisel shanks fit the yoke ($^5/_8$ in. or $^3/_4$ in. shanks are common). Because tolerances are important, it makes sense to buy bits and chisels from the same manufacturer when possible.

Layout and Setup

Properly set up, a drill-press mortiser will make the same cut in exactly the same place time after time. You can take advantage of this capacity for precise repetition when laying out mortises. For example, if you're making four identical frame-and-panel doors, you need to lay out the complete mortises on only one of the eight stiles (Fig. 3), which you then use to set the fence and the depth of cut. (Test the settings on a piece of scrapwood.) All you need to mark on the remaining stiles is the working face and the ends of the mortises. By always placing the working face against the fence, you insure that all the mortises in a frame will be the same distance from the stile faces. The end marks position the mortises on the edges of the stile; if you set stops on the fence, you can even eliminate one or both of these.





When you set up the machine, two adjustments are paramount. First, the bit should clear the inner bevels of the chisel's cutting edges (Fig. 4). Constant rubbing can cause the thin edges to overheat, lose their temper and bend back or fracture. Delta recommends $^1/_{32}$ in. clearance. I've had acceptable results with less, and optimum clearance may vary for each size. Experiment with your chisels and bits, comparing the amount of clogging and overheating at different settings.

Second, the chisel must be square with the drill-press table and with the mortising fence. Because some chisels taper slightly along their length, it's best to put a straight steel rod in the chuck and square the table to it (see Photo 1). I then use an engineer's square to square the chisel to the fence (Photo 2). Repeated tightening of the thumbscrew can wear a spot on the chisel shank, making fine adjustments difficult. Once a spot is worn, tightening the screw forces the shank back to its worn position. If this happens, just realign the fence square to the chisel.

Cutting a Mortise

Whether you're mortising two stiles or twenty, it is important to follow the same routine with each. Always place the working face against the fence. Bore holes at each end first, then take cuts in between (Fig. 5). Leaving stock between two cuts helps

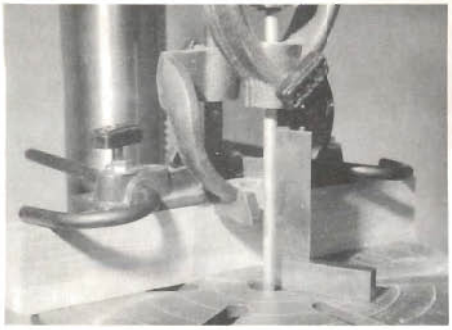


Photo 1: Square the drill-press table against a straight rod held in the chuck.

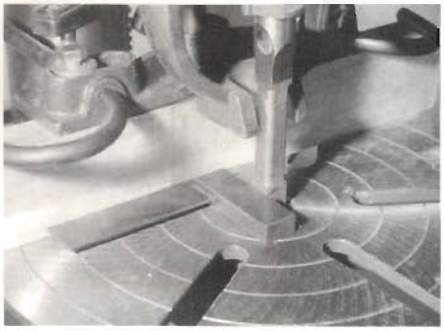


Photo 2: An engineer's square works well to square the chisel to the fence.

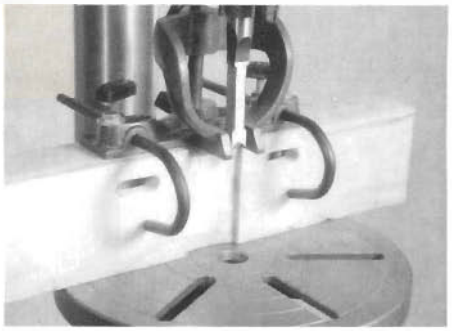
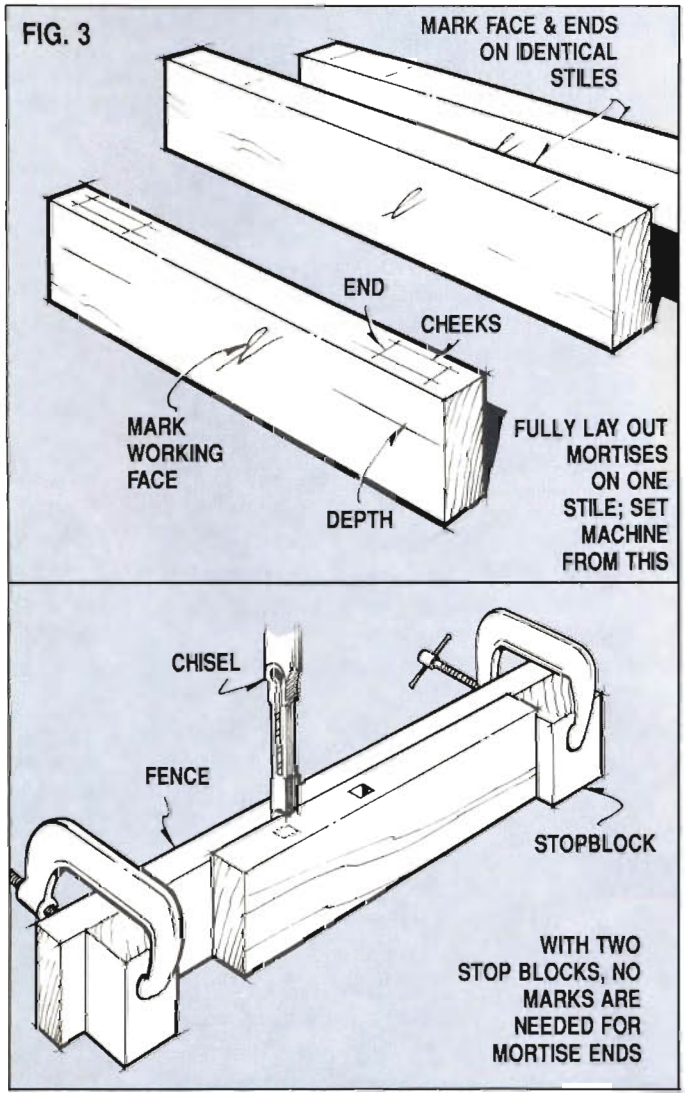
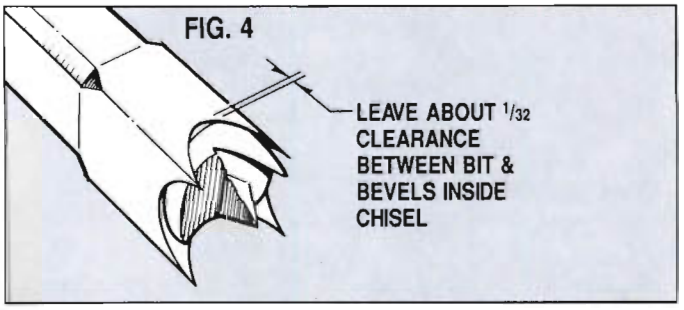


Photo 3: A wider, higher, longer wooden fence makes it easier to support stock and attach stopblocks.





prevent the second cut from drifting into the first.

The sketch also shows the sequence of cuts for making a mortise that is wider than your largest chisel. Use a chisel that is less than half the mortise width so the second row of cuts won't wander into the first. To ensure alignment, keep the working face against the fence for both rows of cuts. Cut the first row on all identical stiles, reset the fence to cut the second row, then reset it again to remove the waste in the middle (or take it out by hand with a chisel).

For each cut, feed the chisel evenly. In general, the harder the wood, the slower the feed. Frequently pull the chisel part way out of the cut to help clear the chips—a clogged chisel quickly heats up. How often this is necessary depends on the type of wood, the depth of cut and the efficiency of the chisel and bit in ejecting chips. Despite improvements in design, chisels still clog. As you'd expect, smaller chisels clog more frequently; the 1/4 in. chisel does so regularly. A clogged chisel will continue to cut, but you risk overheating it. If a few additional cuts don't knock the clogged chips free, stop, cool the bit and chisel in a cup of water, then remove the bit and clear the obstruction.

I think the wooden part of the fence supplied with the attachments is inadequate for some uses. It's too narrow to support wide stiles and too short to allow attaching stops for long stiles. Fortunately, the fence is so easy to replace that you can make a number of them to suit different jobs (Photo 3). Just make sure these new fences are perpendicular to the table.

Tune-up and Maintenance

The machining on new chisels and bits can vary considerably. Anything you can do to eliminate friction between the chisel and the bit and the chisel and the wood will improve performance. File off casting or machining flaws and polish the inside of the chisels and bodies of the bits (use emery paper, a buffing wheel or whatever works) to aid chip ejection. Wilke also suggests spraying the chisel and the bit with a dry lubricant such as Dri-Cote.

Like any cutting tool, chisels and bits work best when they're sharp. The spurs and cutting edges of the bits are easily touched up with small, fine triangular files and slipstones. Chisels are more difficult. I've seen recommendations for using a steel reamer (a countersink-like tool) in a brace, as well as for mounting small grinding stones in the drill-press. Frankly,

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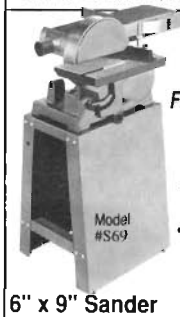

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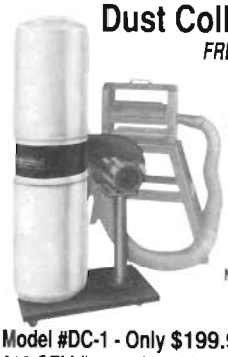

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Specifications:	DC-1	DC-2
Motor	1 HP, 110/220V	1-1/2 HP, 110/220V
Outlets	1 @ 4"	2 @ 4" or 1 @ 6"
Flow	610 CFM	900 CFM
Bags	2 @ 20 Gal.	2 @ 30 Gal.
Weight	75 pounds	120 pounds

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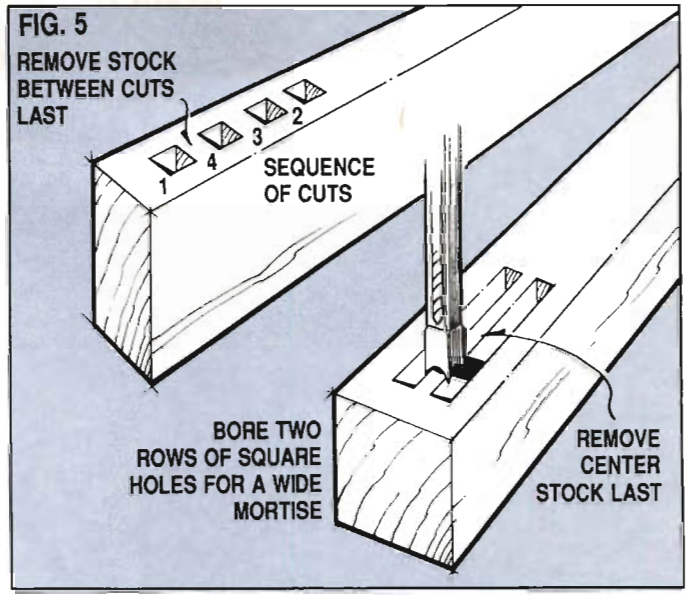


these have always seemed too daunting to try. So I asked my local saw sharpener if he could grind them. He said yes, but pointed out that if I touched up the chisels regularly with slipstones, and didn't abuse them, I'd never need to grind them. He advised working the inner bevels with a suitable round or tapered slipstone, then turning the burr by stroking the outside surfaces *flat* on a benchstone. Fine India slips followed by soft Arkansas should do the job nicely.

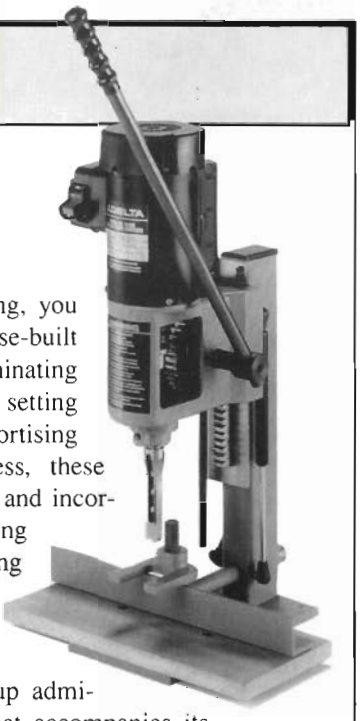
Cost

Prices for hollow-chisel mortising equipment varied considerably among the sources I checked. Attachments—yoke, fence and hold-downs—ranged from about $20 to over $30. A chisel and bit cost as little as $9.95 and as much as $43.20. The difference in price may, as one supplier's representative told me, reflect differences in the quality of the steel. Of the bits I saw, the prices also accurately reflected differences in the quality of machining. I suggest you check with a knowledgeable local machinery dealer first—you may pay a bit more buying locally, but you can inspect before you buy and you know where to go if you're not satisfied. If you shop mail order, and want more information than the catalogs provide, phone the customer service departments and ask questions—all the people I talked to were helpful.

A Final Word

As machine operations go, hollow-chisel mortising is effective but crude. No matter how well the bit cuts, you still have to muscle the chisel through the wood. The average drill press isn't designed to take a lot of this sort of punishment (see "Dedicated Hollow-Chisel Mortising Machines"). An old Delta drill press I used years ago performed admirably through a lot of mortising, but I had to fiddle with it regularly. I tried out a new Taiwanese import recently and found myself adjusting the play in the quill after only a few cuts. Still, a machine that punches out six mortises in the time it would take you to hand-cut one is worth a certain amount of fiddling.

Dedicated Hollow-Chisel Mortising Machines



If you do a lot of mortising, you should consider a purpose-built machine. In addition to eliminating the tiresome task of repeatedly setting up and knocking down the mortising attachment on your drill press, these machines have greater capacity and incorporate features that make mortising easier and more accurate. Sliding in dovetailed ways and moved by rack-and-pinion, the head of a purpose-built hollow-chisel mortiser stands up admirably to the constant jolting that accompanies its task. Many of these machines have tables that slide in two directions and feature very effective work-holding devices. You clamp the work to the fence and move the table with handwheels to cut along the length or width of the mortise. Stops fitted to the table make cutting a series of identical mortises easy.

Until recently, new purpose-built hollow-chisel mortisers started at about $1000. So, if amateurs or small-shop professionals wanted a machine, they usually shopped the second-hand market. Beginning in April, however, Delta will offer the hollow-chisel mortiser shown here for about $500. Made in Britain, the machine takes chisels up to 1/2 in. and handles stock up to 4 in. by 6 in. The head travels 4 1/2 in., moved by pinion on dovetailed ways, and the fence can be adjusted back and forth over almost 4 in. Unfortunately, the table is not movable like those on other machines—doubtless an important reason why they cost more. Still, at this price, Delta's machine may be just the thing for woodworkers who are pushing the limits of drill-press mortising and the limits of their budget.

Sources of Supply

American Machine & Tool (AMT)
P.O. Box 70
Royersford, PA 19468
Tel. 1-800-383-2681

Delta International Machinery Corp.
246 Alpha Drive
Pittsburgh, PA 15238
Tel. 1-800-438-2486

Grizzly Imports
P.O. Box 2069
Bellingham, WA 98277
Orders east of the Mississippi: 1-800-523-4777; Orders west of the Mississippi: 1-800-541-5537

Robert Larson Co.
33 Dorman Ave.
San Francisco, CA 94124
Tel. (415) 821-1021

Sears Craftsman
Tel. 1-800-366-3000

Wilke Machinery Co.
3230 Susquehana Trail
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Tel. (717) 764-5000

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What's Available in Low-Cost Dust Collection Systems

by Jim Barrett

Six Small Shop Dust Collectors for Under $500. Makita 410, Delta 50179, Total-Shop PN90150, Penn State DCI, AMT 4710, Shopsmith DC 3300.

Some woodworkers might consider a portable dust collector as "just another piece of woodworking machinery to clutter up the shop." But these sawdust-eating machines can save countless hours of sweeping or vacuuming up sawdust and wood chips after using your stationary woodworking equipment—a planer, jointer, table saw, or stationary sander, for example. Hooked up to these woodworking machines, a dust collector can bag over 90 percent of the sawdust at the source while you work, promoting a cleaner shop and healthier lungs.

Portable dust collectors represent a middle ground between a central dust collection system such as you would find in a production shop, and the conventional shop vacuum used to fight sawdust in most home shops. Central systems usually consist of a large-capacity cabinet-type collector connected by a system of ductwork to each machine. Such a system can cost anywhere from $1,500 up, and its permanently installed ductwork pretty much fixes the locations of woodworking equipment in the shop; adding or moving machines requires re-routing the ductwork and possibly having to move up to a larger capacity collector.

At the other end of the spectrum, shop vacuums provide mobility, but their suction and storage capacity is limited. Shop vacuums do a respectable job catching dust produced by small benchtop machines, such as a portable planer, and ones that produce small amounts of fine sawdust, such as a scroll saw or band saw. Many such machines come with dust ports that fit standard 1 1/2 in. or 2 1/2 in. diameter shop vacuum hoses. But the vacuum will need to be emptied frequently and won't handle the mounds of dust, shavings and chips produced by larger machines.

Portable dust collectors offer the capacity of a central system combined

with the portability of a shop vacuum. All are mounted on casters so you can move them from one machine to another; larger models can service two or three pieces of equipment running at once, or even be hooked to a permanently fixed ductwork system.

The six models we tested for this article represent the smallest (and in some cases, the only) units available from selected manufacturers. While not all dust collector manufacturers and importers are represented, the models we chose are a typical cross section of the basic dust collector types you'll find in today's marketplace. Most manufacturers also offer larger-capacity versions, but even the small ones shown have plenty of capacity to handle just about any woodworking machine you're likely to find in a home woodshop.

You should be able to buy a collector for under $500, but we've listed larger models in the specifications chart on page 32, just in case you have a monster machine or want to operate several pieces of equipment simultaneously.

Are They Just Oversized Shop Vacuums?

In a word, no. Compared to a shop vacuum, a portable dust collector moves a large volume of air (300–1,300 cubic feet per minute, or CFM) through a large diameter hose at a low velocity, enabling it to evacuate large amounts of dust, shavings, and chips that would clog up a shop vacuum hose. They do this by using a larger blower, powered by a 3/4 hp to 3 hp induction motor. Shop vacuums, on the other hand, have small, high-speed universal (brush-type) motors and blowers that move lower volumes of air (100-120 CFM) at higher velocities. This, combined with their smaller filter bags and smaller diameter hoses, makes them good for picking up relatively small amounts of fine dust and debris over a large surface area such as your shop floor. Because they use universal motors, shop vacuums aren't designed to run for long periods, and the motors are much noisier than those on a dust collector.

With the exception of the Shopsmith DC 3300 (see photo), dust collectors don't make effective vacuum cleaners because their low-velocity airflow limits suction to a relatively small surface area around the hose outlet. For this reason, dust chutes or hoods on woodworking machinery are designed to concentrate the collector's airflow to pick up dust as close to the source (blade or cutter) as possible.

Some manufacturers *do offer* floor sweep attachments for their collectors, which enable you to pick up large, concentrated piles of sawdust off the floor. However, we don't recommend that you use a dust collector as a vacuum unless the blower assembly is of a sparkproof design (see Safety Features on page 35.)

How to Adapt Your Machines For Dust Collection

Most modern woodworking machines have some provision for dust collection, either as standard or optional equipment.

Some tool manufacturers also offer

Specifications Portable Dust Collectors

Manufacturer	Model	Air Flow Capacity[1]	Blower Inlet(s) Dia. Inches	Type[2]	HP	Amps	Volts	Storage Capacity[3]	Size[4] (W x L x H in.)	Accessories[5] Std.	Accessories[5] Opt.	Weight (lbs.)	List Price[6]
AMT[7]	4710	610 @ 1	1 @ 4	SS	1	16/8	110/220	2.2 cu. ft.	15 x 25 1/2 x 57	—	—	75	239.00
Delta[7]	50179	580 @ 7	1 @ 4	TS	3/4	10.6/5.3	110/220	35 gal.	20 dia. x 43	H	A,B,E	53	483.00*
Delta	50180	700 @ 4 1/2	1 @ 6	TS	1	11/5.5	110/220	55 gal.	26 dia. x 52	H	A,B,E	72	611.50*
Delta	50181	1,100 @ 8 1/2	1 @ 6	TS	2	12.6	220	55 gal.	26 dia. x 52	H	A,B,E	97	885.85*
Foley Belsaw	334	500 @ 3	1 @ 4	TS	1/2	7.4	110	51 gal.	24 dia. x 52	H	E	60	369.95
Grizzly	G1032	See AMT 4710								—	H,A,B,E	75	189.95
Grizzly	G1029	1,182 @ 9	2 @ 5	SS	2	20/10	110/220	5 cu. ft.	24 1/2 x 34 x 76	—	H,A,B,E	180	295.00
Grizzly[8]	G1030	1,883 @ 5.8	3 @ 6	SS	3	36/18	110/220	10 cu. ft.	21 x 47 x 78	—	H,A,B,E	220	455.00
Jet	DC610	610 @ 5.51	1 @ 4	SS	1	10/5	110/220	2.12 cu. ft.	14 x 28 x 60	—	—	75	321.00*
Jet	DC1182	See Grizzly G1029								A	—	180	577.00*
Jet[8]	DC1883	See Grizzly G1030								A	—	220	850.00*
Makita[7]	410	307 @ 20	1 @ 2 13/16	SS[9]	1 1/2	9	110	7 cu. ft.	11 1/4 x 11 1/4 x 11	H	E	20.4	510.00*
Penn State[7]	DC1	See AMT 4710								H,A	B	75	199.95
Penn State	DC2	900*	2 @ 4	SS	1 1/2	N/A	110/220	5.3 cu. ft.	21 x 36 x 78	H,A	B	130	299.95
Shopsmith[7]	DC3300	330 @ 6.6	3 @ 2 1/2	SS	1/2	6.7	110	4 cu. ft.	21 x 26 x 48	H,A,V	A,B,E	N/A	459.00
TotalShop[7]	PN90150	680*	1 @ 4	SS	1	12/6	110/220	25 gal.	18 x 24 x 64	—	H,A	70	239.00
TotalShop	PN908A	1,250*	2 @ 4	SS	2	16/8	110/220	40 gal.	22 x 34 x 79	—	H,A	140	309.00
TotalShop	PN91010	1,900*	3 @ 4	SS	3	20	220	90 gal.	22 x 47 x 79	—	H,A	225	525.00

[1]Cubic feet per minute at inches static pressure (*Static Pressure figures not available)
[2]SS = Single Stage (fabric or plastic waste bag) TS = Two Stage (barrel)
[3]Some mfrs. give capacity in cubic feet; others in gallons: 55 gal. = approx. 6.5 cu. ft.
[4]Height for single stage collectors includes inflated filter bag.
[5]H = hose; A = hose adaptors (reducers, increasers, multiple fittings); B = blast gate; E = exhaust hoods/chutes for woodworking machines; V = vacuum cleaner attachments. See manufacturers' catalogs for complete list of adaptors and accessories.
[6](*)Indicates manufacturers' suggested list price; often discounted 10–30%. Other prices are actual catalog or advertised prices at time of publication.
[7]Pictured in article.
[8]Uses 4 bags (2 waste, 2 filter).
[9]Makita uses single stage concept, but with only a single collection bag.

accessory dust hoods or chutes for older equipment, as well. Delta, for example, offers a variety of accessories for their woodworking machines that fit standard 4 in., 5 in. and 6 in. diameter collection hoses.

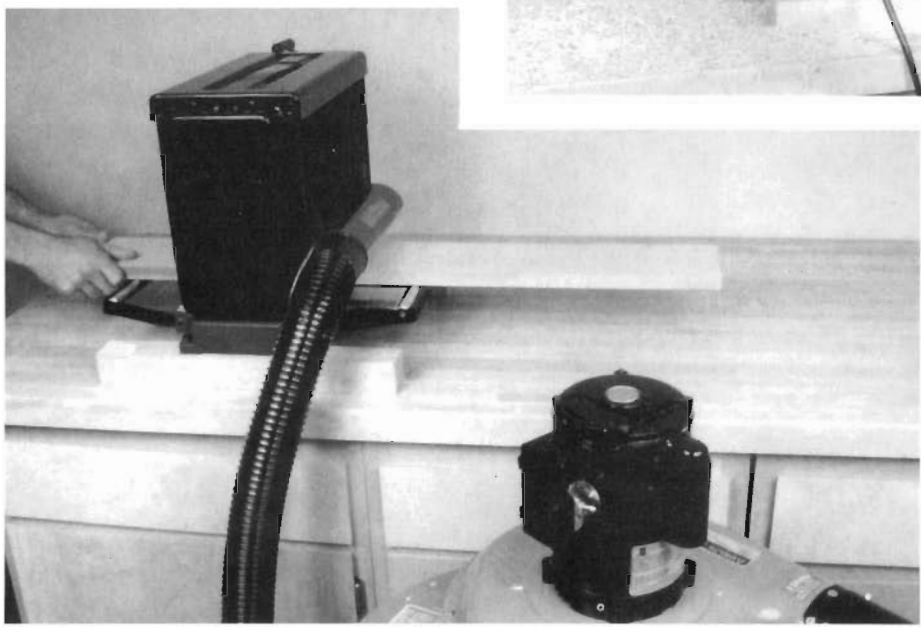
Typically, the smaller dust collectors, such as those reviewed for this article, use a 4 in. diameter pickup hose; the Makita 410 collector uses a metric size hose (approximately 2 15/16 in. in diameter) that fits Makita machines only, but Makita also offers an accessory adaptor to connect this hose to a standard 4 in. outlet. The Shopsmith comes with an outlet that accepts three 2 1/2 in. diameter hoses, which can be removed to accept a 4 in. hose. Larger-capacity machines use 5 in. or 6 in. hoses.

The dust ports or outlets on woodworking machines may be any of these standard dimensions, or even some other size (3 in. or 2 1/2 in.). Many manufacturers offer reducer or increaser fittings to adapt hoses of one size to dust ports of a different size. TotalShop, for instance, offers accessory fittings and hoses to adapt a 4 in. collector inlet to the standard 2 1/2 in. shop vacuum dust ports found on most benchtop machines, including the Ryobi AP-10 planer pictured.

If you can't find the fitting or adaptor you need through one of the tool companies, you can have a sheet metal fabricator or plumbing and heating company make one for you. Often, they can also devise an exhaust chute or hood for an older machine that has no provision for dust collection. (Look in the Yellow Pages under Sheet Metal Work.) For instance, a simple sheet metal hopper with the appropriate size hose fitting can be attached underneath the motor-blade assembly of a table saw to evacuate most of the dust spinning off the blade. The tool manufacturer's technical service

On machines with multiple-hose outlets, sliding blast gates are used to close off hoses to machines not in use.

Most woodworking machines have some provision for dust collection. A machine without a collector (right) quickly makes a lot of loose chips. The optional dust hood for the Ryobi AP-10 benchtop planer (below) fits a standard 2 1/2 in. shop vacuum hose. At the other end of the setup (below right), a Y reducer fitting from TotalShop enables you to run two 2 1/2 in. hoses off a standard 4 in. outlet found on most collectors (the Delta is shown here).



department can often provide helpful design advice for adapting their older machines for dust collection.

Sizing A Dust Collector

The first, and most important, consideration in choosing a dust collector is to match its airflow or suction capacity to the size and number of woodworking machines you have. The collector should be powerful enough to handle the largest machine you have plus a bit of extra capacity in case you decide to add a larger machine in the future.

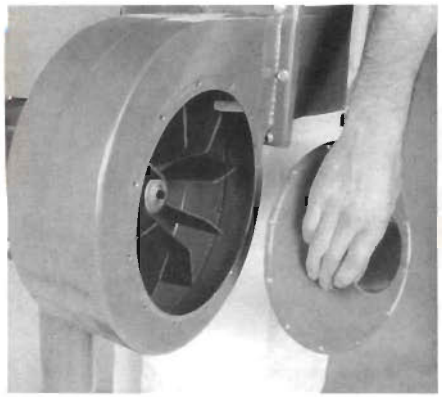
If you intend to hook up the collector to two or more machines that will be operating simultaneously, you'll need to combine the airflow requirements of each and size the collector accordingly. Most dust collectors can be fitted with adapters that enable you to connect them to two or three machines at once. To direct airflow to the machine in use, you can fit sliding blast gates between the hoses and collector inlets to block off the hoses not in use. The ones shown (see photo) are an accessory for the Shopsmith collector, but most major manufacturers offer universal blast gates that fit standard 4 in. or 5 in. diameter hose connections.

The airflow capacity of a dust collector is expressed as a ratio: the number of cubic feet per minute (CFM) measured at a given static pressure (airflow resistance expressed in inches of water). To determine the actual airflow capacity of various collectors, you'll need to know both figures—CFM and static pressure—to make an accurate comparison. Some manufacturers list both figures in their specs; others don't. What's important to remember in the ratio is that when static pressure increases, airflow decreases. For example, a collector might pull 600 CFM at 1 in. static pressure, but only 550 CFM at 4 in. static pressure. In terms of dust collectors, static pressure increases when you restrict airflow, such as by increasing hose length, decreasing hose diameter, or adding hoses, elbows or other attachments. Typically, the blower (motor/fan assembly) on most collectors operates at 1 in. *internal static pressure*. When you hook up the collector to a machine with 5 ft. to 6 ft. of 4 in. diameter hose, you add 2 in. to 3 in. *external static pressure*. In this case, combined external and internal static pressure gives you 3 in. to 4 in. *total static pressure*. So, the collector used in our example would be pulling 600 CFM at the blower inlet with the hose off, and 550 CFM at the machine outlet or source of dust. The CFM figures in the sizing chart (see below) assume that the collector can produce that capacity at about 4 in. static pressure (the approximate airflow resistance created by 5 ft. to 6 ft. of 4 in. or 5 in.

Dust Collection Air Flow Standards

Woodworking Tool	Required Air Flow Capacity, CFM[1]
Jointer, 4-12 in.	350-400
Disk Sander, to 12 in.	300-350
Belt Sander, to 6 in.	350-400
Band Saw, up to 2 in. wide blade	300-400
Table Saw, up to 16 in.	300-350
Radial-Arm Saw	350-400
Planer, up to 13 in.	400-600
Planer, 14-20 in.	600-1100
Shaper, 1/2 in. spindle	300-500
Shaper, 1 in. spindle	500-800
Drill Press	300-350
Scroll Saw	300-350

[1]Practical CFM rates for intermittent use in home shops. Figures indicate CFM requirements at machine outlet.



Unlike a shop vacuum, dust collectors move heavy amounts of material by means of a large blower, powered by a 3/4 hp to 3 hp induction motor. Cover with 4 in. diameter inlet has been removed to show blower impeller.

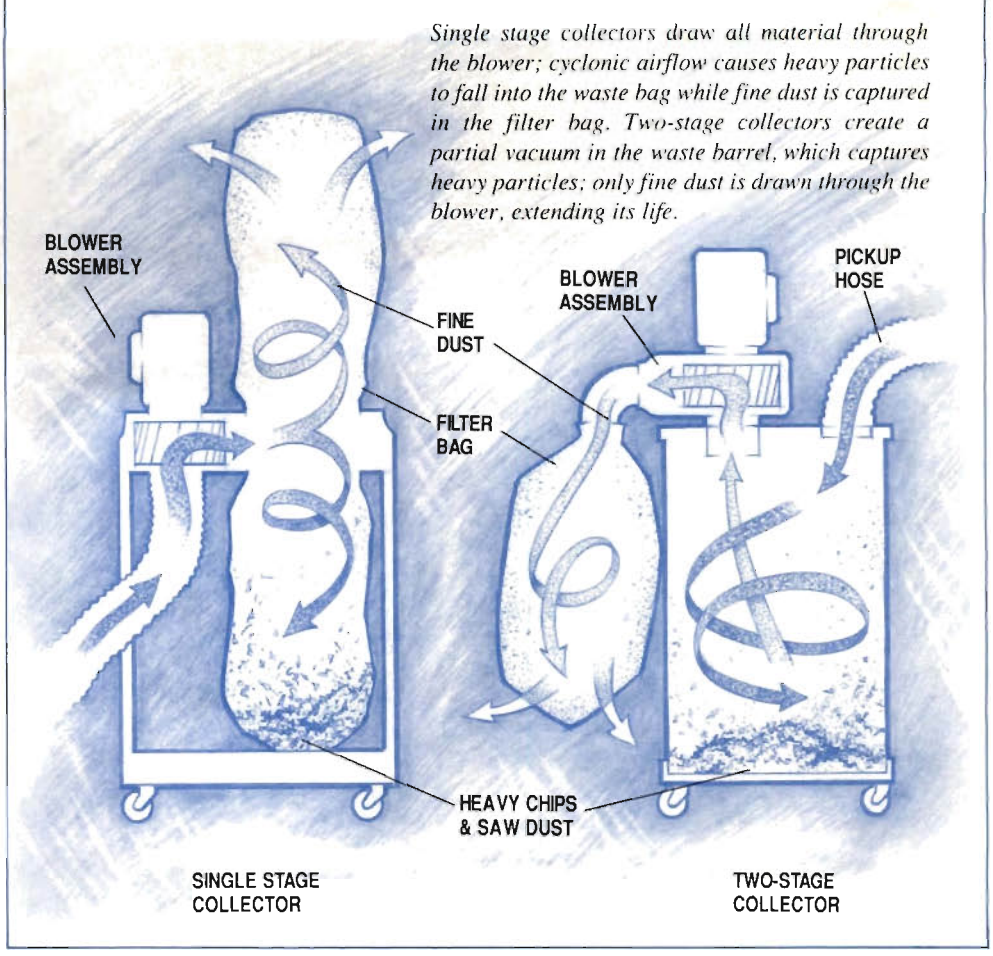
diameter hose when the collector is connected to the machine). Compare these figures against the manufacturer's CFM ratings in the specification chart on page 32. While not all companies use the same yardstick in determining the air flow capacity of their collectors, these figures will give you a general idea of comparative power. The companies can also recommend models in their line to match the equipment you have.

Types of Collectors

In terms of operation, dust collectors are either *single stage* or *two stage*. Most dust collectors on the market, including all of the Taiwanese imports, are single stage collectors. As shown in the drawing, single-stage collectors draw all material through the blower into a cyclonic chamber. The chamber creates a cyclonic airflow effect that causes heavier chips and shavings to drop into the lower waste bag, while fine dust is blown up and trapped in the upper filter bag. The Makita works on the single-stage principle, but uses only one bag for filtration and collection.

The Delta models and other barrel-type collectors remove dust in a two-stage operation: The blower creates a cyclonic action, which causes heavier material to drop inside the barrel or waste container ahead of the blower inlet (first stage). In the second stage, only fine dust is drawn through the blower into the filter bag. Proponents of two-stage collectors claim this design reduces wear on the blower's impeller and the filter bag because only small amounts of fine material pass through the blower. The main drawback to two-stage collectors is that you have to lift the heavy motor/blower assembly off the waste barrel to empty the sawdust.

Single stage collectors draw all material through the blower; cyclonic airflow causes heavy particles to fall into the waste bag while fine dust is captured in the filter bag. Two-stage collectors create a partial vacuum in the waste barrel, which captures heavy particles; only fine dust is drawn through the blower, extending its life.

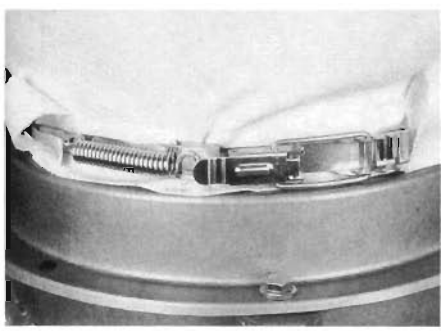


Other Features to Consider

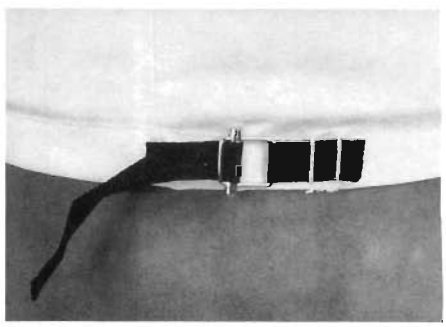
In addition to airflow capacity, there are other considerations you'll need to look at when choosing a dust collector.

First, will the collector you've chosen fit into your shop layout? The chart on page 32 shows the overall dimensions of the various machines. The heights shown for the single stage collectors are with the top bags inflated during use. When you shut the collector off, the top bag fits neatly into the bottom one, making it more compact. The Makita is the most compact of the group: a small box about 11 in. square (without the bag), weighing just over 20 pounds. Some of the largest weigh over 200 pounds and stand nearly 7 ft. tall.

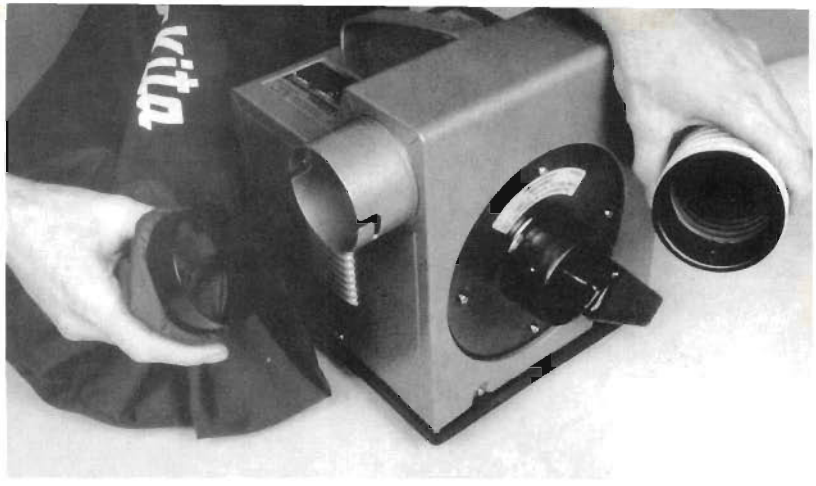
Another aspect of choosing a collector is convenience, which translates into how easy or hard it is to connect and disconnect hoses from your woodworking equipment and empty the collector's waste container. As mentioned, you must lift off the motor/blower assemblies of two-stage collectors to empty the waste barrel. Some single-stage collectors have reusable cloth waste bags (which, like the cloth filter bags on all collectors, must be washed occasionally). Others, such as the TotalShop and



Heavy steel band clamp with release lever on TotalShop (above) fastens the filter bag much more securely than the fabric straps on the AMT/Penn State machines. We found the steel clamps a bit harder to install, however.



Mighty Midget: Weighing in at 20.4 pounds, the Makita 410 is the only collector you can pick up and carry around the shop. When running, the bag inflates to about 2 ft. in diameter and 30 in. long. The tiny box moves 310 CFM at 20 in. static pressure.



Makita features quick disconnects on hose and waste bag.

On two-stage collectors (Delta, Foley-Belsaw), you must remove the motor blower assembly to empty the waste barrel.

Shopsmith pictured have disposable transparent plastic bags. Plastic bags are usually more convenient, and it's easier to tell when the bag is full, but the bags usually can be used only once, and replacement bags can be expensive. As a practical matter, though, many woodworkers just use 30-gallon plastic trash bags instead of the clear plastic bag on the TotalShop or the cloth bags on the other single-stage machines.

While the dust pickup hoses on most collectors are attached to the collector and machinery with screw-type metal band clamps, the Makita collector uses quick-disconnect couplings (see photo). Delta also offers optional quick-disconnect fittings for their machines. These can save time when switching the collector from one machine to another.

The tie-downs on the waste and filter bags should be sturdy, yet easy to remove and replace. The tie-downs on the filter bags must be especially secure. As dust clogs the fabric, back pressure builds up in the bag and can literally blow it off the machine, spewing sawdust everywhere. While not as convenient to use, metal band clamps (Delta, Shopsmith, TotalShop) secure the bags better than cloth straps (AMT, Penn State). The metal clamp on the TotalShop has a quick-release lever (see photo); the clamps on the Delta and Shopsmith filter bags are screw-type hose clamps.

Safety Features

While dust collectors are one of the safer pieces of machinery you can have in your shop, certain models can present hazards, depending on the blower design. If the blower has a steel impeller and/or housing, it has the potential to spark, which could ignite the dust passing through it and cause a fire. If either component (housing or blower) is steel, sparks may result if a piece of metal gets sucked into the blower and strikes the metal fan or housing. Most of the Taiwanese machines have steel blowers *and* housings; should the fan loosen and strike the housing, a shower of sparks will result. The Delta collectors have cast-aluminum fans in a steel housing (the fans won't spark if hit by metal, but the housings might). A few collectors on the market, such as the Shopsmith, have totally sparkproof blowers, with fans and housings made of aluminum, plastic, or fiberglass. But even the collectors with all-steel blowers can be safer if you don't use them as a vacuum and check the impeller periodically to see that it's securely fastened to the motor shaft.

Another potential hazard with some machines is the blower inlet location. Two-stage collectors have a safety advantage. Because the blower inlet is housed inside the waste barrel, the impeller isn't exposed. On most one-stage machines, the pickup hose attaches directly to the blower inlet; should the hose accidentally disconnect during use, the moving impeller blades inside the blower housing will be exposed. If this should happen, turn off the machine and stand well clear of the blower inlet until the machine comes to a complete stop before you reconnect the hose.

Health is another aspect to consider. Dust collectors can save your lungs, but they can also be hard on your eardrums. By themselves, dust collectors don't make as much noise as most shop vacuums (the dust collectors we tested operate between 50 and 65 decibels). But when you combine this noise with that of the machine it's connected to, you might need hearing protection.

The Taiwanese Look-Alikes: Is There Really A Difference?

Perhaps you've noticed that many of the dust collectors pictured in catalogs of the various importers of Taiwanese woodworking equipment (AMT, Grizzly, Jet, Penn State, TotalShop, and others) look virtually identical, save for the color and the importer's logo. That's because there are just a few manufacturers in Taiwan that make a half-dozen or so basic models for all the importers. Some of the importers we spoke with were reluctant to admit this (none were at liberty to reveal the names of the Taiwanese manufacturers); others claimed that while the machines are basically the same as those sold by competitors, the

On most single-stage collectors, disconnecting the pickup hose exposes the blower impeller. If the machine is on when this happens, keep fingers, tools, and clothing clear!

units they buy are being manufactured to their own specifications, or that their company representatives strictly monitor quality control during production. All agreed that quality in materials and workmanship can vary, even if the units look identical. Since we didn't call in a bunch of "identical" machines from all the various importers, we can neither prove nor disprove such claims. But the two units we did try out—the AMT 4710 and Penn State DC-1—were just that—mechanically identical, right down to the last nut and bolt. (Grizzly Imports sells a nearly identical unit as their model G1032.) Also, we saw no apparent difference in the quality of materials and workmanship between the two machines, so we can presume that if any differences exist, they're not significant enough to affect performance or durability. Having had past experience with Taiwanese machinery of various kinds, we judged both units to be relatively high quality (heavy-duty, well-machined parts that were easy to assemble and convenient to operate).

So, if you're interested in a Taiwanese dust collector, which importer should you buy from? Price is one consideration, of course. When comparing prices, be sure to add the cost of shipping and handling charges to the advertised price. Also see what accessories are included in the price. At the time of this writing, the Penn State unit shown had an advertised price of $199, which included 8 ft. of 4 in. diameter hose, a 4 in. to 3 in. rigid adaptor, and a 4 in. to 2 in. flexible adaptor. The AMT unit sold for $239, with an incentive offer of $20 off the purchase of other AMT tools or accessories ordered from their catalog. The Grizzly unit sells for $189.95 with no hose or accessories. You can also shop prices for hoses, replacement bags, and other accessories, since many of these items are interchangeable.

Here are a couple of other points to consider: If you're dealing with a mail-order firm, how long will it take to ship the machine? Does the importer stand behind the product? What kind of warranty do they offer? Can the unit be returned if you're not satisfied? If so, who picks up the return freight charges? A Grizzly representative told us that the major import firms (not just theirs) generally sell quality machines and stand behind their products; but also that the Taiwanese manufacturers do make machines to different specifications, and sell "seconds" to some importers. He suggests calling the various companies and asking what the differences are between their machines and the competitor's look-alikes. He also suggests that if you're buying from a mail-order firm, ask the company for customer references—people in your area who have purchased the machine—and take a look before you buy.

Also find out if the importer has a good inventory of replacement parts and accessories in stock, if any. Bags and hoses, especially, will require periodic replacement. Motors, blowers, and other mechanical parts should also be available. Some importers keep a large Stateside inventory and can supply parts within a few days; others have to order parts from overseas—or from other importers! Find out how long it would take the company to replace such parts if you happen to need them. Some major importers also have Stateside service departments where you can send the machine for repair, if necessary; discount tool houses selling "no-name" imports usually do not. In short, the lowest price might not be the best bargain if you can't locate parts quickly or get the machine fixed if something breaks.

Where to Write

For more information on portable dust collectors and accessories, contact the following companies:

American Machine & Tool Co., Inc.
Fourth Ave. & Spring St.
P.O. Box 70
Royersford, PA 19468
(215) 948-3800

Delta International Machinery Corp.
246 Alpha Drive
Pittsburgh, PA 15238
(800) 438-2426

Foley Belsaw
3300 5th St. NE
Minneapolis, MN 55418
(800) 328-7140

Grizzly Imports, Inc.
West of Mississippi:
P.O. Box 2069
Bellingham, WA 98227
(800) 541-5537
East of Mississippi:
2406 Reach Road
Williamsport, PA 17701
(800) 523-4777

Jet Equipment & Tools
P.O. Box 1477
Tacoma, WA 98401-1477
(206) 572-5000

Makita, USA
14930 Northam St.
La Mirada, CA 90638
(714) 522-8088

Penn State Industries
2850 Comly Rd.
Philadelphia, PA 19154
(800) 288-7297

Shopsmith Inc.
Customer Services
3931 Image Drive
Dayton, OH 45414-2591
(800) 762-7555

TotalShop
P.O. Box 25429
Greenville, SC 29616
(800) 845-9356

ROUTER STORAGE CABINET

by Dennis Preston

If you're like many woodworkers, you've probably got a cabinet, some drawers or perhaps a chest for your most prized hand tools. But when it comes to power tools, if the item didn't come with a factory-supplied plastic case, you'll probably store it wherever space and convenience dictate. Often the router sits on an open shelf, perhaps below the workbench. And who among us hasn't had to waste time looking for a misplaced router collet wrench or guide bushing?

This handy Router Storage Cabinet—designed and built by contributing editor Dennis Preston—solves the problem of not only storing your routers, but also of organizing all your bits and accessories. The interior dimensions will store both a full-size plunge router and a standard-size router. Bits and accessories fit in the two drawers. The door back is a good place to hang the edge guide. The storage cabinet can either sit on a flat surface or be wall-mounted. The integral wall mount allows the cabinet to be hung on an angled bracket and lifted off the wall when needed. Although our cabinet was designed specifically for router storage, it's handsome enough to fit just about anywhere in the home.

This unit was designed to be a companion to the portable tool cabinet in the September/October 1990 issue. It uses the same simple edge-banded plywood case construction. This is also an ideal practice project if you plan on making larger cabinets, since it includes many basic cabinet-making operations, though on a modest scale. I used a combination of birch plywood, oak and bird's-eye maple. The bird's-eye maple may seem extravagant for a shop project, but given the small amount of stock required, it only adds a few dollars to the project cost. And if you make the cabinet for a kitchen or living room, the figured wood is a sure eye-catcher.

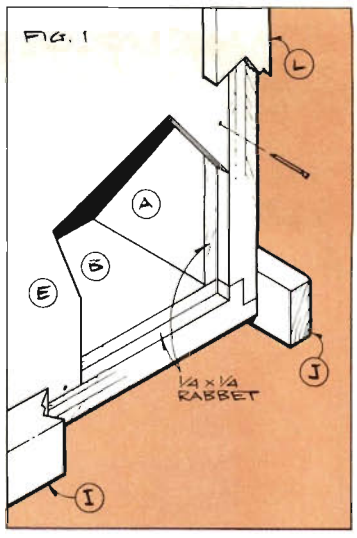
For starters you'll need a piece of 3/4 in. thick plywood, 1 ft. wide by 8 ft. long. I used birch plywood because its high-quality core is very stable, has almost no voids, and is more suitable than fir construction plywood for cabinetwork. The 1 ft. wide by 8 ft. long section will yield the sides (A), top and bottom (B), and shelf (C). To maintain grain uniformity, sequentially mark and cut the four parts. The shelf must be ripped to 11 3/4 in. wide to allow for the 1/4 in. thick back (E).

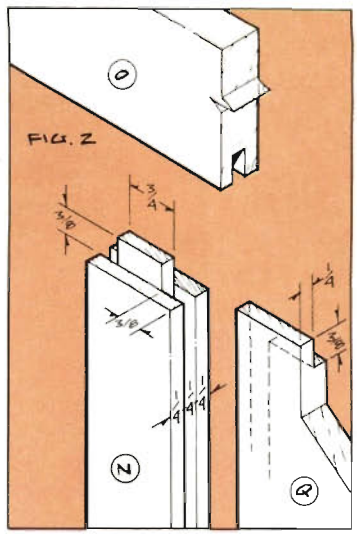
Now, using the table saw with a dado head, cut the 1/2 in. by 1/2 in. rabbets on the ends of the sides, and the corresponding 1/4 in. by 1/2 in. rabbets on the ends of the top and bottom. Also cut the 1/4 in. by 1/4 in. rabbet in the sides, top and bottom for the back, and the 1/4 in. by 1/2 in. and 1/4 in. by 3/4 in. dadoes in the sides for the drawer guides (D) and shelf. Note that the rabbets in the top and bottom for the back should be stopped (Fig. 1). Use a router table for most of this back rabbet work, then square the ends of the cuts with a chisel. Final sand the inside surfaces, then glue and assemble the cabinet. The assembly is simple: spread a generous amount of glue on all the joints, join the sides to the shelf, then add the top and bottom. Use finishing nails through the sides to anchor the top and bottom joints, then cut, fit and glue the back into its rabbet. Finish nails also hold the back in place. Wipe off any glue squeeze-out and set the case aside to dry.

Next, cut the various edgings, all of which are oak. Start with the top back edging (F), which has an angled lower edge (see side elevation). This angled edge nests within a similar piece mounted to a wall, should you choose to hang the cabinet (see Bill of Materials for wall-mounting details). Add the top side edging (G), followed by the top front edging (H). Now move on to the bottom edging, which is nearly identical to the top with a few exceptions. The bottom back edging (I) has no angled edge, and the 1 in. width of it and the bottom side edging (J), along with the 1 in. thickness of the bottom front edging (K) lend the bottom of the cabinet a slightly heavier look. The assembly procedure is identical to the top, with the back edging applied first, followed by the side and then the front pieces. All these edgings are applied with a generous amount of glue and are held in place with finishing nails, set and later filled. As before, wipe away any glue squeeze-out with a damp rag before allowing to dry.

All that remains of the edging work is the front/back/shelf edging (L). Rip about 10 ft. of 1/4 in. thick by 3/4 in. wide oak, then cut and fit it to the remaining exposed plywood edges, specifically the front and back edges of the sides and the front edge of the shelf. Bevel the top ends of the back edging to match the angle on the bottom edge of part F.

While you are waiting for the edging to dry, you can go to work on the door. Use care in the selection of stock here, since





this is the front of the cabinet. The door is a very basic construction, just a pair of stiles (M) and a center stile (N) held together with top and bottom rails (O, P). The door panels (Q) are 1/2 in. thick bird's-eye maple, which is a nice highlight to the oak door frame and case edging.

The door construction uses a single groove for both the joinery and the panels. The fussiest part of the door is the center stile (see Fig. 2), which has grooves along both edges to house the panels, and a tenon on both ends to fit within the grooves in the top and bottom rails. The table saw and dado head can be used for cutting both the tenons, grooves, and the rabbet on the panels. The only variance in the setups will be the fence settings and the use of a tenon jig to safely hold the center stile, rails and panels when the cuts on the ends of these parts are made.

Sand the face of the panels, then glue up the door assembly. Remember, use glue only on the stile and rail joints, not on the panels. The panels are captured within the grooves in the stiles and rails, but must float freely to allow for seasonal expansion/contraction. The door knob (R) is a hardware store item, and the cleat (S) must be drilled to fit your edge guide.

Next up are the drawers. Note that both drawers are identical—just two sides (T), a back (U) and bottom (V), with the exception being the drawer fronts (W, X). The top drawer front is 3 1/2 in. wide—the same dimension as the sides and backs, but the bottom drawer front is 4 in. wide. The extra 1/2 in. covers the space that would otherwise show between the two drawers. The drawer bottoms are plywood, the sides and backs can be just about any hardwood, and the drawer fronts are bird's-eye maple, matching the door panels. The cutouts in the drawer front top edges serve as pulls. Cut and glue the two drawer guides in place in their respective dadoes, then assemble and test-fit the drawers, using small brads or finishing nails to secure the drawer joinery. The 3/4 in. thick router bit board (Y) should be drilled to match your router bit collection.

After the glue on the door, drawers, cabinet and edging is dry, test-fit the door. But before final mounting the door, round the cabinet edges as shown. The top and bottom edgings have a 1/8 in. radius roundover, and the corners are shaped to a 1/4 in. radius. The 1/8 in. radius roundovers can be either router-applied or sanded by hand. Hand sand to soften the edges of the door and drawer fronts.

Next, apply the finish. I filled all nail holes first with a colored putty, available at any hardware store, sanded that smooth, and then applied a sanding sealer. After sanding the dried sealer, I followed up with a coat of varnish.

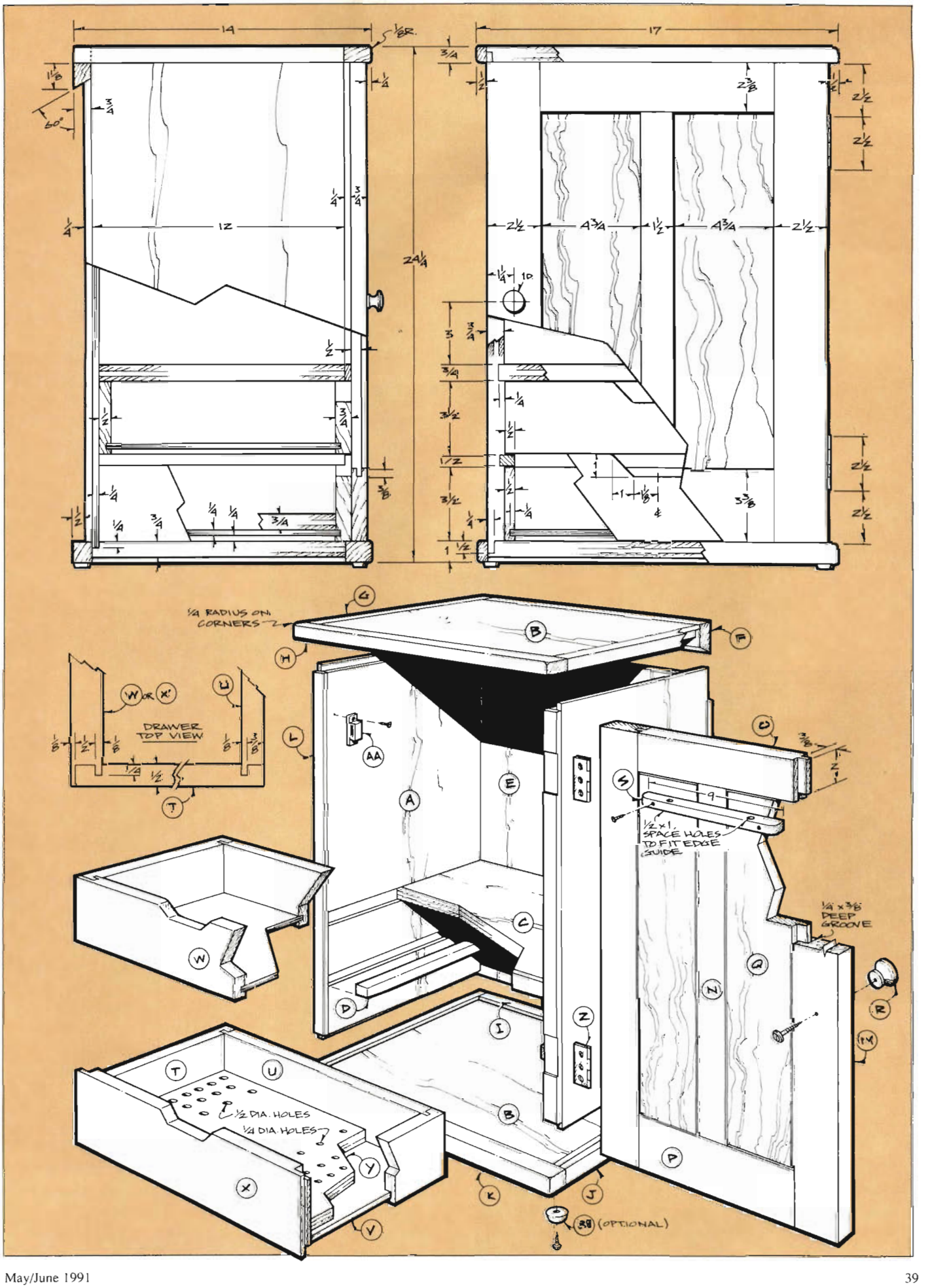
All that remains are a few details. I used a pair of hardware store hinges (Z) and a magnetic catch (AA) to hang the door and keep it closed. If you plan on standing the cabinet on a floor or some other surface—instead of wall-mounting it—you'll need four rubber feet (BB), also available at your local hardware store.

Now get your router, laminate trimmer, bits and accessories, put them in your new cabinet and step back to admire. You've got a router storage cabinet that not only organizes all your router equipment, but also displays your fine craftsmanship.

Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Side	3/4 x 12 x 23 1/2*	2
B	Top/Bottom	3/4 x 12 x 16	2
C	Shelf	3/4 x 11 3/4 x 15	1
D	Drawer Guide	1/2 x 3/4 x 11 3/4	2
E	Back	1/4 x 15 x 23	1
F	Top Back Edging	3/4 x 1 7/8 x 16**	1
G	Top Side Edging	1/2 x 3/4 x 12 3/4	2
H	Top Front Edging	3/4 x 1 1/4 x 17	1
I	Bottom Back Edging	3/4 x 1 x 16	1
J	Bottom Side Edging	1/2 x 1 x 12 3/4	2
K	Bottom Front Edging	1 x 1 1/4 x 17	1
L	Front/Back/Shelf Edging	1/4 x 3/4 stock	10 ft.
M	Door Stile	3/4 x 2 1/2 x 22 1/2	2
N	Door Center Stile	3/4 x 1 1/2 x 17 1/2*	1
O	Door Upper Rail	3/4 x 2 3/8 x 11 3/4*	1
P	Door Lower Rail	3/4 x 3 3/8 x 11 3/4*	1
Q	Door Panel***	1/2 x 5 3/8 x 17 1/2*	2
R	Door Knob	1 dia.	1
S	Cleat	1/2 x 1 x 9	1
T	Drawer Side	1/2 x 3 1/2 x 11 7/8	4
U	Drawer Back	1/2 x 3 1/2 x 14*	2
V	Drawer Bottom	1/4 x 11 1/4 x 14	2
W	Top Drawer Front	3/4 x 3 1/2 x 14 1/2	1
X	Bottom Drawer Front	3/4 x 4 x 14 1/2	1
Y	Router Bit Board	3/4 x 10 3/4 x 13 1/2	1
Z	Hinge	1 5/8 x 2 1/2 long	2
AA	Magnetic Catch	1 x 2 long	1
BB	Foot	3/4 dia.	4

* Length includes tongue or tenon.
** To make a wall mount bracket, cut a length of stock identical to part F, but size it at 14 1/2 in. long. The bracket must be screwed securely to the wall, preferably into several studs. For a masonry or plaster wall, use wall anchors with a load rating of at least 60 pounds.
*** Panel width is 1/8 in. less than groove-to-groove dimension to allow for wood movement.


14
17
12
24¼
60°
DRAWER TOP VIEW
¼ RADIUS ON CORNERS
½ DIA. HOLES
¼ DIA. HOLES
½ x 1 SPACE HOLES TO FIT EDGE GUIDE
¼ x ⅜ DEEP GROOVE
(OPTIONAL)

Clocks are among today's most collectible items—and with good reason. They are typically a focal point in a room. Even a smaller clock, like this Eli Terry shelf clock, is an attention getter. To help make this clock a little easier for you to build, we've arranged for the Mason & Sullivan Company to offer a component package that includes just about everything you need, from the high-quality German-made, brass, key-wound Westminster chime movement right down to the screws and escutcheon pins (see Bill of Materials for details). Mason & Sullivan can also provide the column turnings, in either cherry, or while supplies last, in walnut. If you intend to make the clock in walnut and plan to order the column turnings, we suggest you make sure they're still available in walnut before starting work. It's a good idea to have all the hardware and parts on hand before starting the construction.

The body of the clock is just two sides (A), joined by the top (B) and bottom (C). The ends of the sides have a 1/4 in. thick by 1/4 in. long tenon that fits into a matching stopped dado in the top and bottom. The front inside edge of both sides has a 1/4 in. deep by 3/4 in. wide rabbet, which accepts the door. When cutting this rabbet, you should actually make it a little over 3/4 in. wide so the door fits flush with the front edges of the sides after they have been rounded slightly. The router table and a 1/4 in. straight cutter are used to make the stopped dadoes in both sides for the shelf (F), and the stopped grooves for the 1/4 in. thick plywood dial board (G). Note that the shelf is only 3 in. wide, which leaves a space between its front edge and the back of the dial board. The shelf also has a 1 in. deep by 4 in. long notch in the center of the back edge to allow for the pendulum. The dial board is just a 13 1/4 in. square section of 1/4 in. plywood, with a 4 1/2 in. diameter hole cut in the center.

Mold the side and front edges of the bottom using 1/4 in. radius roundover and cove cutters in the router table. Again using the router table, but now with a 3/8 in. radius roundover bit, apply the 3/8 in. radius roundover on the front and ends of the top and on the front edges of the two sides. Next, cut the rabbets for the wings (H) and back (I) in the top and bottom, and drill the column (J) holes in these same parts. You can turn the columns to the dimensions shown in the Turning Detail, or as noted earlier, the columns may be purchased.

Now assemble the sides, dial board, top, bottom and columns. Screws help secure the top and bottom to the sides. The dial board is captured in the grooves in the sides and top. The shelf, to which the chime portion of the movement is mounted, slides into place from the back, but is not glued in place. This facilitates adjusting the chimes, if needed. The back, which is added later, helps keep the shelf in place. Also at this time, cut the two wing parts. Their top and bottom ends are notched to fit within the rabbets in the top and bottom (see Back view), but like the back they aren't screwed in place until after the shelf, chimes and movement are mounted.

Now make the base ends (D) and front (E). Cut the parts to size, transfer the profiles from our full-size patterns, cut

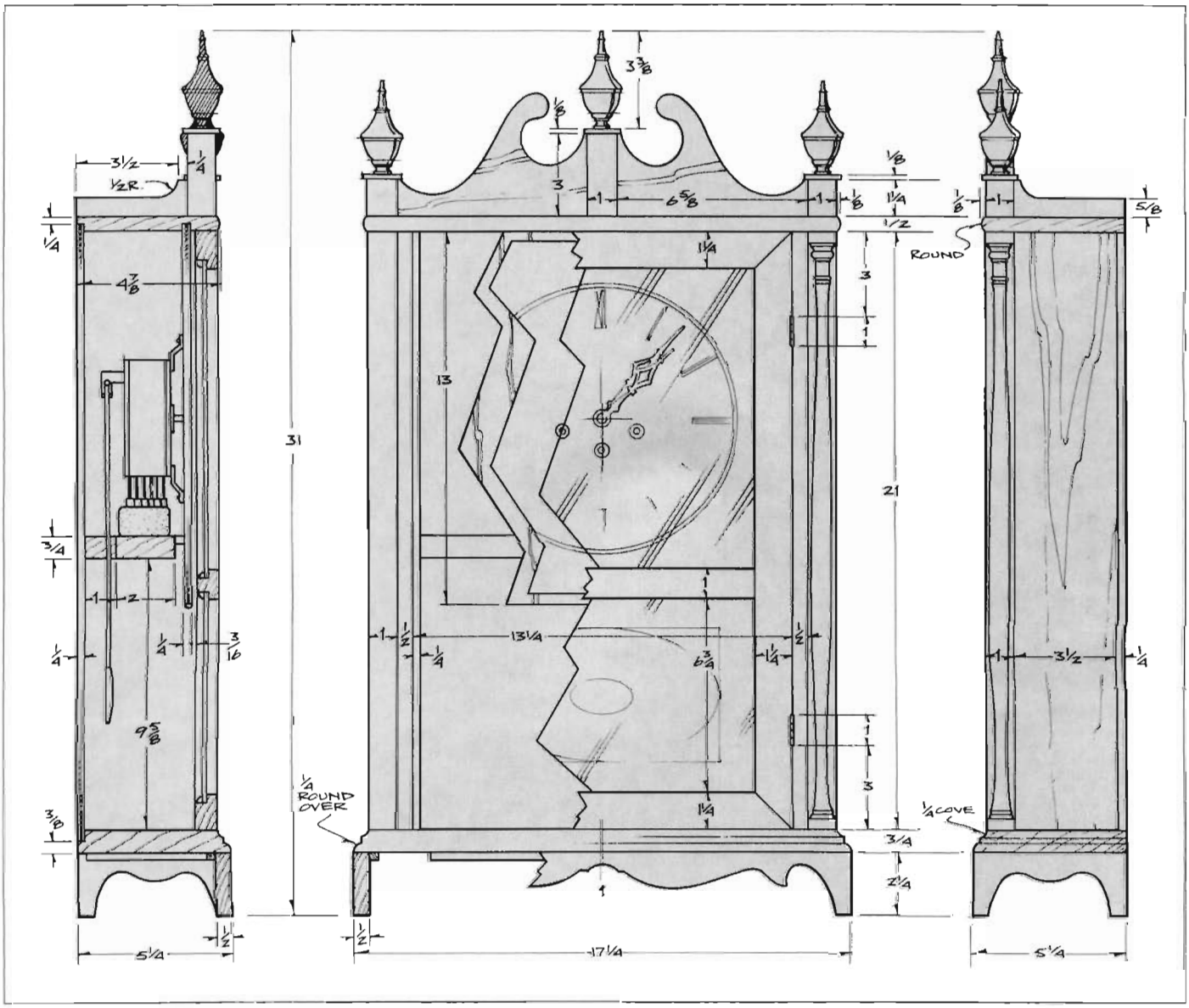
the miters, and lastly cut out the scroll profiles. Glueblocks help secure the base parts. The top gallery consists of two corner blocks (K), a center block (L), three cap parts (M) and side and front gallery parts (N, O). Transfer the profile of the front gallery from the full-size pattern and cut it out. Note the 1/2 in. radius profile of the side gallery. Use glueblocks behind the gallery parts to lend them added stability.

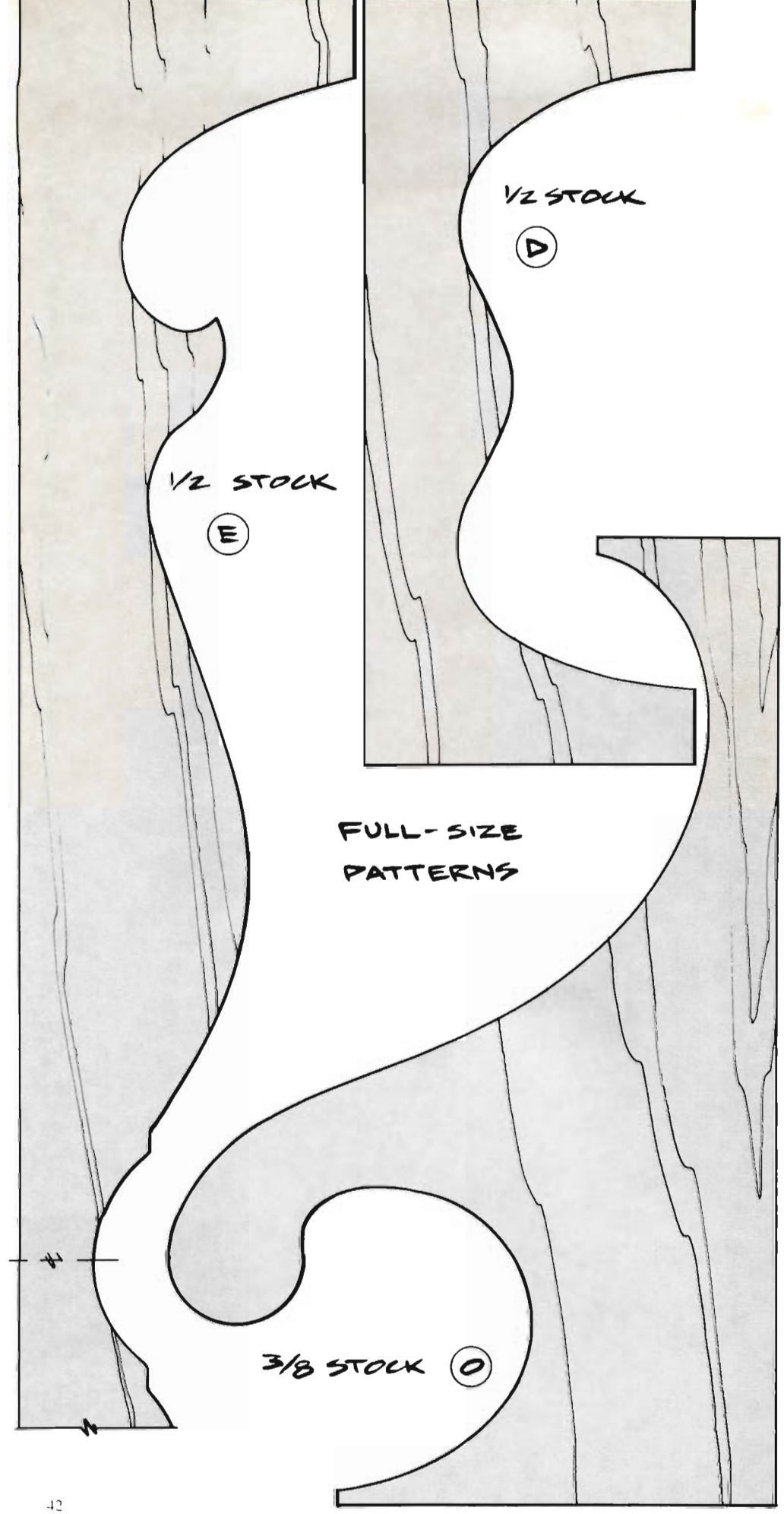
Now go to work on the door. It consists of mitered and slip-joined stiles (P) and rails (Q). Fig. 1 shows the rail ends. As shown in Fig. 2, a center rail (R) separates the clear upper glass (S) from the painted lower glass (T). The lower glass is supplied with the clock kit, but you must have the upper glass cut to fit at your local glass shop. Before you mount the glass, mortise the door and side for the hinges (V), drill for the knob (W), mount the bullet catch (X) and then test-fit the door.

The door must have its finish applied before the glass is mounted, and the case must be finished before the movement (Y), dial (Z), hands (AA), pendulum (BB) and urn finials (CC) are added. Both cherry and walnut look fine with just a clear protective finish, no stain required. We suggest a semi-gloss lacquer, which will provide good protection and has enough shine to make the clock stand out. The wings and back should also be finished now. They have been test-fit but are not yet final mounted.

Once the finish has dried, you can get to work on the remaining details. First up is mounting the dial and movement. The movement is screwed into the back of the plywood dial board. The chimes are mounted to the shelf with machine screws before it's slid into place. You may need to fuss with the hammers or the chime mount to get the hammers to strike the chime bars squarely, but that's easily done since the back is off. If the shelf doesn't fit snugly in the dadoes, add a few brads to lock its location. That way you'll prevent the shelf from moving out of position after the hammers have been set to properly strike the chime bars. Also mount the dial, which screws in place with four very small roundhead screws, and the urn finials, which are screwed through the caps and into the gallery corner and center blocks.

All that's left is to mount the door glass and knob, and to final mount the door. Both the glass parts are held in place with a plastic keeper strip (U), which is supplied with the kit. Cut lengths of the keeper strip and miter the ends, just as you'd do with a quarter-round wood keeper strip. Take care not





Bill of Materials
(all dimensions actual)

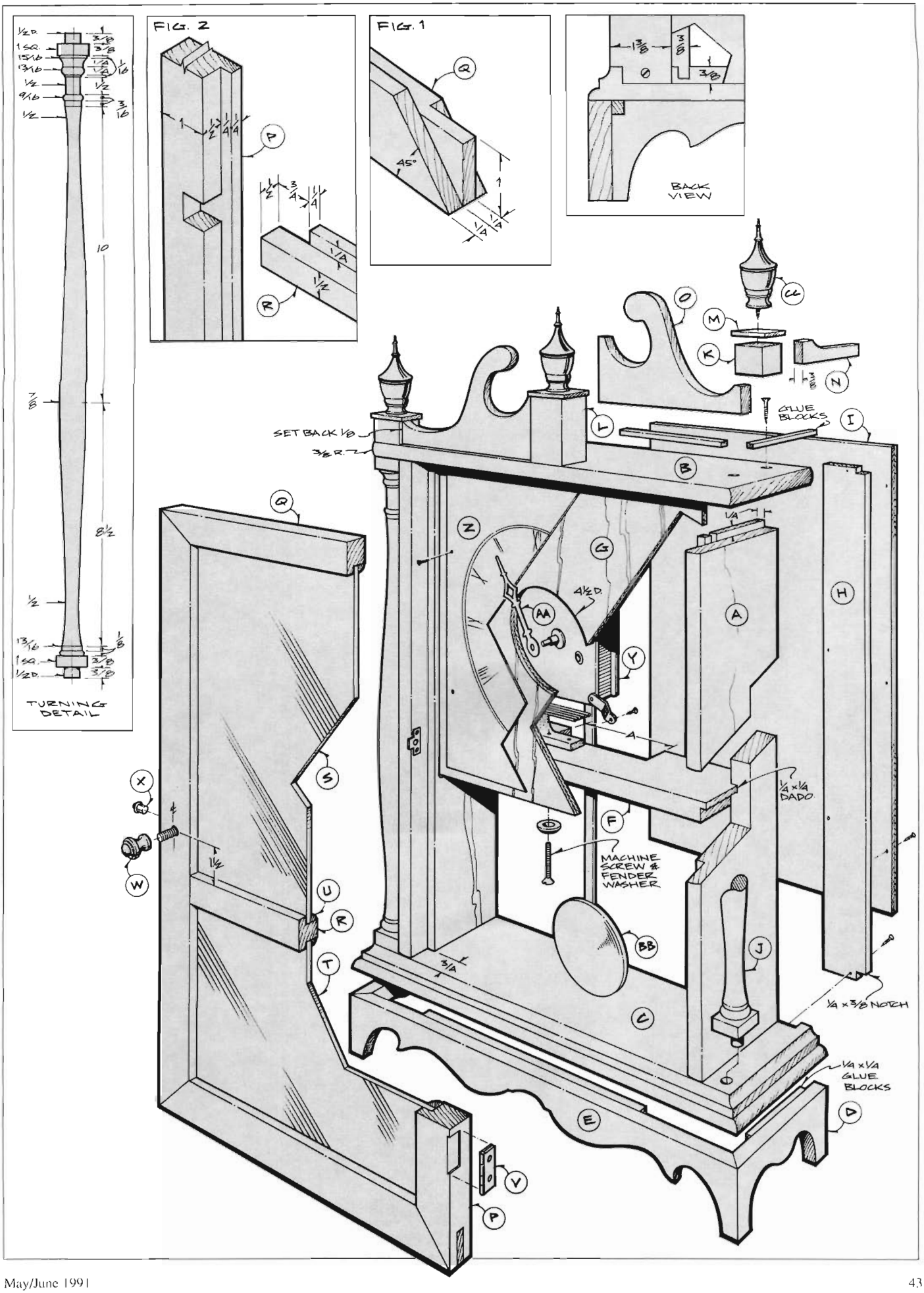
Part	Description	Size	No. Req'd.
A	Side	3/4 x 4 1/2 x 21 1/2*	2
B	Top	1/2 x 4 7/8 x 16 1/2	1
C	Bottom	3/4 x 5 1/4 x 17 1/4	1
D	Base End	See Full-size Pattern	2
E	Base Front	See Full-size Pattern	1
F	Shelf	3/4 x 3 x 13 1/4*	1
G	Dial Board	1/4 x 13 1/4 x 13 1/4	1
H	Wing	1/4 x 1 3/8 x 21 5/8	2
I	Back	1/4 x 13 1/2 x 21 5/8	1
J	Column**	See Detail*	2
K	Corner Block	1 x 1 x 1 1/4	2
L	Center Block	1 x 1 x 3	1
M	Cap	1/8 x 1 1/4 x 1 1/4	3
N	Side Gallery	3/8 x 1 1/4 x 3 3/4	2
O	Front Gallery	See Full-size Pattern	2
P	Door Stile	3/4 x 1 1/4 x 21	2
Q	Door Rail	3/4 x 1 1/4 x 13 1/4	2
R	Door Center Rail	3/4 x 1 x 12 1/4*	1
S	Clear Glass	11 1/4 x 11 1/4	1
T	Painted Glass***	7 1/4 x 11 1/4	1
U	Keeper Strip***	1/4 round	as req'd
V	Hinge***	1 x 3/4	2
W	Knob***	1/2 dia.	1
X	Bullet Catch***	5/16 dia.	1
Y	Movement***	Westminster Chimes	1
Z	Dial***	12 3/8 x 12 3/8	1
AA	Hands***	Supplied w/ Movement	1 pair
BB	Pendulum***	Supplied w/ Movement	1
CC	Urn Finial***	3 3/8 x 1 9/16 dia.	3

* Length includes tongue or tenon.

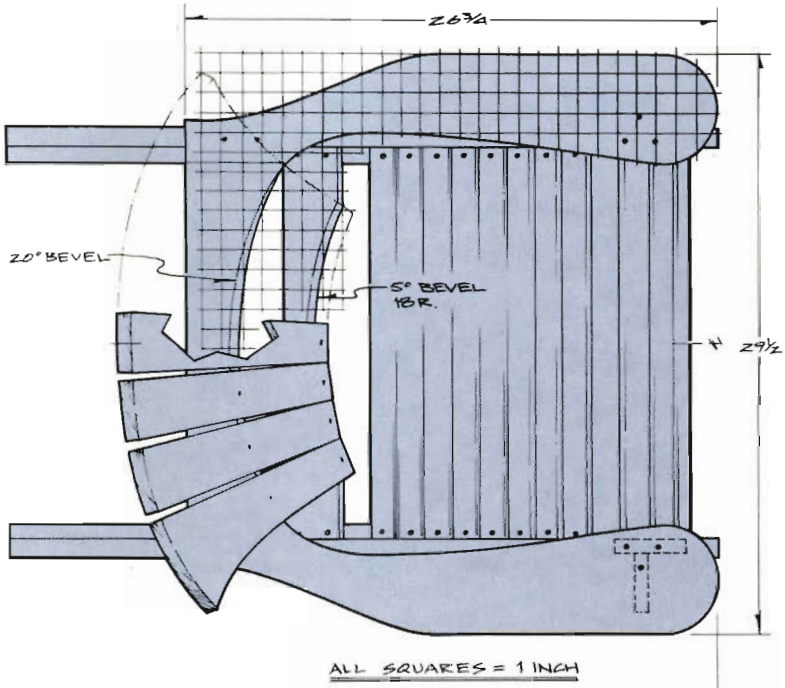
** Column turnings are available from Mason & Sullivan (see below for address). For columns in cherry order part no. A2232C-2; price is $14 postpaid. A limited number of the columns are also available in walnut. Order part no. A2232W-2; price is $11 postpaid. Walnut columns will no longer be available once present stock is gone.

*** A component package including the Westminster chime movement, the dial, hands, pendulum, painted glass, and a hardware package with the hinges, urn finials, knob, bullet catch, glass keeper strip and all necessary brass screws and escutcheon pins is available from Mason & Sullivan, Dept. 3978, 586 Higgins Crowell Rd., W. Yarmouth, MA 02673; tel. (508) 775-4643. The component package is part no. A0540X, and the cost is $199 postpaid. This component package does not include any of the wood parts. The column turnings can be ordered separately (see above).

to scratch the painted inside surface of the lower glass when installing it. Predrilling the holes for the brass escutcheon pins (also included with the kit) that hold the retainer strip in place will make mounting it easier, and lessen the danger of a slip that could break the glass.

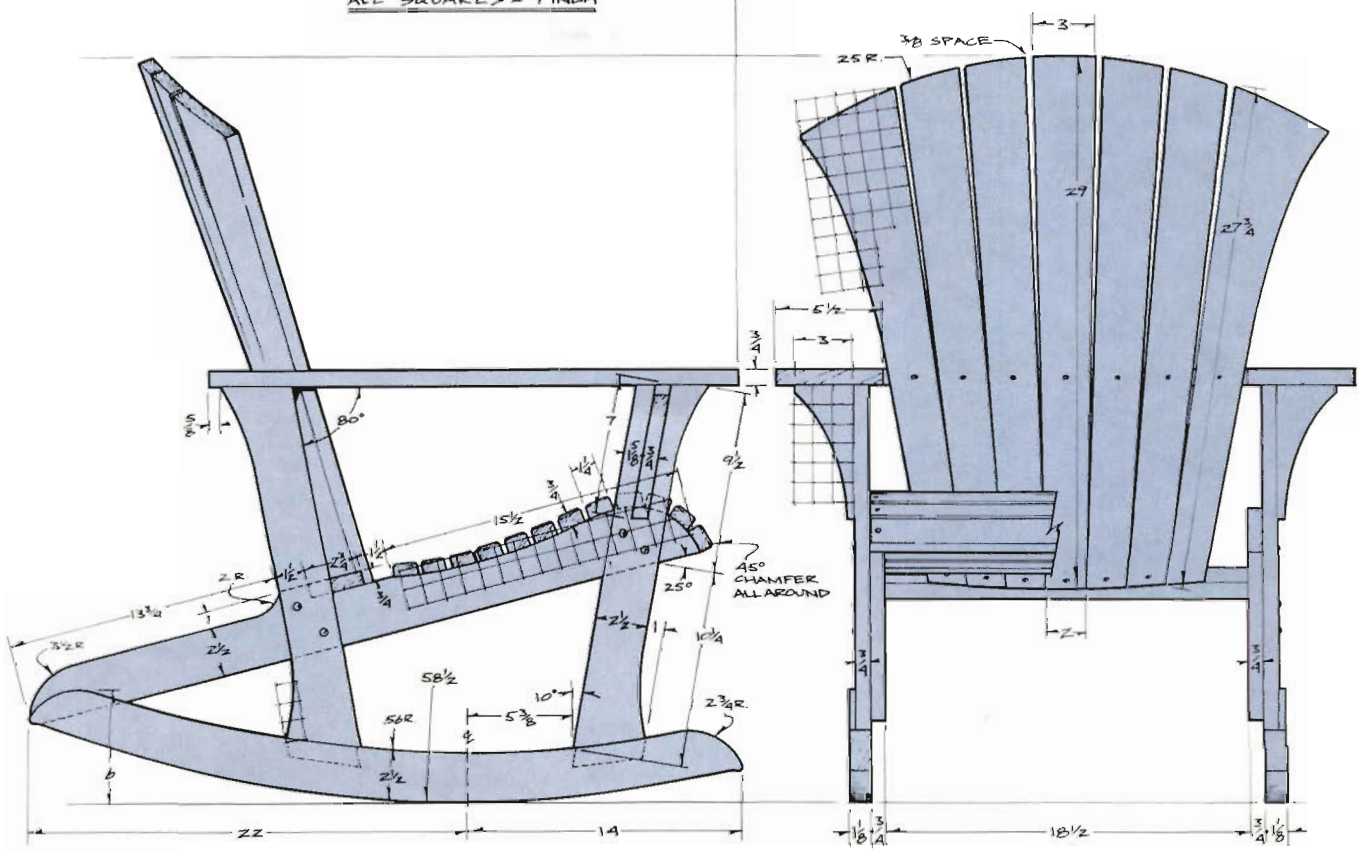

TURNING DETAIL
FIG. 2
FIG. 1
BACK VIEW
SET BACK 1/8
3/8 R.
GLUE BLOCKS
4½ D.
1/4 x 1/4 DADO
MACHINE SCREW & FENDER WASHER
1/4 x 3/8 NORTH
1/4 x 1/4 GLUE BLOCKS

ADIRONDACK ROCKER



The Adirondack Chair that we featured in our March/April 1986 issue was such a success, that back issue has long been sold out. But for fans of the distinctive Adirondack style, here's a handsome rocker that is also bound to please. Its curved back and seat combine to cradle your torso, while the generous return at the seat front provides a gentle support for thighs. The wide arms are sturdy enough for your favorite book, or a paper plate piled high with grilled chicken and coleslaw. With its good looks and comfort, this rocker will fast become everyone's favorite front porch seat.

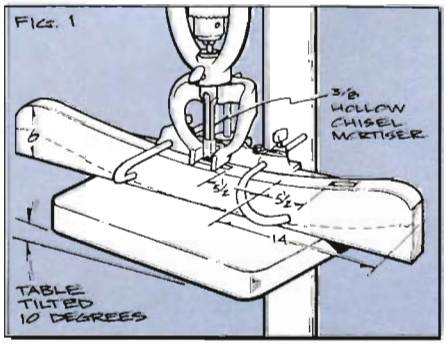
To make this project easier for you to build, we've arranged with a hardware supplier to offer a kit (K) that includes all the stainless steel screws and bolts that you'll need (see Bill of Materials). If



you haven't used square-drive screws before, don't miss "Square-Drive Screws: Are they Really Better?" on page 47.

We built our rocker entirely of 3/4 in. thick pine, except for the 1 1/8 in. thick rockers (E), which are hardwood (poplar) for better wear. Avoid stock with knots, since they reduce strength.

Start by cutting the seat supports (A), legs (B), lower stretcher (C), seat slats (D) and rockers to length and width. Then lay out the various profiles. We've supplied grid patterns for the seat supports and legs, but you'll need to use a string and pencil to lay out the radii on the lower stretcher and rockers. Be sure to lay out the radii on the rocker blanks so the 58 1/2 in. radius line touches the bottom edge at a point exactly 14 in. from the front end (see side elevation). This layout is essential for the proper location of the leg tenon mortises. The four legs are identical except for the tenons, which should not be cut until after your mortise work on the rockers is complete. Also, leave the top end of the legs square for now.



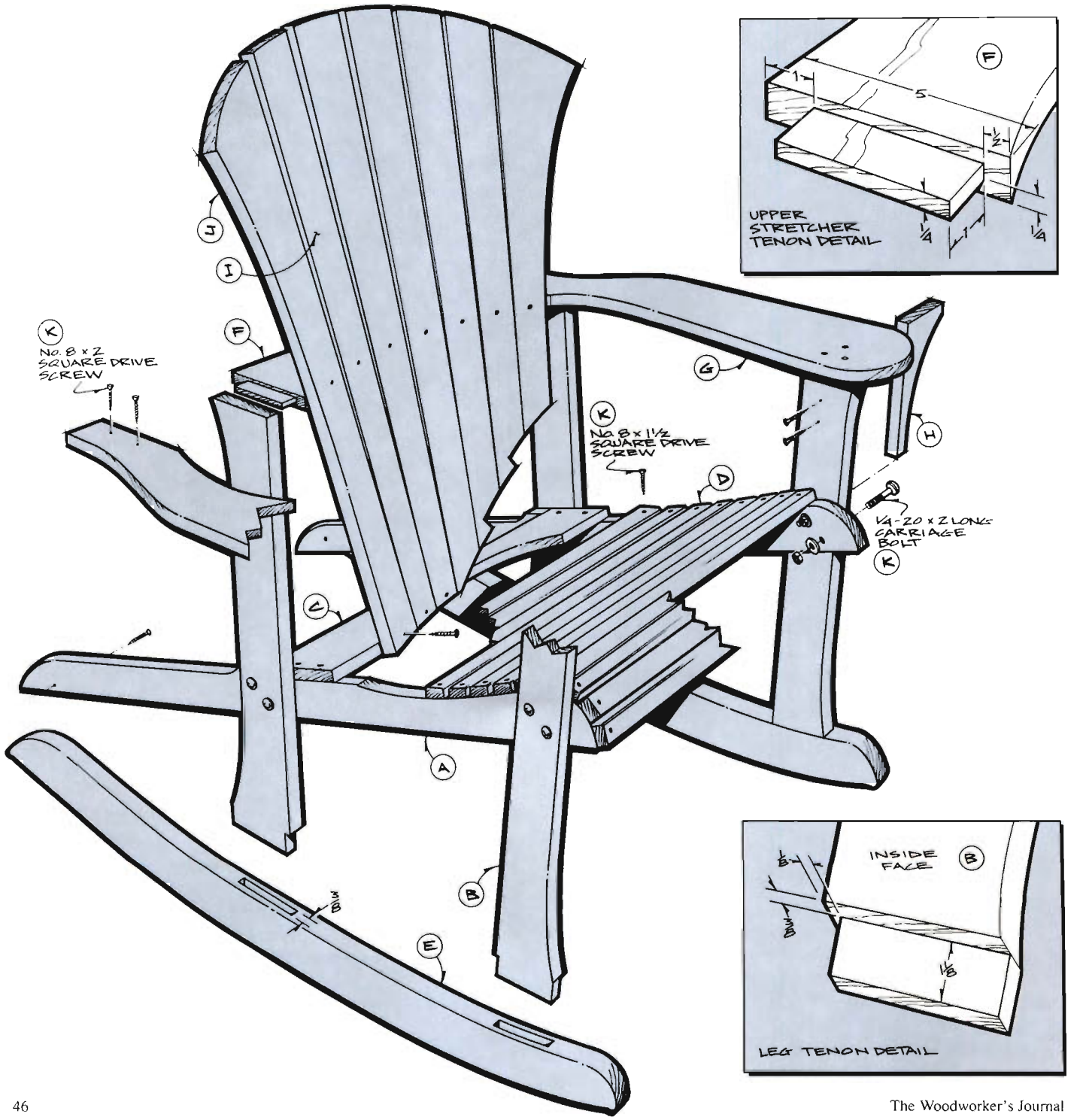
Use the band saw to cut the shape on the seat supports, legs, lower stretcher and on the top edge of the rockers. Leave the bottom edge of the rockers square for now. Lay out the leg tenon mortises so each is 5 1/2 in. from the 14 in. line (see Fig. 1). Then use the drill press, with the table angled 10 degrees, to bore the rear mortise in each rocker. Flip the rockers around to bore the front mortises, or just tilt the table 10 degrees to the left. We show a mortising attachment with a 3/8 in. hollow chisel in use, but you can also just use a 3/8 in. diameter drill bit and

clear the waste with your chisel. You'll need to readjust the depth of cut several times to maintain a consistent 1 1/8 in. mortise depth, but don't worry about getting the bottom of these mortises exactly even. The epoxy that's used to secure the joint will fill any gaps.

Cut the shape on the bottom of the rockers, then cut and fit the leg tenons (see detail), making certain to orient the tenon shoulders properly. The diagonally opposed legs are identical. Transfer the curved shoulder to the tenons by scribing a line directly from the rockers, then use files to gently shape the shoulders to the scribed lines.

Now go to work on the upper stretcher (F) and arm (G) assembly. Cut the tenons on the upper stretcher ends (see detail) and the corresponding mortises in the arms, then glue and lightly clamp these parts. We used G1 waterproof epoxy, available from the Garrett Wade Co., 161 Avenue of the Americas, New York, NY 10013; 1-800-221-2942. When dry, lay out the profile from the grid pattern and cut to shape. Use a spokeshave to apply the 5-degree bevel to the lower stretcher and the 20-degree bevel to the upper stretcher. The router table and a chamfering bit are used to apply the 45-degree chamfer to the seat slats.

Assemble the lower stretcher and seat slats to the seat supports. Dry-mount the legs to the rockers, then use spring clamps to temporarily clamp the seat assembly in place. Use the dimensions on the side elevation to check that the



Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Seat Support	3/4 x 3 1/2 x 35	2
B	Front/Back Leg	3/4 x 3 1/2 x 20 7/8*	4
C	Lower Stretcher	3/4 x 2 3/4 x 20	1
D	Seat Slat	3/4 x 1 1/4 x 20	12
E	Rocker	1 1/8 x 6 x 36**	2
F	Upper Stretcher	3/4 x 5 x 20 1/2*	1
G	Arm	3/4 x 5 1/2 x 26 3/4	2
H	Arm Brace	3/4 x 3 x 7	2
I	Back Slat	3/4 x 3 x 29**	5
J	Flared Back Slat	3/4 x 5 x 27 3/4**	2
K	Hardware Package***	see below	1

* Length includes tenon(s).
** Width of rockers and lengths of back slats are before parts are final shaped.
*** Hardware package is available from Bruss Fasteners (see Sources for address). Package is all stainless steel, and includes 15 no. 8 x 2 in. long and 50 no. 8 x 1 1/2 in. long square-drive screws, plus 10 carriage bolts (1/4-20 x 2 in.), 10 washers and 10 nuts. Note that these numbers include a few extra of each part. The kit is part no. WWJ2 and the cost is $10 postpaid.

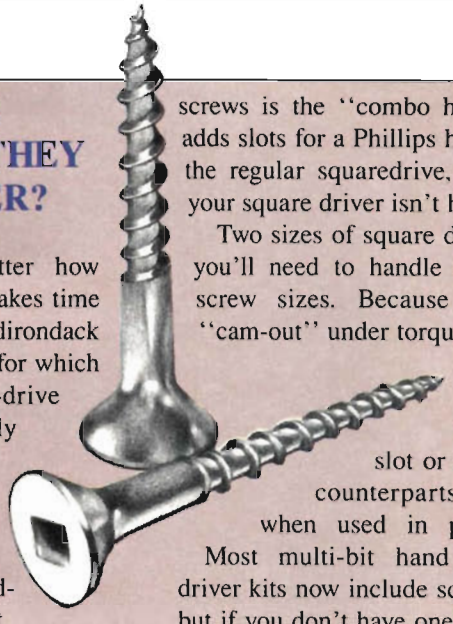
seat assembly location is correct. Next, block the rockers on a flat and level surface so the point on the rockers that's 14 in. from the front touches that surface. Use a long straightedge to scribe a straight line across the top ends of the legs that's parallel to your level surface, then cut the tops of the legs off along this line. The angle of cut should be 10 degrees if you've got everything else right. It's important that the tops of all four legs are cut at the same level, so the upper stretcher/arm assembly can rest evenly. Lay out the arm brace (H) profile from the grid pattern, establish the 10-degree angle along the top ends that butt to the underside of the arms, cut the shape, then screw the braces in place.

Glue the leg tenons into the rocker mortises, again using the G1 waterproof epoxy. Clamp pressure isn't needed here, since gravity should keep the tenons seated in the rocker mortises. Drill for and mount the bolts that fasten the seat assembly to the legs, and screw the upper stretcher/arm assembly into the leg tops. Add a screw through the back end of each seat support into the rockers.

All that's left is to cut and mount the back and flared back slats (I, J) and apply the finish. Start with all the slats a little longer than final length, cut the tapers as shown, then transfer the pattern from the grid to the flared slats and cut the flare shape. The top radius is established by laying out the back slats so the bottoms are touching and the tops fan out to about a 3/8 in. spacing. Scribe the 25 in. radius across the top, cut along this line, final sand, then mount the back slats. Locate the center slat first, then work out to the side, adding the flared slats last. Don't worry if the bottom ends of the back slats aren't all even; the important part is that the top radius looks right. You'll need to remove a few seat slats to facilitate mounting the bottom ends of the back slats. Once the back slats are all mounted, use a hand saw to trim any excess slat length even with the bottom side of the lower stretcher.

We used a semi-transparent exterior stain for a finish, but you could use just about anything from a clear finish to paint. Since all the hardware is stainless steel, you'll never have a problem with rust bleeding through the finish.

SQUARE-DRIVE SCREWS: ARE THEY REALLY BETTER?



Sometimes, no matter how great an idea is, it takes time to catch on. The Adirondack Rocker is the first project for which we've specified square-drive screws, but it certainly won't be the last. We're convinced that once you try them, you will agree that square-drive screws have several important advantages over standard slot or Phillips drive wood screws.

Square-drive screws aren't new. In fact they've been around since 1908. But until fairly recently, their use was mainly for industry. Today, woodworking supply catalogs routinely carry square-drive screws, and reports are that most woodworkers who try square-drive screws prefer them.

The obvious advantage of square-drive screws is that the square recess enables you to apply maximum driving torque without fear of the bit coming out and skittering across the stock. Sharp, deep-cutting threads and a narrow body provide excellent hold—even in end grain—with minimum tendency to split the wood.

Square-drive screws are made in all standard sizes, shapes and materials. Standard head types are flathead, trim head, pan head and round washer head, and screws are available in everything from stainless steel and zinc-coated to brass. A new wrinkle on square-drive screws is the "combo head," which adds slots for a Phillips head driver to the regular squaredrive, just in case your square driver isn't handy.

Two sizes of square drivers are all you'll need to handle the different screw sizes. Because they don't "cam-out" under torque, the drivers last longer than their slot or Phillips head counterparts, especially when used in power drills. Most multi-bit hand and power driver kits now include square drivers, but if you don't have one, the supplier of the Adirondack Rocker hardware kit has agreed to include a driver in the kit.

If you've ever had a piece ruined by a screwdriver bit skittering across your finely sanded surface, or felt the dismay of having to back off and replace a chewed-up screw because you couldn't drive it home, then you'll appreciate square-drive screws. Both of the sources listed below carry a wide range of square-drive screws.

SOURCES

Bruss Fasteners
P.O. Box 88307
Grand Rapids, MI 49518-0307
Tel. (616) 698-8314
(for Adirondack Rocker hardware kit)

McFeely's
712 12th. St.
P.O. Box 3
Lynchburg, VA 24505-0003
Tel. (800) 443-7937

Pennsylvania Small Chest

Built by Paula Garbarino

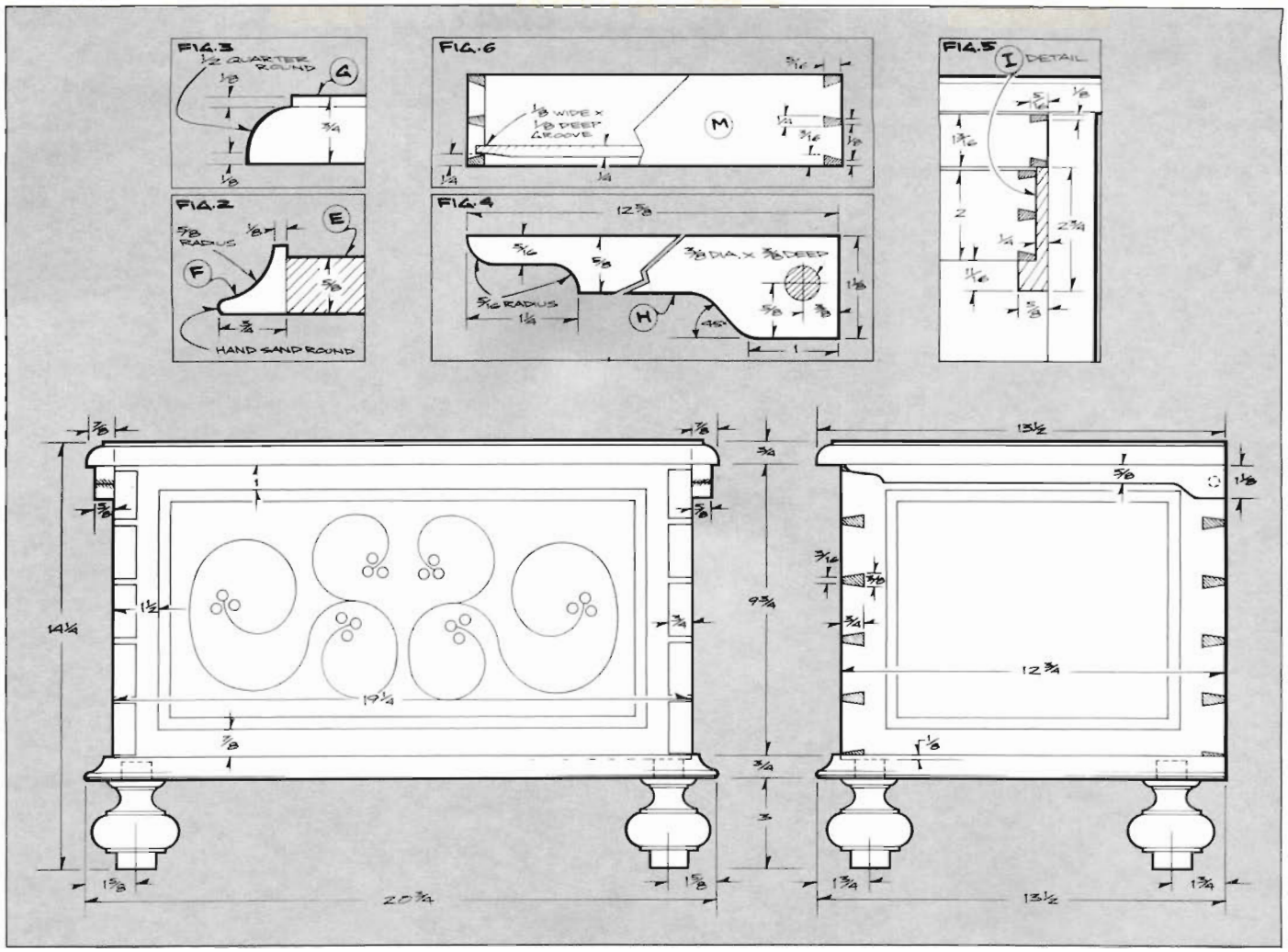
This small chest, by Massachusetts woodworker Paula Garbarino, is typical of the fine detail that woodworkers in the Pennsylvania area had achieved by the early 1700's. The combination of inlays, molded edges, and bun feet shows a strong William and Mary influence.

Walnut chests in this style were often used to hold books—such as the family bible—and valuable documents. Today it can be used as storage for just about anything, from a large jewelry collection to knitting. It could even make an elegant repository for reading matter in the living room.

With the exception of the line-and-berry and banding inlays (see Special Techniques, page 17), the chest is rather simple to build. It's just a dovetailed, lidded box, nested in a molded frame and set on bun feet, with two shallow trays within. Our chest is walnut, though cherry or mahogany are other choices you may want to consider. By the way, if you like the chest, and would rather not fuss with all the inlay work, but still want some decoration, similar bandings are available from Constantine's, 2050 Eastchester Rd., Bronx, NY 10461; tel. 1-800-223-8087.

A good place to start is with edge-gluing stock for the wide parts—chiefly the chest front and back (A), ends (B) and lid (G). Once these parts are out of clamps, cut them to final length and width. Then refer to the Special Techniques article and do the inlays. The chest front has both a line-and-berry and banding, but the ends and back use the banding only.

Once the inlay work has been completed, use the table saw dado head to cut the 1/4 in. deep by 1/4 in. wide groove in the front, back and ends for the bottom (C), then lay out and cut the dovetails. If you haven't cut dovetails before, the Woodworking Basics article in our January/February 1991 issue details an easy method for making hand-cut dovetails. The bottom panel is 1/4 in. thick aromatic cedar. While you are at it, plane enough 1/4 in. thick aromatic cedar to also yield the bottoms



of the two interior trays. Test-fit the dovetails, then glue the chest front, back and ends up around the bottom. In practice, the bottom should be sized just a little under the groove-to-groove dimensions to allow for wood movement.

Next, make the frame. It's basically just two ends (D) and a front and back (E), mitered at the corners and joined with splines. The frame is 5/8 in. thick, which enables the chest to nest within the cavity that's created when the 3/4 in. square molding (F) is added. Naturally, the frame should be sized to fit the dimensions of your chest. The molding will cover the frame on the sides and front, but you should use walnut for the frame back, which is exposed. The 1/8 in. wide spline grooves are cut with the table saw, using a tenon jig to safely hold the stock. Be sure to cut the hardwood splines so the grain runs perpendicular to the joint (Fig. 1). Or you can use a biscuit jointer—should you have one—for the frame joinery.

The walnut molding is mitered and applied to the assembled frame as a 3/4 in. square strip, which makes the glue-up easy. The router table with a 5/8 in. radius cove cutter is then used to mold the cove profile. Hand-sanding rounds the edge (Fig. 2). Once the frame and molding are complete, the frame is mounted to the chest with screws.

Now go to work on the lid. Use a 1/2 in. radius roundover bit to mold the front and ends of the lid (Fig. 3), then make the cleats (H). The cleat profile is shown in Fig. 4. Drill for the 3/8 in. diameter dowel pivot hinges, which fit in blind holes in the chest ends and on the inside face of the cleats. To mount the lid, first insert the pivot dowels, then add the cleats, and lastly screw the lid in place through the cleats. Note that the two frontmost holes in the cleats are slotted to allow for wood movement across the width of the lid. Test-fit the lid, but don't mount it permanently yet. That's not done until the chest is finished. Note that the top back edge of the chest is rounded to a 3/8 in. radius, which enables the lid to pivot smoothly without interference.

The two trays provide a space for small

Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Front/Back	3/4 x 9 7/8 x 19 1/4	2
B	End	3/4 x 9 7/8 x 12 3/4	2
C	Bottom	1/4 x 11 3/4 x 18 1/4*	1
D	Frame End	5/8 x 2 1/2 x 12 3/4	2
E	Frame Front/Back	5/8 x 2 1/2 x 19 1/4	2
F	Molding	3/4 x 3/4 stock	4 ft.
G	Lid	3/4 x 13 1/2 x 21	1
H	Cleat	5/8 x 1 1/8 x 12 5/8	2
I	Tray Support	5/8 x 2 3/4 x 11 1/4	2
J	Upper Tray Front/Back	5/16 x 1 3/16 x 17 3/4	2
K	Upper Tray End	5/16 x 1 3/16 x 5 1/2	2
L	Upper Tray Bottom	1/4 x 5 1/8 x 17 3/8*	1
M	Lower Tray Front/Back	5/16 x 2 x 17 1/4	2
N	Lower Tray End	5/16 x 2 x 5 1/2	2
O	Lower Tray Bottom	1/4 x 5 1/8 x 16 7/8*	1
P	Foot	see full-size pattern	4

* Bottom panel widths should be sized a little less than actual groove-to-groove dimensions to allow for panel expansion.

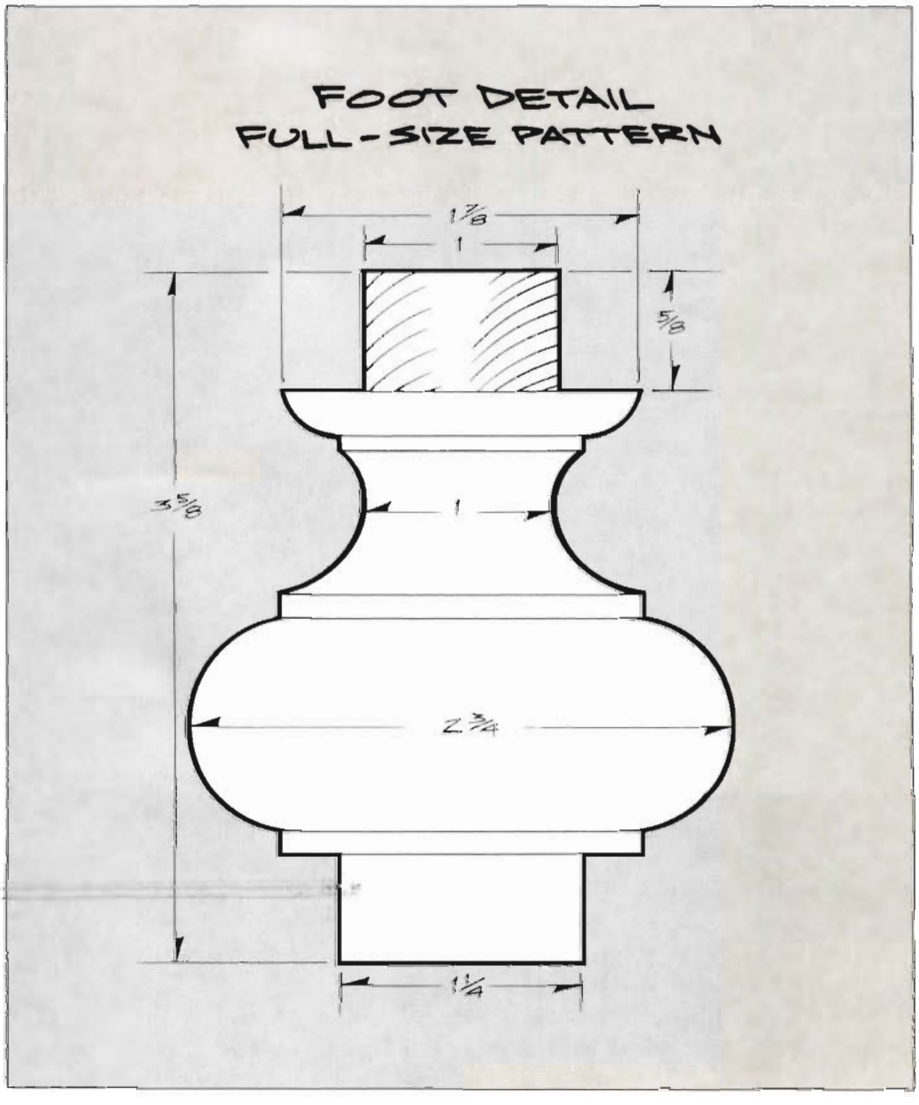
things inside the box. They rest on a pair of stepped supports (I), which are mounted with screws. To make the supports, notch some 5/8 in. thick by 2 3/4 in. wide stock to give it an L-shape (Fig. 5). The upper tray (J, K, L) is 1/2 in. longer than the lower tray (M, N, O), but the lower tray is a little deeper. Suggested dovetail layouts for the trays are shown in Fig. 5. The tray sides and ends are constructed of 5/16 in. thick stock, a dimension that's yielded when 3/4 in. thick stock is resawed. You can resaw with the band saw (see our Woodworking Basics feature on resawing, page 13), or you can use a thin-kerf blade in the table saw. A good quality thin-kerf blade should produce a surface that needs minimal sanding.

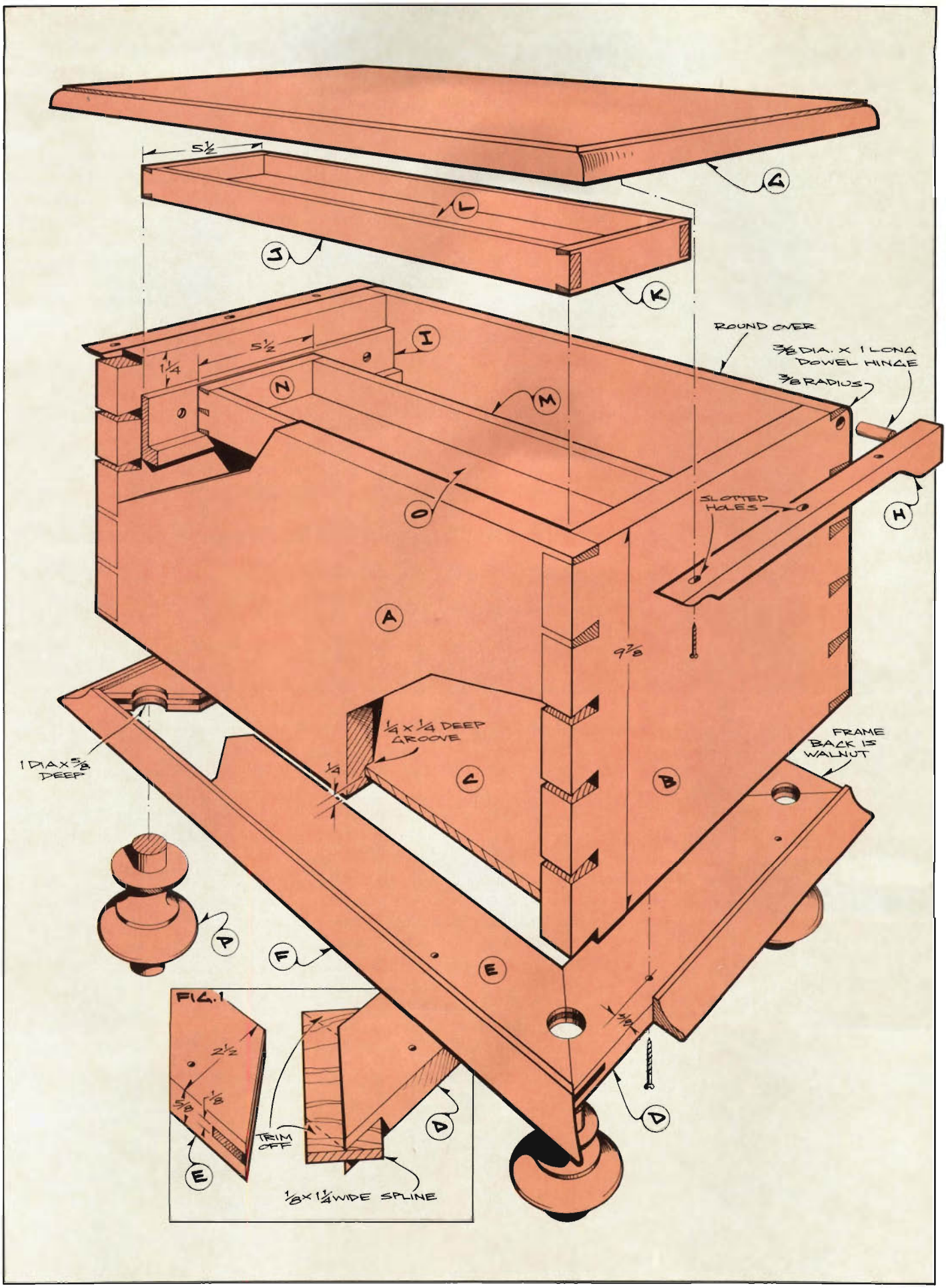
The tray bottoms are cut from the same 1/4 in. thick aromatic cedar that you planed earlier. However, you'll need to bevel all four edges so the bottoms will fit within the 1/8 in. wide grooves in the trays (Fig. 6). The bevels are easily formed with a hand plane. The grooves are made with your 1/8 in. thick table saw blade, set for a 1/8 in. depth of cut.

All that remains are the bun feet (P). Actually, these are optional. If you intend the chest for a dresser top, you may want to dispense with the bun feet and just use four rubber feet to cushion the chest. If you opt for the turned feet, use our full-size pattern as a guide. Turned 1 in. diameter tenons on the upper ends of the feet fit within same-sized holes drilled in the frame.

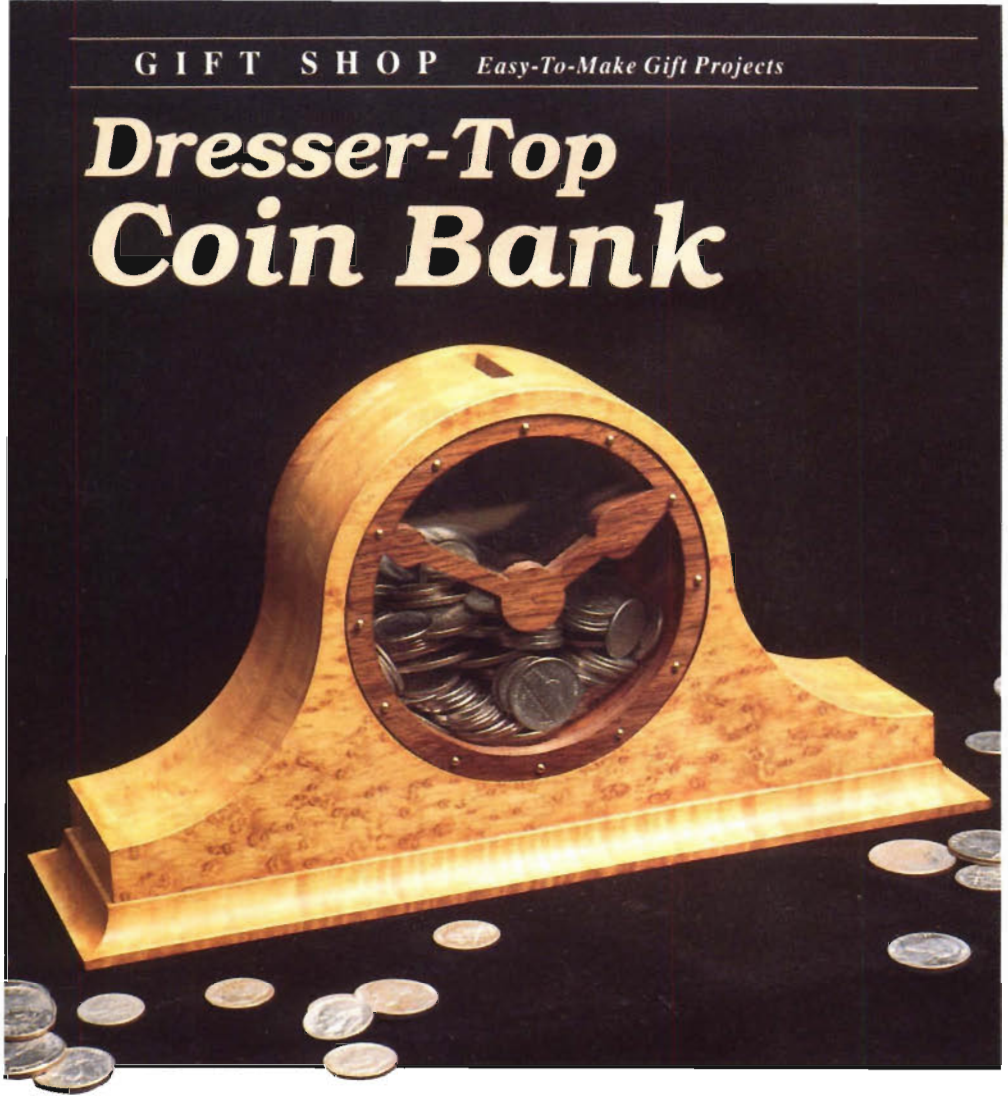
Our chest sports a traditional French-polished lacquer finish. If you've never tried French polishing, a small chest like this makes an ideal practice project. We recommend Qualasole padding lacquer by Behlen. Called the modern French polish, Qualasole padding lacquer yields a French polish finish in about one-tenth the time required by traditional French polish methods. Qualasole is applied with cheesecloth, and both the finish and the cheesecloth can be ordered from *Wood Finishing* Supply Co., 100 Throop St., Palmyra, NY 14522; tel. (315) 597-3743.

Once your finishing work is complete, the lid can be mounted. The dowel hinge pins are glued into the chest, but the ends that fit into the cleats are waxed to reduce friction and wear. Make certain that the cleats pivot smoothly on the pins before you screw the lid in place. WWJ




5½
G
L
J
K
ROUND OVER
⅜ DIA. x 1 LONG DOWEL HINGE
⅜ RADIUS
5½
1¼
I
N
M
O
SLOTTED HOLES
H
A
9⅞
¼ x ¼ DEEP GROOVE
1 DIA x ⅝ DEEP
¼
C
B
FRAME BACK IS WALNUT
P
F
E
D
D
FIG. 1
2½
⅝
⅛
TRIM OFF
E
⅛ x 1¼ WIDE SPLINE

Dresser-Top Coin Bank



With this handsome coin bank on your dresser top, it will always be the right time to save. It's an attractive and interesting alternative to the tray that many of us use to hold our loose change when we empty our pockets at day's end.

With the full-size half-pattern that we provide, the bank is easy to make. We used bird's-eye maple for the clock body, curly maple for the base, and walnut for the clock face. However, almost any combination of contrasting woods will look fine. You can cut the Plexiglas front and back yourself, or we've arranged for a mail-order source to supply both the two Plexiglas disks and the 12 brass escutcheon pins that hold the front disk and face in place.

Start by laminating three boards, each measuring 3/4 in. thick by 5 in. wide by 9 1/2 in. long (Fig. 1). When the lamination has dried, transfer the pattern to the workpiece (Fig. 2). Note that the pattern being transferred is only the bank body; the base is added later.

FIG. 1

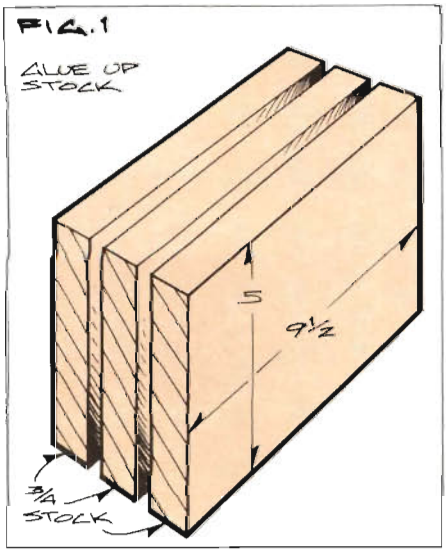
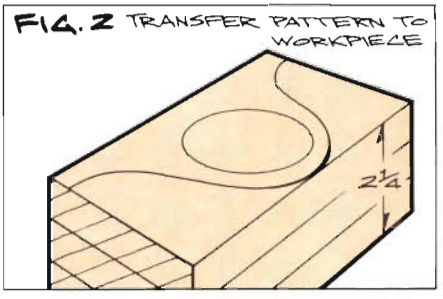
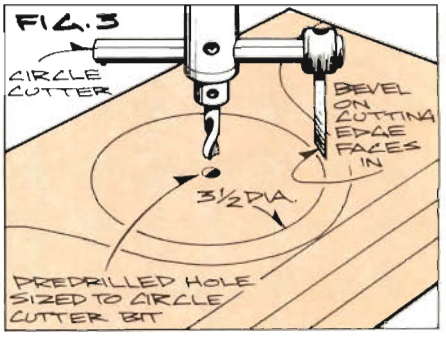


FIG. 2 TRANSFER PATTERN TO WORKPIECE



We used a circle cutter to cut the 3 1/2 in. diameter coin cavity hole (Fig. 3). Pre-drill a hole for the circle cutter bit, cut halfway through, then flip the workpiece and cut through from the opposite side to finish the cavity. The pre-drilled center hole insures that the cuts from both sides will line up. If you don't have a circle cutter, you can rough out the cavity with a hand-held jigsaw. Smooth the interior of the cavity by hand with sandpaper, or use a sanding drum mounted in your drill press.

FIG. 3



Next up is cutting the rabbets (Fig. 4). You'll need a rabbeting bit in the router table. The rabbet on the back is 1/8 in. deep to hold the Plexiglas back, but the front rabbet must be 3/8 in. deep to accommodate both the 1/8 in. thick Plexiglas and the 1/4 in. thick clock face cutout. Once the rabbets are established you can use the band saw to cut the outside profile (Fig. 5). You'll need a narrow blade (no more than 1/4 in. wide) to achieve the fairly tight curves.

The clock face cutout is next. Once again using the full-size pattern, lay out the face profile on some 1/4 in. thick

FIG. 4

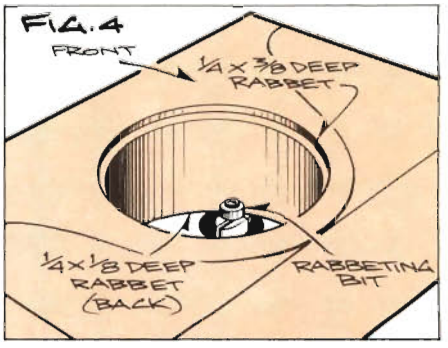
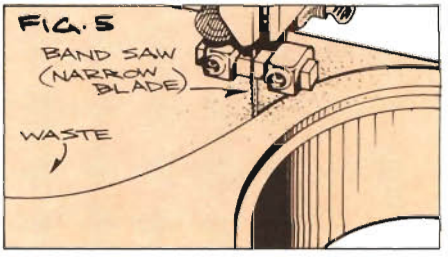
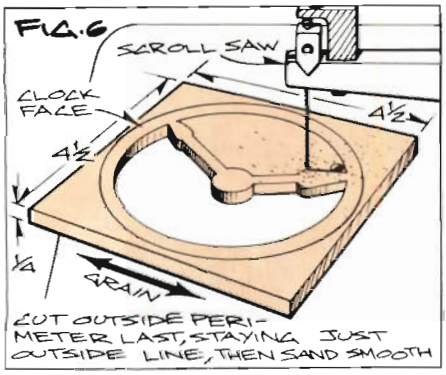
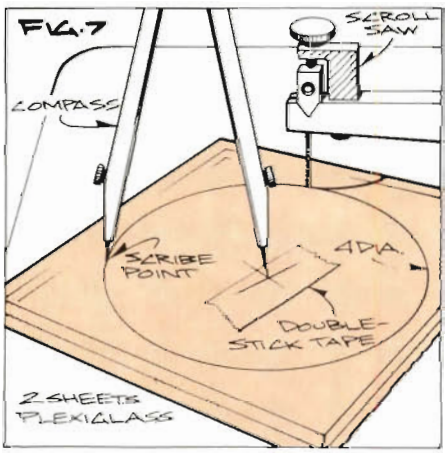


FIG. 5



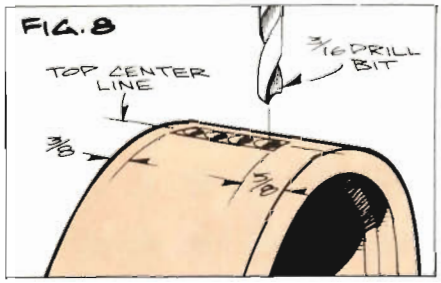
stock. Using either the scroll saw or a coping saw with a fine blade, first cut the inside and then the outside perimeter (Fig. 6). Drill starter holes for the scroll or coping saw blade in each separate interior section that's to be cut out.



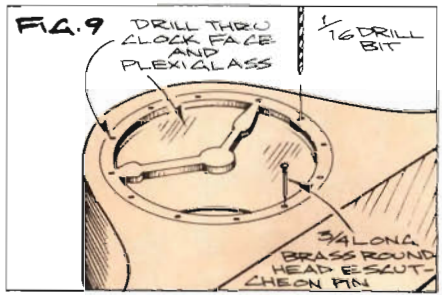


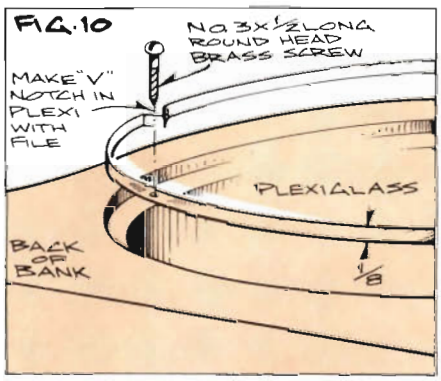
Use some double-stick tape to tape two 4½ in. square sections of Plexiglas together, scribe a 4 in. diameter circle with the compass, then cut out the disks with the scroll or coping saw (Fig. 7). A little sandpaper will smooth the edges. Plexiglas is sold at many building supply and craft stores. If you order the Plexiglas disks, they come laser-cut, so no edge sanding is needed.

Chuck a 3/16 in. diameter drill bit in the drill press and make a series of holes to rough in the coin slot (Fig. 8). Then pare the waste between the drilled holes with a sharp knife or chisel.

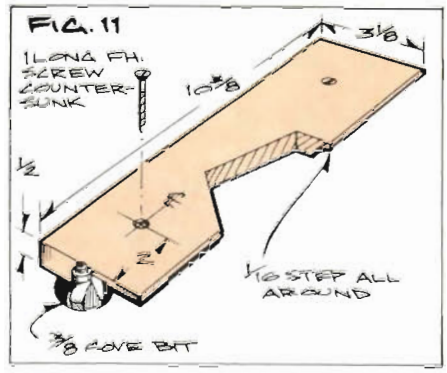


As shown in Fig. 9, the escutcheon pin holes through the face and front Plexiglas disk are made with a 1/16 in. diameter drill bit. If you don't have a complete drill bit set in 1/16 in. increments, you can make a bit by sharpening one end of a brad or finishing nail and





chucking it in your drill. Locate an escutcheon pin at each hour location on the face. If you order the Plexiglas, the escutcheon pin holes are laser-cut. Use the front Plexiglas as a template for drilling the holes in the clock face.



The back Plexiglas disk is removable, so you can empty the bank as needed. Use a file to notch the back Plexiglas (Fig. 10) for the two brass roundhead screws that hold it in place.

All that remains is to make the base (Fig. 11) and apply the finish. Cut the base to the size shown, then use the router table with a 3/8 in. radius cove cutter to mold the edge. Screws hold the base to the body. The finish—we used a golden oak stain followed by shellac and then Minwax Antique Oil—should be applied to the clock and face before the Plexiglas and the face are mounted.

Source of Supply

A hardware kit containing two 4 in. diameter clear Plexiglas disks (one is predrilled with 12 holes), and 12 escutcheon pins is available from Meisel Hardware Specialties, P.O. Box 70-J, Mound, MN 55364. Order no. 9839 Clock Bank Kit. Send $5.99 per kit, plus $2.50 total per order for shipping and handling.

Oak Music Stand

Robert Bodendorf was commissioned to design and build this music stand for St. Andrew's church in Marblehead, Massachusetts. It's a handsome piece, and one that we think you will find a pleasure to use, especially if you are accustomed to those rickety tubular steel stands sold by most music stores. The sliding shaft and pivoting bracket permit a variety of height and angle adjustments, so the stand can be used while sitting or standing.

To get the 2 in. thickness needed for the two feet (A), you'll need 10/4 stock (which measures 2 1/2 in. thick) or 12/4 stock (which is 3 in. thick). Using the band saw, resaw the stock to about 2 1/8 in. (see our Woodworking Basics article on page 13), then plane it down to 2 in. As another option, you can face-glue two pieces of 5/4 stock or three pieces of 4/4 stock to get the necessary thickness. Later on, you'll also need 2 in. thick stock for the bracket (K), so this is also a good time to get stock for that part.

Rip the 2 in. thick stock to 3 3/8 wide and crosscut it into two 20 in. lengths. Referring to the drawing, lay out and mark the notch location for the half-lap joint that is cut in each foot. Note that the notch measures 2 in. wide by 2 1/8 in. deep in the top foot, while in the bottom foot the notch measures 2 in. wide by 1 1/4 in. deep. Mark the notches and use the band saw to cut them out.

Now, with a compass, scribe the curved shapes on the sides of each foot, then band saw them to shape. Check the half-lap joints to make sure the top and bottom surfaces are flush.

Cut the post sides (B) and ends (C) to the dimensions shown in the Bill of Materials. Also, make the connector (F) by ripping 5/4 stock to 7/8 in. square and cutting it to a length of 6 3/4 in. When the project is completed, the bottom end of the connector will serve as a tenon to join the post to the feet, while the top end acts as a stop for the shaft (L).

The post sides and ends, and the connector, are glued in a two-step process. In the first step (Fig. 1), two post ends and one side are glued together along with the connector. Use clamps to apply pressure as needed, and be sure all the surfaces are flush. Note the connector extends out the end for a distance of 1 in. When dry, remove any excess glue squeeze-out, then complete step two of the process by gluing the remaining side in place. The 7 1/2 in. long chamfer on each corner is made with the router and a chamfering bit.

Next, the frame can be made. Miter the ends of the sides (G) and the top and bottom (H). Mortises for the divider (I) are chopped in the center of the top and bottom as shown. The table saw and dado head can be used to cut the tenons on each end of the divider. Splines at each corner help reinforce the joints. The dado head is used to cut the 1/2 in. by 3/4 in. rabbet in the holder (J), then the holder is glued to the lower front edge of the assembled frame.

Since most dado-head cutters are limited to a 1 1/2 in. depth of cut, you'll need to make multiple passes with the table saw blade to cut the 3/4 in. wide by 1 3/4 in. deep groove in the bracket (K). For safety's sake, use a piece of stock at least 10 in. long. And, as always, use a pushstick and keep your hands well away from the blade.

Once the groove is cut, transfer the bracket profile from the grid pattern, then cut it out with the band saw. Also, lay out and bore the 1/4 in. diameter pivot hole and the three angle locking holes.

Cut the shaft (L) for a smooth sliding fit in the post, then round over the top end. Now, using the bracket as a template, bore the pivot hole and the angle locking hole in the shaft.

The three locking pins (M) are made next. There are two parts to each locking pin—a 3/16 in. diameter brass rod and a wooden knob. You can turn the knob to

the dimensions shown or, as an option, substitute a knob from your local hardware store. The rod fits into a 1/2 in. deep hole bored in the knob, and a spot of epoxy glue holds it in place.

Bill of Materials
(all dimensions actual)

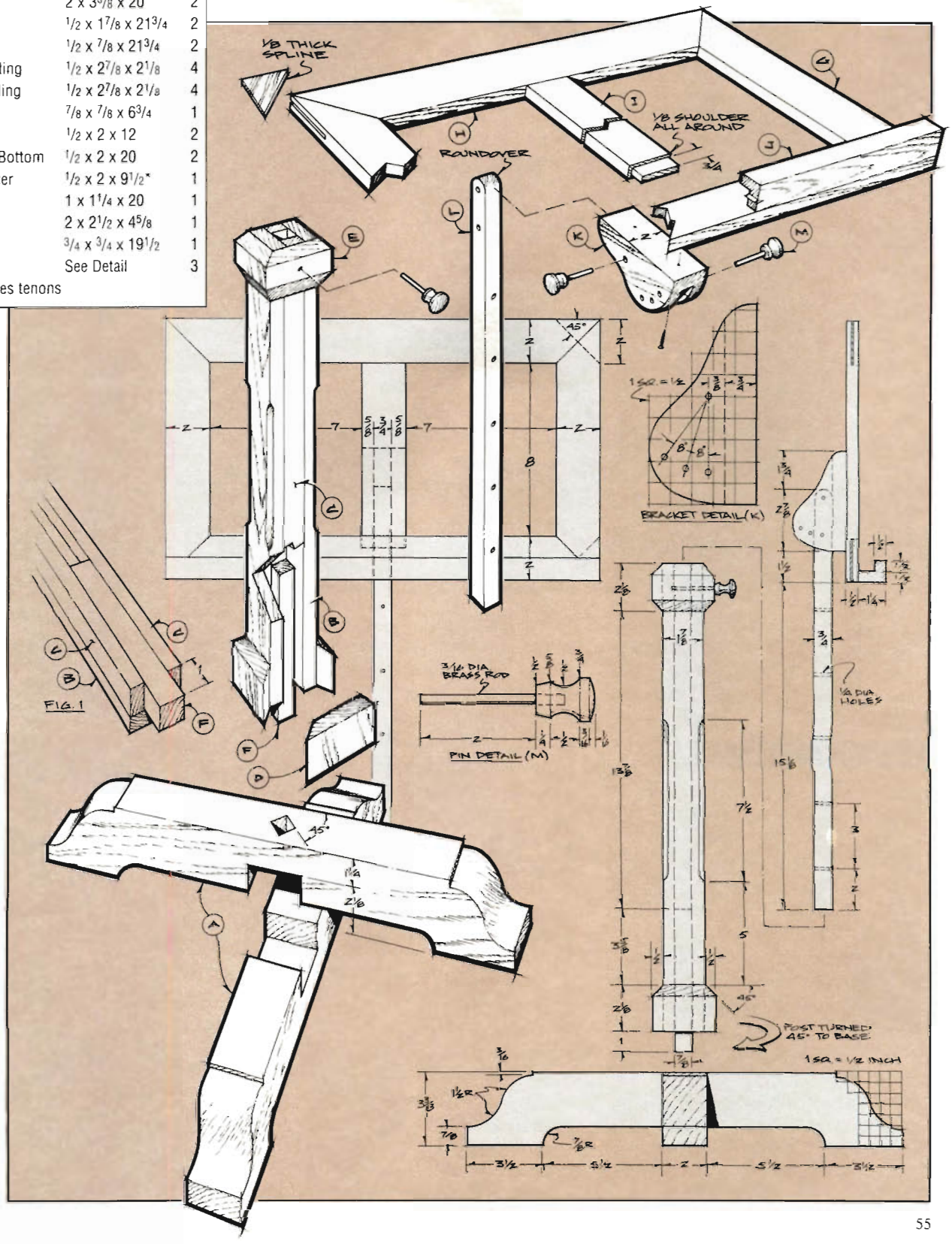
Part	Description	Size	No. Req'd.
A	Foot	2 x 3 3/8 x 20	2
B	Post Side	1/2 x 1 7/8 x 21 3/4	2
C	Post End	1/2 x 7/8 x 21 3/4	2
D	Lower Molding	1/2 x 2 7/8 x 2 1/8	4
E	Upper Molding	1/2 x 2 7/8 x 2 1/8	4
F	Connector	7/8 x 7/8 x 6 3/4	1
G	Frame Side	1/2 x 2 x 12	2
H	Frame Top/Bottom	1/2 x 2 x 20	2
I	Frame Divider	1/2 x 2 x 9 1/2*	1
J	Holder	1 x 1 1/4 x 20	1
K	Bracket	2 x 2 1/2 x 4 5/8	1
L	Shaft	3/4 x 3/4 x 19 1/2	1
M	Locking Pin	See Detail	3

* Length includes tenons

Final sand the feet before gluing them together. To cut the mortise in the top foot, bore a 7/8 in. dia. by 1 in. deep hole, then square the corners with a chisel. Use glue to join the post to the foot. Now, add the lower (D) and upper (E) moldings, mitering the corners as shown.

Bore a 1/4 in. diameter locking pin hole in one side of the upper molding. Using this hole as a guide, slide the shaft into the post and bore five holes spaced 3 in. apart as shown.

Use glue and a pair of screws to join the bracket to the frame. Final sand all parts, then apply a coat of Minwax Golden Oak Stain, followed by two coats of their Antique Oil Finish.



Toy Airport Baggage Cart

Designed and built by Clare Maginley

A couple of evenings in the workshop should be about all that's needed to make this toy. It's made from pine, but just about any wood can be used.

The two carts are identical except for the location of the cart couplers (R). The front cart (the one that connects to the tractor) has a coupler on the bottom; the back cart has a coupler on the top.

Cut all the parts to the dimensions shown in the Bill of Materials, then use the router table to cut the 1/4 in. deep by 1/2 in. wide groove in both the tractor chassis (A) and the two cart floors (Q). The router table can also be used to cut the 1/8 in. by 1/4 in. rabbet along each side of the base (E) and the groove in the back axle support (G). Although we show the groove as 1/4 in. by 1/4 in., you'll actually want to cut it about 1/32 in. larger. That extra space will allow room for the 1/4 in. diameter back axle (N) to rotate in the groove.

Bore a 9/32 in. diameter hole in the tractor coupler (B) and also in the back end of the cart coupler (R). In the front end of the cart coupler, bore a 1/4 in. diameter hole. Once all the holes are bored, apply a 1/8 in. radius to all the coupler corners as shown. Glue the couplers into the grooves and, when dry, add the two sides (C) to the tractor chassis. When the sides dry, sand the top and bottom of each chassis so that all surfaces are flush. Glue a coupler pin (S) to the front end of each cart coupler.

The front axle support (F) and the back axle support (G) are now added to the tractor. Use glue and clamp firmly.

The cart axle support (U) and the spacer (V) can now be glued together. When dry, sand the top edges flush, then glue them to the cart chassis as shown.

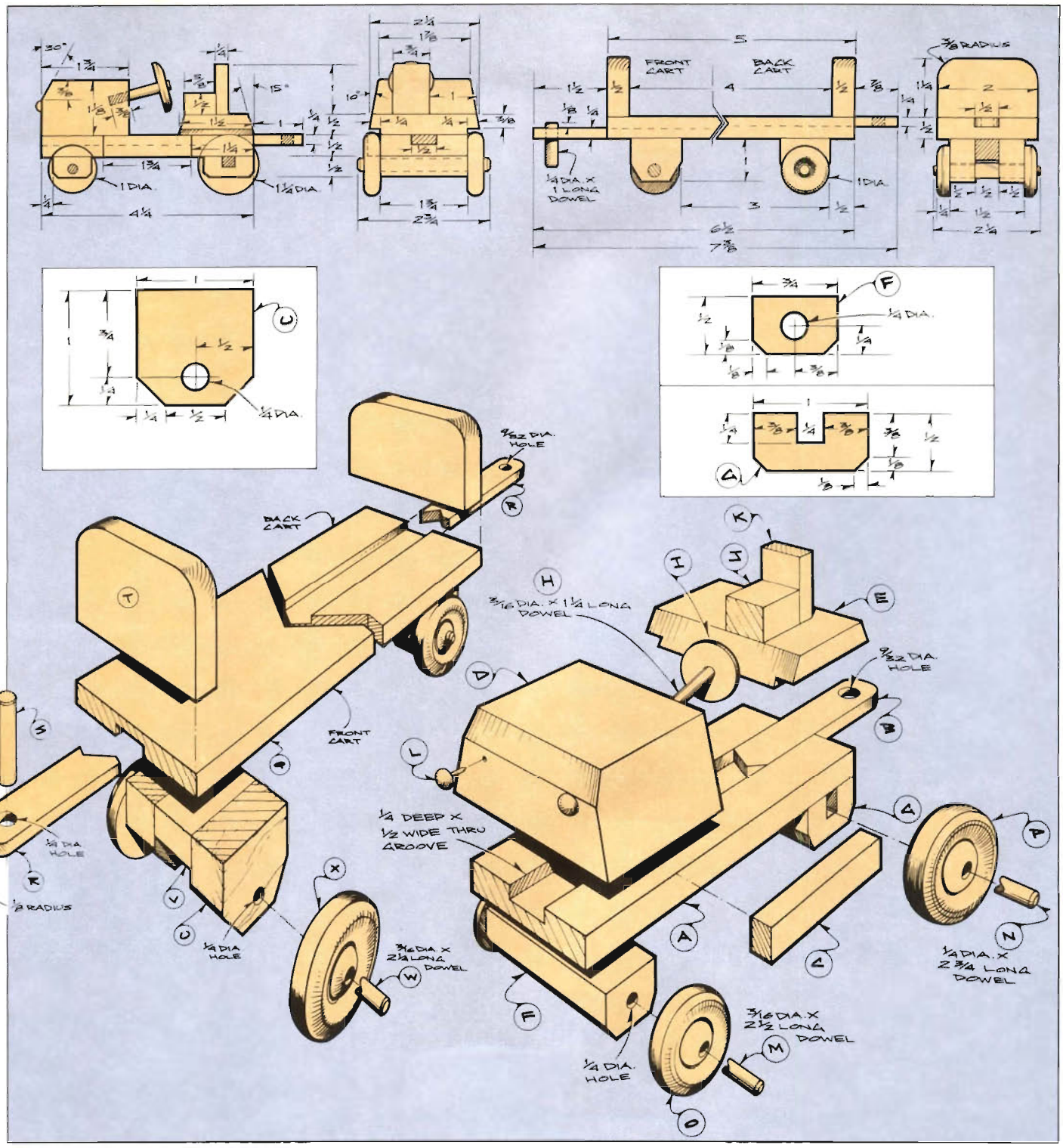
Cut the hood (D) to size and bore a 3/8 in. deep angled hole for the tractor steering wheel post (H). Also, use a file and sandpaper to bevel the front and side as shown. The headlights (L), which are 1/4 in. dia. round-head upholstery tacks

Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
	Tractor		
A	Chassis	1/2 x 1 3/4 x 4 1/4	1
B	Coupler	1/4 x 1/2 x 5 1/4	1
C	Side	1/4 x 1/2 x 1 3/4	2
D	Hood	1 1/8 x 2 1/4 x 1 3/4	1
E	Base	1/2 x 2 1/4 x 1 1/2	1
F	Front Axle Support	1/2 x 3/4 x 1 3/4	1
G	Back Axle Support	1/2 x 1 x 1 3/4	1
H	Steering Wheel Post	3/16 dia. x 1 1/4 long	1
I	Steering Wheel*	1 dia. x 1/4 thick	1
J	Seat Cushion	1/2 x 3/4 x 5/8	1
K	Seat Back	1/4 x 3/4 x 1	1
L	Headlights	1/4 dia.	2
M	Front Axle	3/16 dia. x 2 1/2 long	1
N	Back Axle	1/4 dia. x 2 3/4 long	1
O	Front Wheel*	1 dia. x 1/4 thick	2
P	Back Wheel*	1 1/4 dia. x 3/8 thick	2
	Cart**		
Q	Floor	1/2 x 2 x 5	1
R	Coupler	1/4 x 1/2 x 7 3/8	1
S	Coupler Pin	1/4 dia. by 1 long	1
T	End	1/2 x 1 1/4 x 2	2
U	Axle Support	1/2 x 1 x 1	4
V	Axle Support Spacer	1/2 x 1/2 x 1	2
W	Axle	3/16 dia. x 2 1/4 long	2
X	Wheel	1 dia. x 1/4 thick	4

* Wooden wheels can be ordered from Barap Specialties, 835 Bellows Ave., Frankfort, MI 49635; tel. (616) 352-9863. For 1 in. dia. by 1/4 in. thick wheels, order part number W15 (80¢ per dozen). For 1 1/4 in. dia. by 3/8 in. thick wheels order part number W16 ($1.57 per dozen). Add $1.00 handling charge for orders under $15.00. Prices do not include shipping.

** The quantities shown are the number of parts needed to make one cart.



(nickle-plated), can also be added now. Since small parts can be hazardous to children, secure the headlights by adding a dab of epoxy glue to the point before pushing the tack in place.

As mentioned earlier, the rabbeted edge of the base (E) is cut on the router table. Some short work with a file and sandpaper will produce the bevels on the ends and sides.

Now glue the hood and base in place on the tractor chassis. At the same time, the ends (T) can be added to the cart chassis.

Use glue to secure the steering wheel post (H) to the steering wheel (I), then glue the post into the hole bored earlier. Once the steering wheel is in place, the seat cushion (J) and the seat back (K) can be added.

Now cut the tractor front axles (M), back axles (N), and the cart axles (W) to length. Once cut, glue the tractor front wheels (O) and back wheels (P), and the cart wheels (X) to the axles. If you are unable to find wooden toy wheels locally, we've listed a mail-order source in the Bill of Materials. Note that you will need only two wheel sizes for this toy, a 1 in. diameter by 1/4 in. thick wheel for parts I, O, and X, and a 1 1/4 in. diameter by 3/8 in. thick wheel for part P.

Final sand all parts, taking special care to round over all sharp edges and corners. If you apply a finish, be sure to use one that's non-toxic.

Pierced-Tin SPICE CABINET

This small but elegant cabinet can have many faces and a multitude of uses. The photo shows a combination of a painted cabinet, natural doors and pierced-tin panels, yielding a distinctly traditional spice cabinet look. *But don't be limited by what you see.* The piece can be just as at home in the living room, perhaps as a collector's display cabinet. Substitute clear glass for the tin, and use walnut, cherry, or perhaps a figured maple instead of the painted/natural pine. Should you opt for the cabinet as shown, we've included sources for the tin panels (either blank or pre-pierced) and all the hardware (see Bill of Materials).

Whatever your intent for this cabinet, the construction will be the same. The carcase is just a pair of sides (A) joining a top and bottom (B). Start by cutting these four parts to the lengths and widths indicated. Note that the 23 1/4 in. length of the sides includes the 3/8 in. long tenons on each end. The router table and a 3/8 in. diameter straight cutter are used to cut the rabbet on the ends of the sides and the matching stopped dado in the top and bottom. Use at least three passes, with the first two passes removing most of the stock and the final pass cleaning up the cut. Be sure to stop the cuts in the top and bottom a little short of the dado end, so you can square the ends of the dado with the chisel.

Test-fit the joints you just cut and make any needed adjustments. Next apply the molded edge details to the top and bottom. Use the router table with a 1/2 in. radius quarter-round bit for the bottom edge and a 1/4 in. radius Roman ogee bit for the top. We recommend that you use the fence for these molded edges, since the narrow edge of material remaining—especially on the Roman ogee—may not provide sufficient support for the ball-bearings on some bits.

Also, make a simple template and bore a series of shelf pin holes on the inside of the two sides. The template is just a length of scrap identical in length to the sides, with a row of holes. Clamping the template so it's flush with the ends of the sides as each row of shelf pin holes is drilled will insure that all four rows are indexed the same. This may seem like a small point, but there's nothing quite so frustrating as putting the finishing touches on a piece only to find that you've got a shelf that rocks every time you take something off or put something on it. Note that the shelf pin holes are designed to locate the pins (E) both under and above the shelves (D). This helps prevent the shelves from tipping.

Now glue, assemble and clamp the sides, top and bottom. Check the cabinet with a framing square to insure that the four corners are all at 90 degrees, then set aside to dry. Once dry, mount a 3/8 in. bearing-guided rabbeting bit in your router table, set the bit to make a 1/4 in. deep cut, and establish the rabbet for the back (C). This rabbet can also be cut before assembly, though you'll need to make sure that the rabbet in the top and bottom parts is stopped on both ends.

Now fit the back. You can either round the corners of the 1/4 in. thick pine plywood back to match the radius of your rabbet, or square the corners of the rabbet to fit the plywood (see Back Detail). In either case, the back is glued and screwed in place, though that's not done until after all the parts have had a finish applied. On a simple project like this, the back adds an important measure of strength and rigidity to the carcase.

Next up are the doors. We used a basic slip joint (also called a bridle joint) to join the stiles (F) and rails (G). There are

many ways to cut the slip joint, but the quickest and easiest is on the table saw using a dado head, with a tenon jig to safely support the stock on end. You'll probably need an 8 in. dado head to get the 1 1/2 in. depth, since some 6 in. dado heads aren't capable of achieving this depth of cut. Add a backup block behind the stock being cut, to prevent chip-out as the dado head exits the cut. Be sure to mark all the outside faces on your stock, and cut each piece so the outside face is against the fence or tenon jig.

To start, set the dado head for a 1/4 in. wide cut, locate the tenon jig 1/4 in. from the dado head, and cut the 1/4 in. wide by 1 1/2 in. deep dado in the stile ends. If *your saw isn't* powerful enough to take out stock to a 1 1/2 in. depth in a single pass, use several passes to achieve the full depth. Move the fence and tenon jig 1/4 in. closer to the dado head, mark all the outside faces on the rails, orient the outside faces against the jig as before, and establish all the outside shoulders. Finally, reposition the tenon jig 1/2 in. away from the dado head, and with the rails still oriented so the outside faces are against the jig, establish the inside shoulders. As always, use a piece of scrap to check each new setting before committing your stock to the blade.

Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Side	3/4 x 4 1/4 x 23 1/4*	2
B	Top/Bottom	3/4 x 5 5/8 x 19 1/4	2
C	Back	1/4 x 17 1/4 x 23 1/4	1
D	Shelf	1/2 x 3 7/8 x 16 3/8	3
E	Shelf Pin	1/4 dia. x 3/4 long	24
F	Door Stile	3/4 x 1 1/2 x 22 1/2	4
G	Door Rail	3/4 x 1 1/2 x 9*	4
H	Tin Panel**	6 1/2 x 20	2
I	Retainer Molding	1/4 x 1/2	9 ft.
J	Knob***	3/4 dia.	2
K	Bullet Catch***	As Shown	2
L	Hinge***	1 wide x 2 long	2 pr.

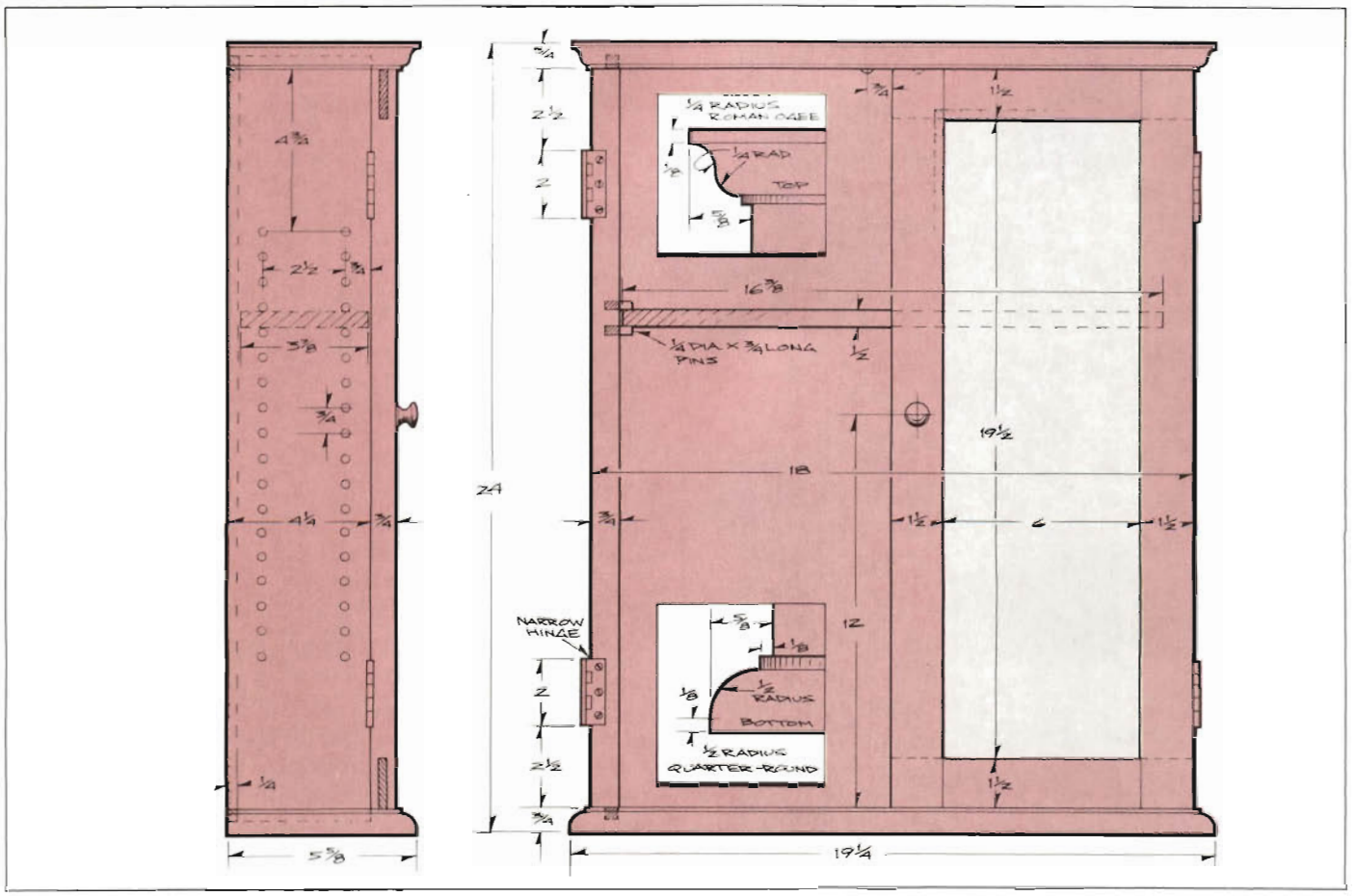
* Length includes tenons.

** Tin panels (either blank tin or pre-pierced with pattern shown) are available from Country Accents, P.O. Box 437, Montoursville, PA 17754; tel. (717) 478-4127. Order part no. RPA-1036 WWJ 6 1/2 x 20. Prices are $8.50 postpaid for two blank tin panels or $30 postpaid for two pre-pierced panels. Be sure to specify whether you want the blank panels or the pre-pierced. A tin-piercing tool is also available. Order part no. T-0359. Cost is $8 postpaid.

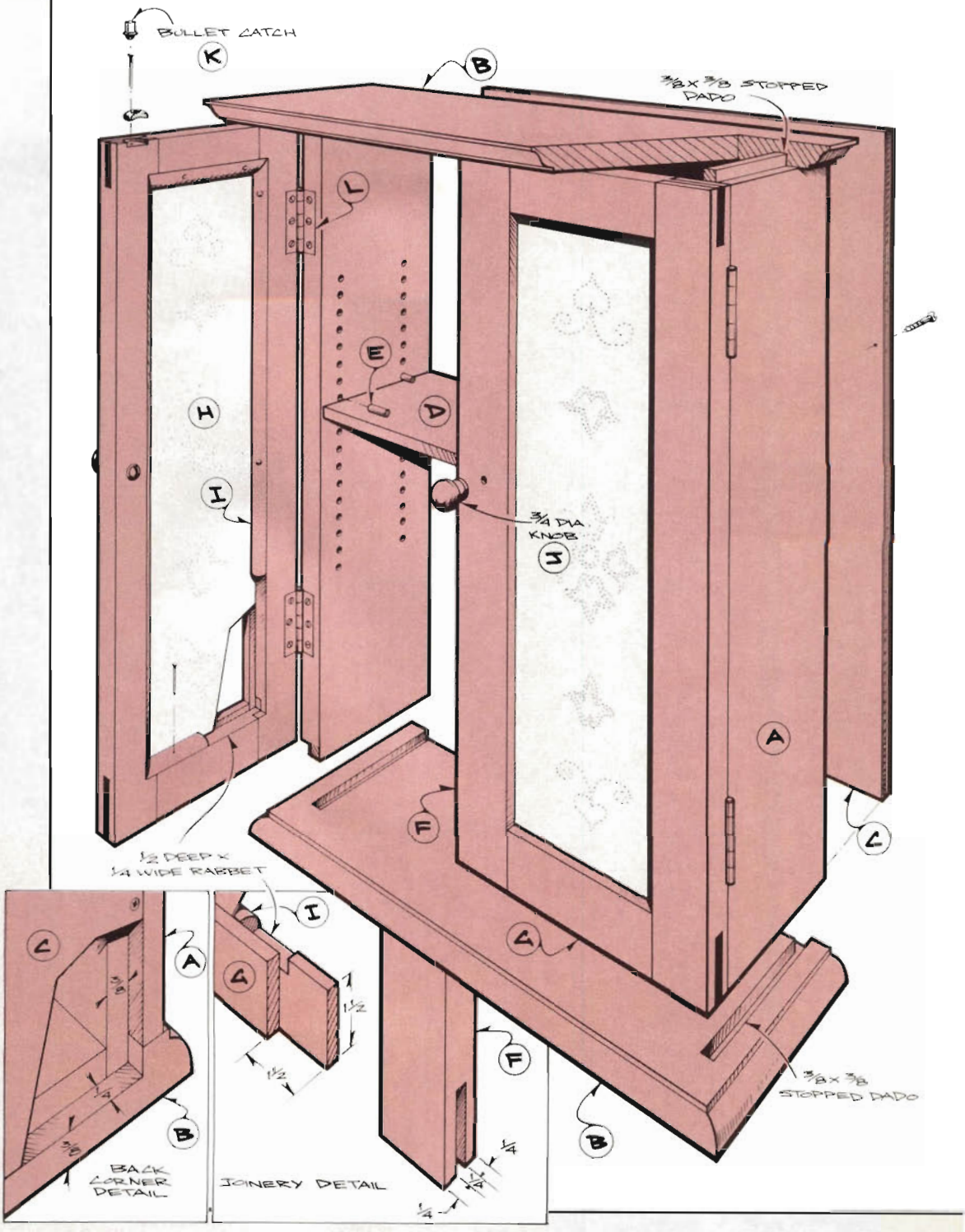
*** Knobs, bullet catches and hinges are available from Constantine's, 2050 Eastchester Rd., Bronx, NY 10461; tel. (800) 223-8087. Knob is part no. 94V5 (25¢ each); bullet catch is part no. 75B11 ($3.30 for 10); hinge is part no. 73A24B ($2.30 per pair).

Glue, assemble and clamp the doors, again carefully checking for squareness. When dry, use a 1/4 in. bearing-guided rabbeting bit to establish the 1/4 in. wide by 1/2 in. deep rabbet for the tin panels. Square the corners of the rabbet with a chisel. Then test-fit the doors, trim them to final size if needed, and mortise for the hinges (L). Before mounting the pierced-tin panels (H) and hanging the doors, you'll need to cut and fit the retainer molding (I) and pre-finish the doors and retainer. We used Minwax Puritan Pine stain, followed by two coats of orange shellac and one coat of Minwax Antique Oil.

If you decide to do the tin piercing yourself, just make photocopies of the full-size pattern provided and tape them over the tin as a guide. Note that you'll need to pierce through and flip the copy of the quarter pattern to get the opposite side. Use either a nail or a professional tin-punching tool (see Bill of Materials) to make the holes. We suggest a scrap of plywood as a backup board under the tin unless you don't mind also perforating your bench top.



FULL-SIZE QUARTER PATTERN



All that's left are a few details. Cut your shelves to length and width from 1/2 in. thick stock, cut sufficient shelf pins, and finish these parts and the back (still not applied) the same as the doors. Take care not to apply finish to the 3/8 in. wide perimeter of the back that will be glued into the rabbet in the carcase. Masking tape over this 3/8 in. wide perimeter is an easy way to keep it finish-free. Now paint the cabinet and the knobs (J). We used Stulb's Old Village Paint, their New England Red, available from Shaker Workshops, P.O. Box 1028, Concord, Massachusetts 01742; tel. (617) 646-8985. It's their part no. A941, and the cost is $9.40 postpaid for a pint. Take care not to get any paint in the rabbet for the back.

Once the finish is dry, mount the back. Apply a bead of glue in the rabbet, screw the back in place, then wipe away any glue squeeze-out with a damp rag. Now drill for the knobs, mount the doors, and add the two bullet catches (K), which keep the doors closed.

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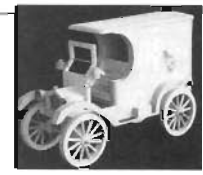

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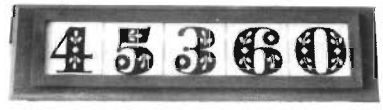

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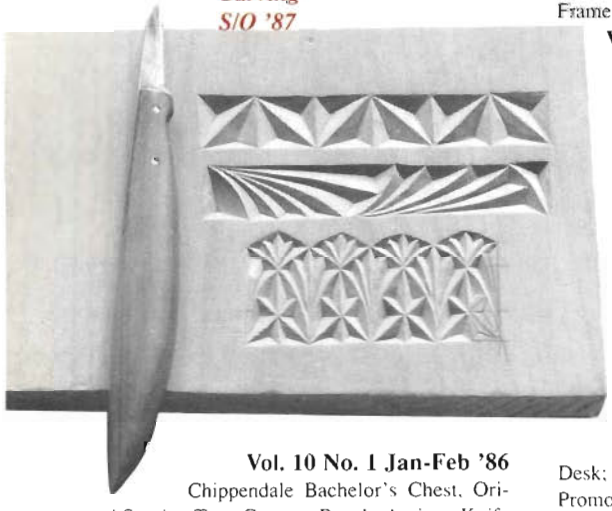
Dulcimer, Dining Table, Shaker Washstand, Marking Gauge, Veneered Wall Clock, 4 x 4 Off-Roader, Teddy Bear Puzzle, Duck Pull-Toy, Landscape Cutting Boards, Early American Tall Clock, Desk Organizer, Moravian Chair; *Articles:* Weaving a Rush Seat, Part I; Table Saw Ripping Problems and Their Solutions; 4-Piece Book Match Veneering; Running a Profitable Business.

Traditional Chip Carving S/O '87



Vol. 10 No. 1 Jan-Feb '86

Chippendale Bachelor's Chest, Oriental Serving Tray, Country Bench, Antique Knife Tray, Tape Dispenser, Valentine Box, Toy Tow Truck & Car, Shaker Drop-Leaf Table, Shop-Made Bow Saw, Child's Settle Bench, Plate Shelves, Freestanding Shelf System; *Articles:* On Getting Paid for Your Work; Weaving a Fiber Rush Seat, Part II; Table Saw Crosscutting; Router-Lathe Fluting: A Shop-Made Approach.

Vol. 10 No. 3 May-June '86

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Vol. 10 No. 4 July-Aug '86

Wall-Hung Display Cabinet:, Latticework Planter, Country Bucket Bench, Adirondack Chair, Coffee Mill, Clamdigger's Basket, Box of Shapes Toy, Disk Clock, Tenon Jig, Dictionary Stand, Shaker Slat-Back Side Chair; *Articles:* Selecting the Right Project for Production; More About Warped Boards; All About Router Bits; The Sliding Dovetail Joint.

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Vanity Case, Stool, Coffee Table, Blanket Chest, Mortar and Pestle, Whale Folk Art Silhouette, Toy Wagon, Cranberry Rake, Router Bit Box, Shaker Drop-Leaf Table, Desk with Tambour Top; *Articles:* Are Your Prices Competitive?; Restoring a Rosewood Chair; Basic Router Operations; Making Tambour Doors.

Vol. 10 No. 6 Nov-Dec '86

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Vol. 11 No. 1 Jan-Feb '87

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Kitchen Canister Set, Riding Biplane, Contemporary Serving Cart, Napkin Holder, Decorative Planter, Country Vegetable Bin, Medicine Cabinet, Shop Drum Sander, Vienna Regulator Clock, Display Pedestal; *Articles:* Penetrating Oils; The Jointer; Veneer, Part I; Dovetail Key Butt-Miter.

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Contemporary Coffee Table, Puss 'n Books Bookends, Cookbook Holder, Wooden Jewelry, Child's Duck Puzzle, Shaker Wall Clock, Stereo Cabinet and Speakers, Country Occasional Table, Drill Press Jig, Early American Pierced Tin Cabinet; *Articles:* Edge-Gluing; The Drill Press; Pierced Tin; Four Shopmade Finishes.

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Oak & Glass Tier Table, Crystal Regulator Clock, Early American Candlesticks, Arrow Wall Decoration, Three-Drawer Country Wall Box, Key Cabinet, Contemporary Box, Shaker Carrier, Folk Harp; *Articles:* Use and Sharpening of the Hand Scraper; The Lathe: Basic Setup; Quartered Turnings; Lacquer.

Captain's Clock S/O '88

Curio Cabinet N/D '87

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The Woodworker's Journal, *P.O. Box 1629, New Milford, CT 06776; tel. (203) 355-2694*

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Vol. 12 No. 5 Sept-Oct '88
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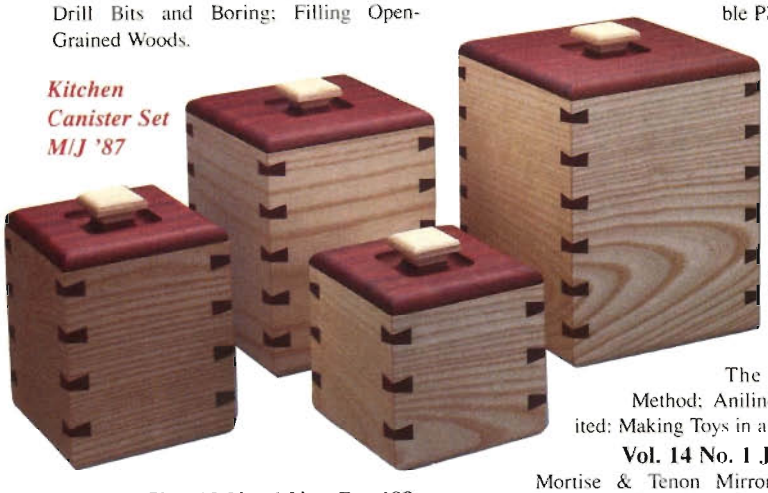
Kitchen Canister Set M/J '87

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Vol. 13 No. 1 Jan-Feb '89
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Vol. 13 No. 3 May-June '89
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Vol. 13 No. 4 July-Aug '89
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Vol. 13 No. 5 Sept-Oct '89
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Vol. 14 No. 1 Jan-Feb '90
Mortise & Tenon Mirror, Weaver's Chest of Drawers, Tissue Box Cover, Band-Sawn Napkin Holder, Grasshopper Pull Toy, Compact Disc Holder, Shop-Built Spindle Sander, Wall-Hung Ironing Board, Tavern Table; *Articles:* Clamps: One Shop Tool You Can't Do Without; How to Hang Wall Cabinets; Marquetry: The Direct Method; A Guide to Waxes and Polishes; Special Section: Back Issue Index.

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Small Early American Mirror, Shop-Built Sanding Blocks, Cookie Jar Holder, Hourglass, Candle Holder, Toddler Cart, Folk Fiddle, Plant Stand, Santa Fe Bench; *Articles:* Making Drawers; Using Router Bits in the Drill Press; Finishing Outdoor Projects; Making Curved Instrument Sides; A Conversation with Allene and Harold Westover.

Vol. 14 No. 3 May-June '90
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Low-Cost Workbench J/A '87

Sunburst Mirror; *Articles:* Rasps; Safety: Workshop Finishes Pose Risks; Making the Dovetailed Wedge; Knock-Down Hardware.

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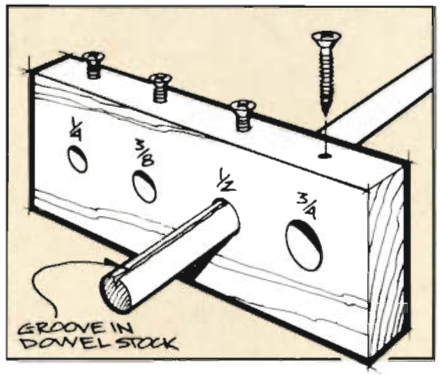
Mitered-Corner Boxes J/A '88

Shop Tips

Commercial dowel pins are made with a lengthwise groove in them which allows excess glue and air to escape when the pin is driven into a dowel hole. Although the commercially made dowel pins work fine, they are somewhat expensive and not always available in the length I need. With the help of a simple jig, I find it easy to groove just



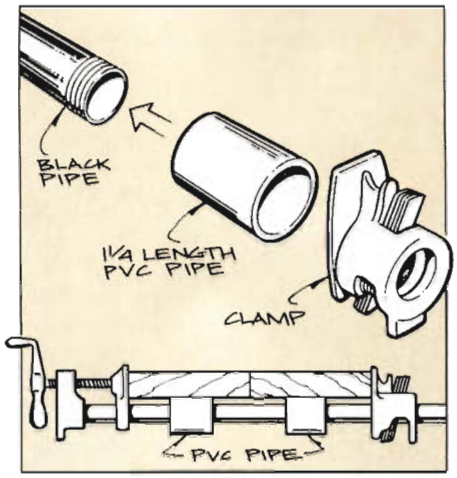
about any length of 1/4, 3/8, 1/2 and 3/4 in. diameter dowel. The jig is simply a piece of 3/4 in. thick hardwood cut about 2 in. wide and 4 in. long. Each hole is slightly bigger (about 1/16 in.) than the dowel-stock diameter. A pilot hole is bored to accept a screw, then the screw is driven until about 1/16 in. protrudes into the hole. To apply a groove you need only clamp the block in a vise and pull a length of dowel through the hole. If necessary, adjust the screw depth to change the depth of the groove.

M.J. Murray, Tilba Tilba, Australia

After a finishing job is complete, I mark the outside of the can, drawing a line at the level of the finish. Next time it's needed, I don't have to remove the lid to see if there is enough for the job. This saves time and, since the finish is exposed to air less often, helps increase the shelf life.

Howard E. Moody, Upper Jay, N.Y.

I use black iron pipe to make my pipe clamps. I've found, however, that a hard-to-remove dark stain often forms on the wood where the black pipe comes in contact with glue. To avoid the problem, I slip a couple of short lengths of PVC pipe over the black pipe. The PVC serves to keep the pipe from



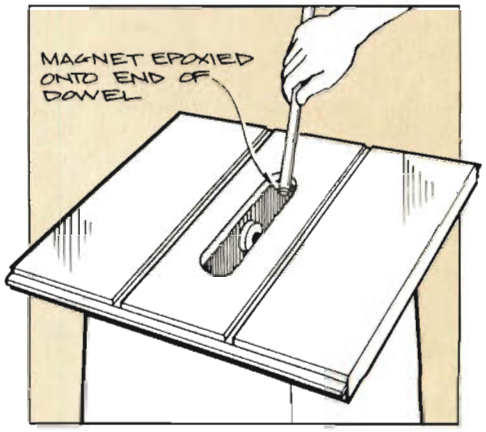
coming in contact with the glue, so the wood doesn't stain. I've found that 1 1/2 in. PVC fits 3/4 in. pipe, while 1 in. PVC fits 1/2 in. pipe.

Chuck Frantz, Cortland, Ohio

I have a rather large assortment of 5 in. scroll saw blades. But, because many of the blades are quite small, it can be difficult to identify the various sizes. Also, some of the teeth are so tiny I need a magnifying glass to see the tooth direction. Now, however, I've made it easier on my eyes by color coding the top end of each blade with a spot of paint. For example, the no. 5 blades are red, the no. 7 are green, and so on. And since the color code is always applied to the top end of the blade, I immediately know the tooth direction.

Bruce Montag, Aston, Penn.

When changing table saw blades, it's all too easy to drop the nut as you remove it from the arbor. If, like many



woodworkers, you have a sawdust collection bin of some sort mounted to the saw, it's usually not an easy matter to reclaim the nut. We've solved the problem by gluing a magnet to the end of a 3 foot long dowel. Now, with the dowel in hand, it's an easy matter to reach into the bin and recover the missing nut.

***The Woodworker's Journal** pays $25 for reader-submitted shop tips that are published. Send your ideas (including sketch if necessary) to: **The Woodworker's Journal,** P.O. Box 1629, New Milford, CT 06776, Attn: Shop Tip Editor. We redraw all sketches, so they need only be clear and complete. If you would like the material returned, please include a self-addressed stamped envelope.*

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from *The Woodworker's Journal*

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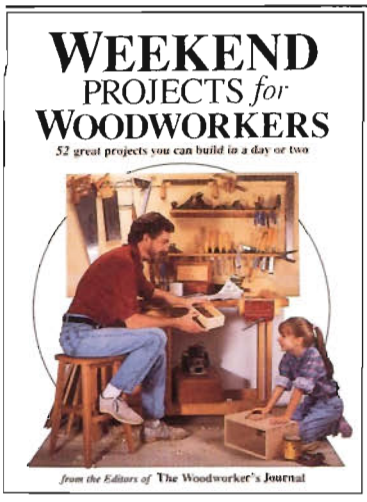
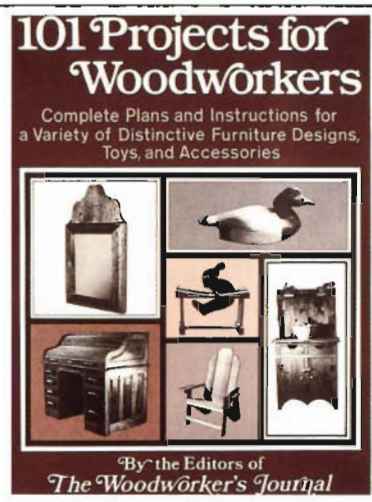


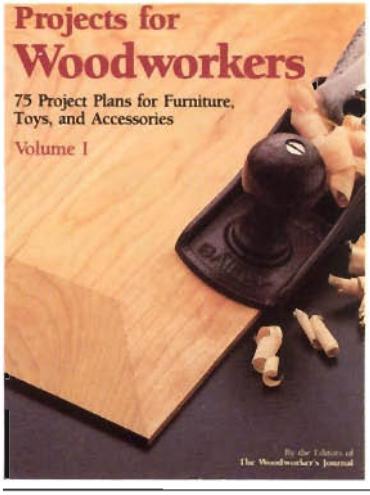
Weekend Projects For Woodworkers

This is the book for the craftsman long on enthusiasm and short on time. Selected from the 1986-87 issues of *The Woodworker's Journal*, all 52 projects are quick, easy and attractive. Each plan is presented clearly with fully detailed instructions and drawings. Whether scrambling for a break or enjoying lots of spare time, woodworkers of all skill levels will appreciate the satisfaction of seeing a project through to completion in just an evening or weekend.



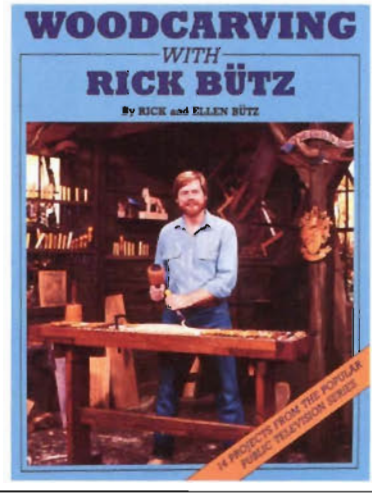
101 Projects For Woodworkers

For the amateur just starting out or the craftsman with a shop full of tools, **101 Projects For Woodworkers** features an variety of classic projects for everyone. Included in this collection of plans from the 1977-80 issues of *The Woodworker's Journal* magazine are a classic Rolltop Desk, an old-fashioned Porch Swing, traditional and contemporary furniture, clocks, mirrors, home accessories, toys and novelties. Complete instructions and illustrations.



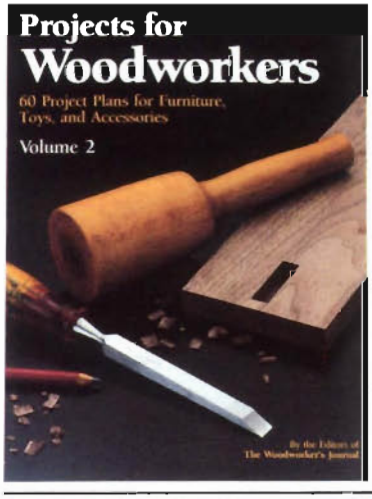
Projects For Woodworkers, Volume 1

Beginning and advanced woodworkers alike will appreciate the full range of styles in furniture, accessories, lamps, clocks, toys and gifts. Of the 75 projects selected from the 1980-81 issues of *The Woodworker's Journal* magazine, plans include a Cabinetmaker's Workbench, Pine Shaker Cupboard, Old-time Icebox, a Cobbler's Bench Coffee Table and a Child's Victorian Sled. Fully detailed instructions, illustrations, and photos.



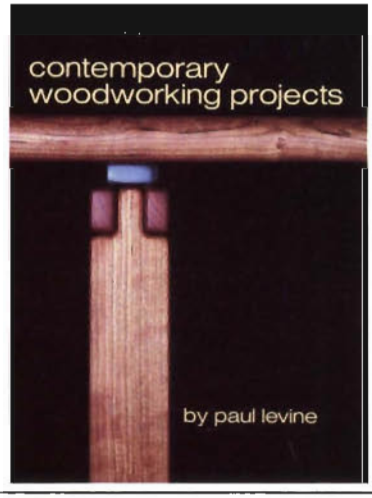
Woodcarving With Rick Butz

With just a few tools and a few hours to spare, you can share in the pleasures of carving. Wander into the Black Forest of Germany with a carving of St. Nick, or into a Russian village with a Dancing Bears folk toy. Enjoy a chip-carved Quilt Rack, wildlife carvings, and a Tobacconist's Indian. All 14 projects are fully detailed with step-by-step photos. There are chapters on tool selection, sharpening, whittling, chip and relief carving.



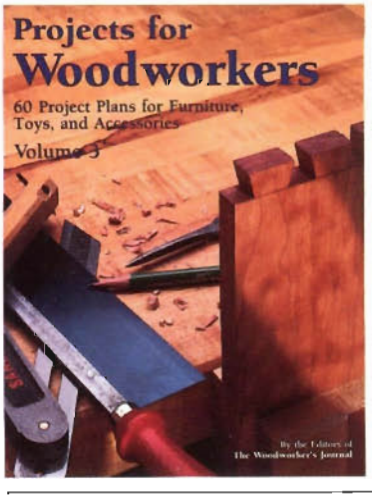
Projects For Woodworkers, Volume 2

Originally published in the 1982 issues of *The Woodworker's Journal* magazine, all 60 projects were chosen with a variety of styles and skill levels in mind. Each project has complete instructions and illustrations. You'll find household accessories like the Desk Caddy, Casserole Dish Holder, and Breakfast Tray easy to build. And you're sure to enjoy completing more involved projects like the Tambour Desk, Old Danish Chest of Drawers and Swinging Cradle.



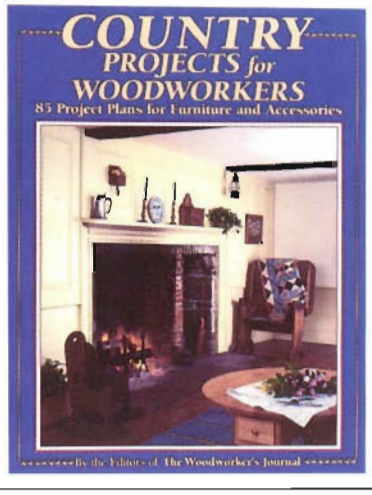
Contemporary Woodworking Projects

Paul Levine guides woodworkers of all skill levels through room-by-room chapters of coordinated furniture and accessories. The clean angles and sturdy joinery are made easy with step-by-step instructions and illustrations. Among the 40 handsome projects are a Love Seat, Chair and Ottoman set, an Oak Credenza, a Platform Bed, and a Japanese Shoji Lamp. Children will enjoy their own table and chair, puzzles and a great box of dominoes.



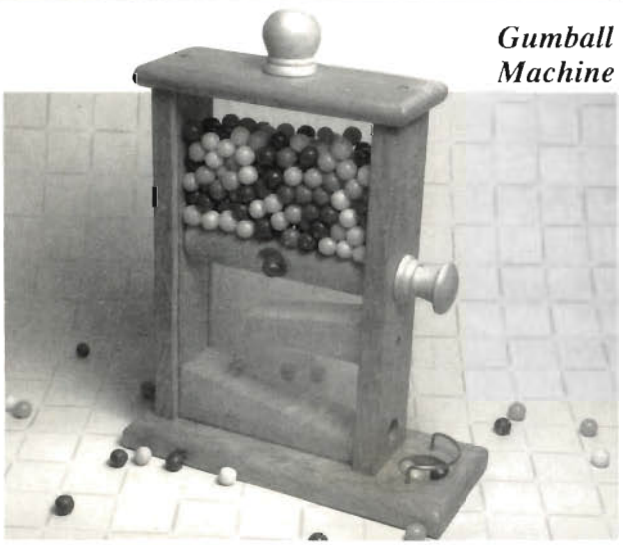
Projects For Woodworkers, Volume 3

The best projects from the 1983 issues of *The Woodworkers Journal* magazine—toys, lamps, cupboards, chests, cabinets, tables, planters, mirrors, and much more. Clear illustrations and thorough written instructions make each project easy-to-understand and fun to build. A book you'll want to keep within easy reach of your workbench.

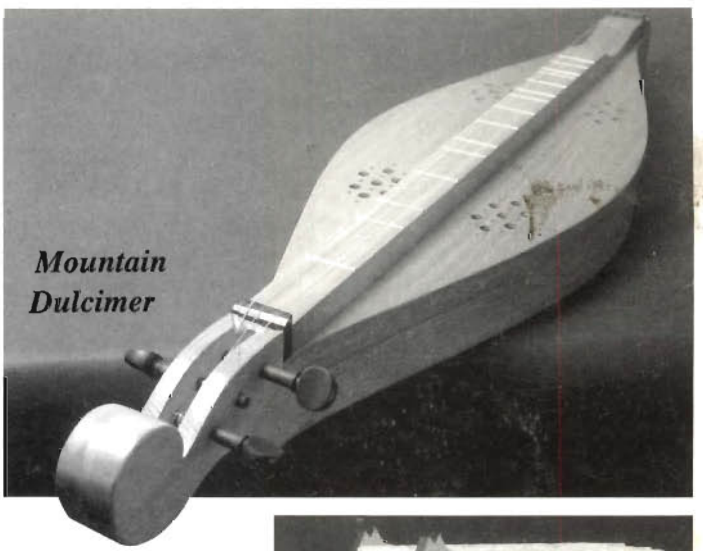


Country Projects For Woodworkers

If building the simple, sturdy furniture of the old cabinetmakers appeals to you, then you'll want this collection of country projects from the 1980-84 issues of *The Woodworker's Journal*. 85 complete plans range from projects like Colonial Candlesticks and Fireplace Bellows to more challenging projects such as a Shaker Chest, a Stepped-Back Hutch, and an 18th Century Trestle Table. Some plans are also in *Projects for Woodworkers*, Volumes 1 and 2.



Gumball Machine

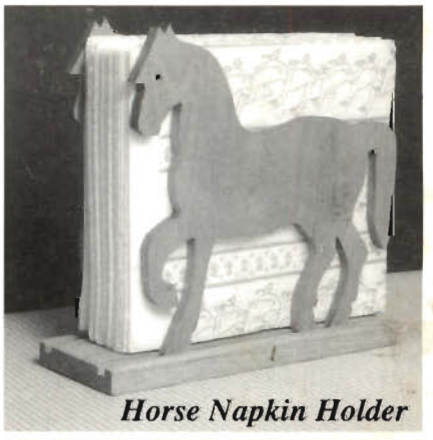


Mountain Dulcimer

In the next issue . . .

You'll find some great ideas to fill those long summer evenings. We think you'll enjoy making the Horse Napkin Holder for sale or for gifts and the beautiful Mountain Dulcimer for the musician in your life. We've found a Horse and Cart Toy for the little ones and a fun Gumball Machine that'll be a hit with young and old alike. We've come up with a variety of picture frames for the artists and photographers, while woodturners will appreciate our plans for a Shop-made Lathe Chuck and our article and patterns for turning small objects. And the Shaker-style Drop-leaf table will please just about everyone.

You won't want to miss the review on Thin-Kerf Saw Blades we've worked up and the many other articles on techniques and methods. Join us for the hazy (not so lazy!) days of summer!



Horse Napkin Holder