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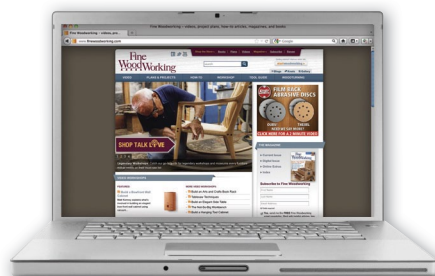


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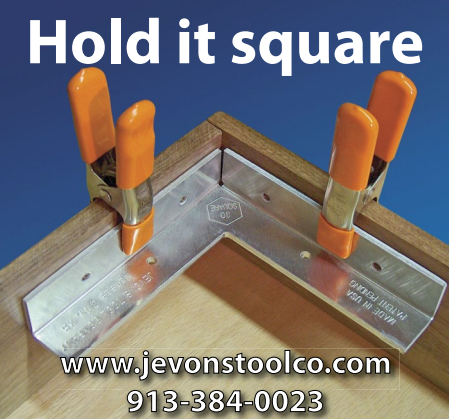
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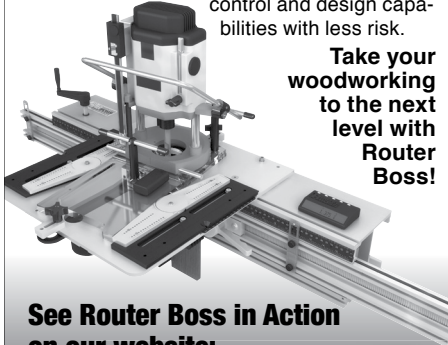


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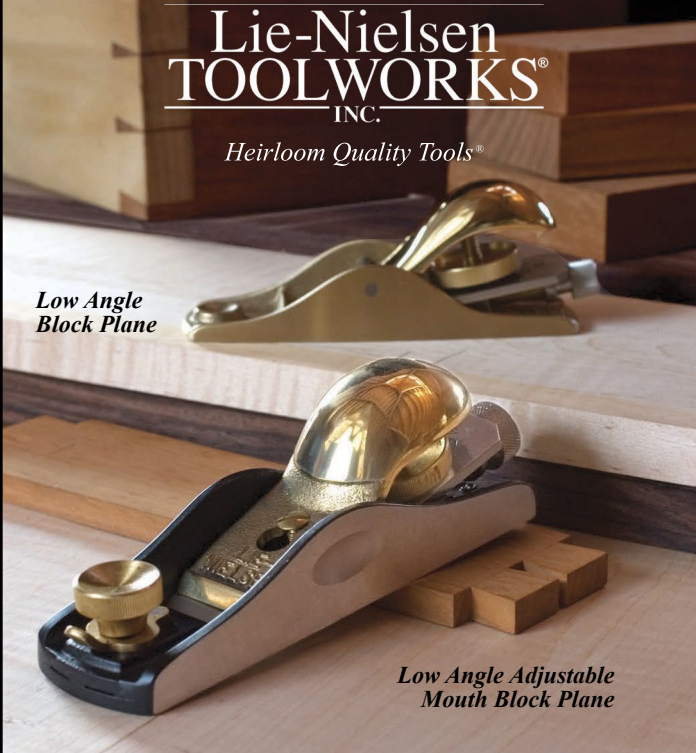
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from the editor

PLAYING FAVORITES

In the Northeast we get four distinct, glorious seasons, each one gently (sometimes not so gently) bumping into the next. Somebody once asked me which was my favorite. My answer was whichever one I'm in, and I meant it. Each season comes with its own

allure. And so it goes with furniture styles; Biedermeier, Art Deco, Art Nouveau, Shaker, Danish Modern, Ming Dynasty, American period furniture, Federal, Arts and Crafts ... each style offers a grace of its own, something to be revered.

For me, Arts and Crafts furniture is autumn. And autumn, with its gorgeous colors, comfortable temperatures, and pumpkins, is practically perfect. Arts and Crafts furniture exudes beauty, warmth, and strength and exemplifies superior craftsmanship and understated design. Arts and Crafts is more than just a style; it is an enduring movement, one that is as relevant today as it was 100 years ago.

This special issue takes a comprehensive look at this classic furniture style. In it, today's experts like Kevin Rodel, Michael Pekovich, Nancy Hiller, and Gregory Paolini share their experience and knowledge so you can efficiently reproduce this timeless style or successfully add your own flair to an iconic piece. You also will get background on influential makers and the elements of their styles.

Woodworking in the Arts and Crafts style isn't solely about the design and materials; it's also about putting the handiwork on display. Our authors will teach you to do just that, taking away the frustration of figuring it all out on your own. Arts and Crafts furniture has a distinctive aesthetic down to the finish and smallest details. This issue gives finishing information that ranges from traditional to more user-friendly modern finishes that look just as authentic.

But more than anything, the furniture in the pages of this issue will inspire you to get into your shop and build. What could be more perfect than that?

—ANISSA KAPSALES
Editor, Arts and Crafts Furniture



Fine Woodworking®

VP, Home & Construction	Tom Ott 203-304-3421 tott@taunton.com
National Ad Director, Home & Construction	Brian Quinn 203-304-3569 bquinn@taunton.com
Digital Ad Sales Manager	Noelle Kennedy 203-304-3530 nkennedy@taunton.com
Custom Solutions Manager	Brenden Delaney 203-304-3590 bdelaney@taunton.com
Senior National Account Manager	Linda Abbett 203-304-3538 labbett@taunton.com
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To contact us:

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The Taunton Press
63 South Main Street
PO Box 5506
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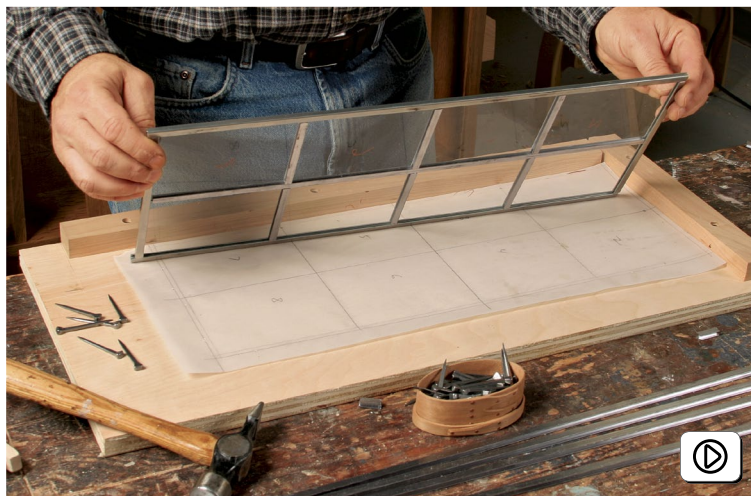
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Visit our website for a host of information on Arts and Crafts furniture, including projects, tips on design, and more. Plus, become an online member to access our extensive archive of articles and videos.



Expand into Glass

Learn how to create custom leaded-glass doors (p. 114) for your Arts and Crafts furniture projects with our soup-to-nuts audio slideshow.



Arts and Crafts Upholstery

Veteran furniture maker Kevin Rodel demonstrates his techniques for traditional upholstery on a Craftsman classic (p. 64).

Flawless Finish for Greene and Greene

Unlock the secrets of Darrell Peart's (p. 24) simple finish for Greene and Greene furniture.



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VIDEO WORKSHOP

Arts and Crafts Dining Table

The hayrake stretcher in this rustic table, inspired by Sidney Barnsley, isn't as complicated as it looks. In this series, Michael Pekovich breaks construction into manageable steps. The workshop includes:

- Tricks to simplify joinery on curved parts
- Tips on flattening wide boards with a narrow jointer







Design

10 Quintessential
Arts and Crafts

16 True Greene
and Greene



Quintessential Arts and Crafts

An illustrated guide to the elements that define this style

BY GRAHAM BLACKBURN

The Arts and Crafts style has been popular for a hundred years; there are examples in every antique and secondhand furniture store; reproductions abound; and it's a perennial favorite with woodworkers—but what exactly defines Arts and Crafts? Ask anyone familiar with the style—also known as Mission, Craftsman, Crafts, Cloister, or even Quaint—how they identify it, and you'll get answers that typically contain words such as “foursquare,” “straight-forward construction,”

“exposed joinery,” and “quartersawn oak.” Such elements make the Arts and Crafts style inviting to many woodworkers who are new to the craft and who are less intimidated by Arts and Crafts furniture than they are by other, more sophisticated styles. Despite its apparent simplicity, however, it's just as easy to get a piece of Arts and Crafts furniture wrong as it is to fail at your first attempt at constructing a Chippendale piece that features cabriole legs—unless you have a full understanding of what the essential design details are and how they work together.

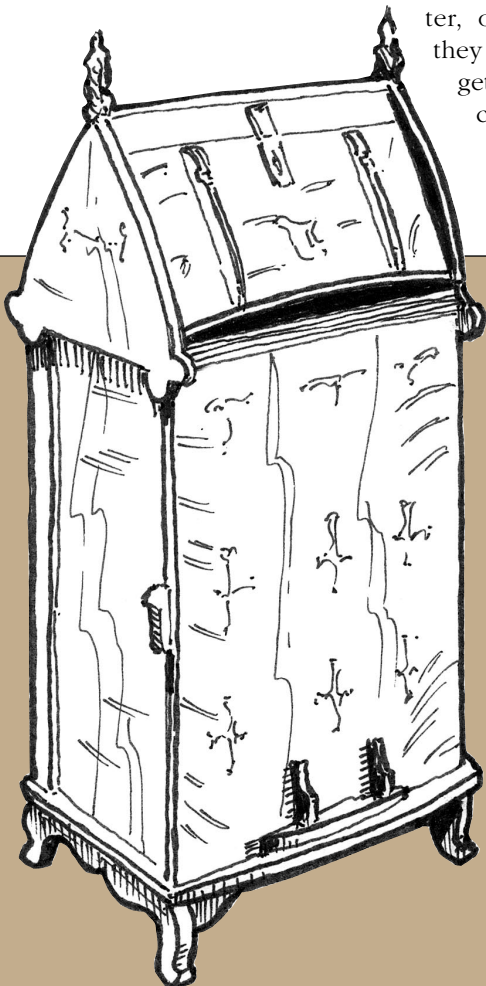
It's true that the Arts and Crafts style originated partly in response to overdecorated and directionless 19th-century furniture, but equally important were concerns about the shoddy qual-

Influential makers of the era

By the late 1800s, the Industrial Revolution was changing the world of furniture: The individual craftsman was being supplanted by factory production as the leading influence on style. Driven strictly by commercial concerns, mechanization was overtaking what had been a craft with an aesthetic founded on tradition, training, and individual craftsmanship. The result was an abuse of style and an excess of indiscriminate decoration that took the form of a series of “revivals” produced primarily for the sake of novelty in an attempt to capture the market. The Arts and Crafts movement developed primarily in opposition to this trend, as designers, architects, and furniture makers strove to produce items that placed a greater value on purer ideals of artistic honesty and craftsmanship. Initially, at least, the Arts and Crafts movement was more about what not to do than it was about a clearly defined new style. This is why there is such a broad range of pieces—spanning a long period—that can be identified as belonging to the Arts and Crafts style.

CHARLES ROHLFS DROP-FRONT DESK, 1883

Heavily influenced by the Gothic style, Rohlf's was a leading figure in the American Arts and Crafts movement and was a friend of Elbert Hubbard (founder of the Roycroft Community at East Aurora, N.Y.). Rohlf's was influenced by modern designers such as Charles Rennie Mackintosh and, as many other Arts and Crafts designers did, looked back to the Gothic Period in his use of oak, as exemplified by this desk.



ity of mass-produced factory furniture and its effect not only on the consumer but also on the people who made it. Arts and Crafts was conceived as an essentially utilitarian style affordable by all; the idea that its manufacture should be something in which the maker could take pride was central to the philosophy underlying what became known as the Arts and Crafts movement.

A piece of furniture built in the genuine Arts and Crafts style is therefore first and foremost completely functional. The furniture is solidly constructed with a minimum of superfluous ornament, unashamed yet not boastful of its joinery and, more often than not, made of oak—which is a supremely appropriate wood for hard-wearing furniture and a species that harks back to the period in furniture-making history when craftsmanship was valued more than commercial success.

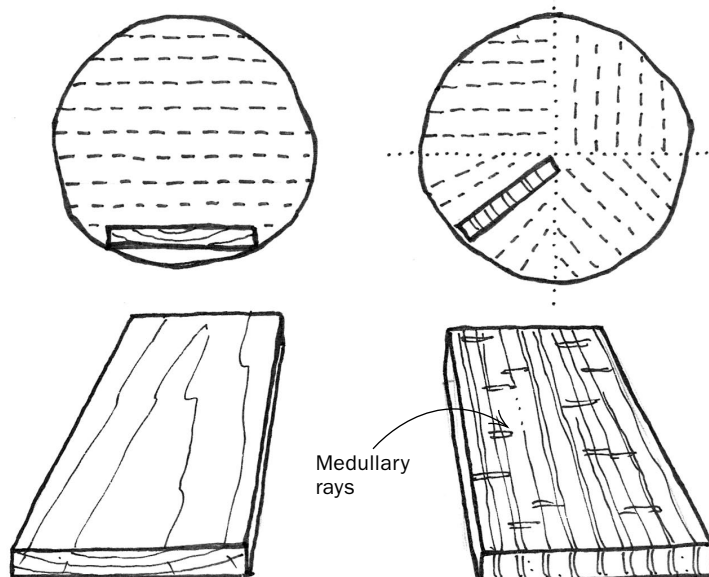
The movement embodied the writings of a variety of influential 19th-century art critics, philosophers, architects, and designers such as John Ruskin and William Morris, as well as the work of 20th-century furniture makers Gustav Stickley (and his brothers), Elbert Hubbard, and the Roycrofters. Other seminal figures included the noted California architects Charles and Henry Greene; Frank Lloyd Wright; and internationally known and influential designers and furniture makers Charles Voysey, Ernest Gimson, and the Barnsley brothers.

Because the movement that resulted in this style of furniture began as far back as the middle of the 19th century, the range of design elements that belong to this style is, in fact, much broader than many people realize.

Six quintessential elements

1. Material—Quartersawn oak does have much to recommend it: strength, durability, relative stability, and an attractive fig-

QUARTERSAWN LUMBER SUITS THE STYLE



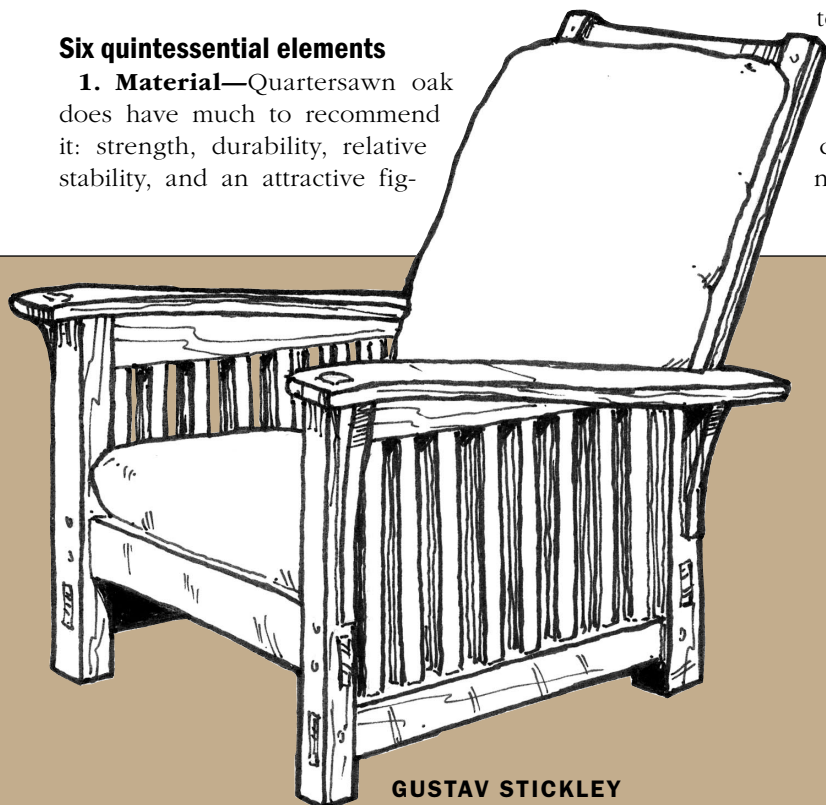
FLATSAWN OAK

Most boards from a tree sawn in this pattern show no medullary rays and are less stable.

QUARTERSAWN OAK

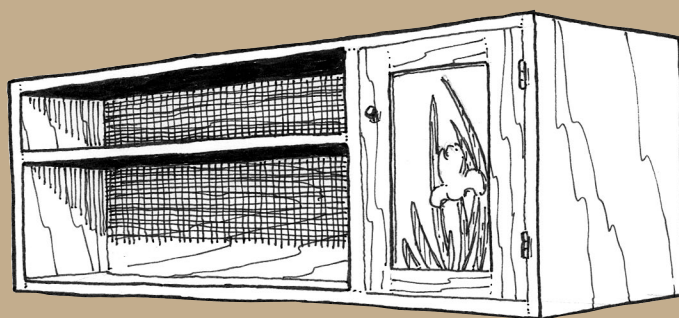
When a tree is first quartered, the boards cut by any of the patterns shown are less likely to warp and will show medullary rays.

ure characterized by the medullary rays not visible in flatsawn stock. Although a hardwood, oak is not excessively difficult to work—it is easier, in fact, to produce a crisp surface with a less than perfectly sharp tool on a piece of oak than on a piece of softwood. Oak is not toxic and may have a wide range of color—red, white, or brown—depending on the species. The wood also takes stain well and can be fumed, a technique that can produce a wonderful aged look. Although most



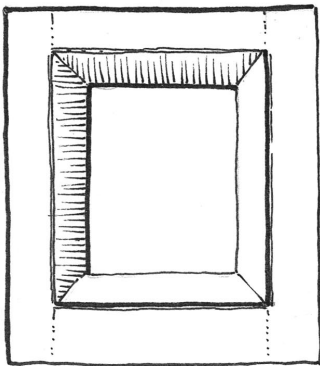
GUSTAV STICKLEY
ARMCHAIR, 1902

Regarded by many as defining the style, Stickley's mass-produced pieces made of oak were the most commercially successful manifestation of Arts and Crafts furniture. Although his are among the most simple examples of the style, Stickley drew his inspiration from more sophisticated designers, such as Charles Voysey and William Lethaby in England.

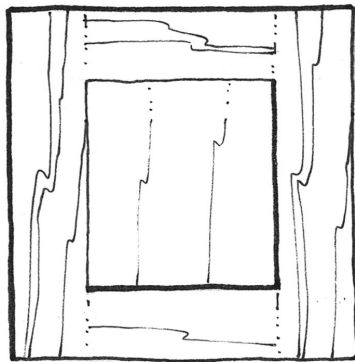


BYRDCLIFFE
ARTS COLONY
WALL CABINET, 1904

This stained poplar cabinet, with a carved and polychromed door panel, was a typical product of the Byrdcliffe workshops in Woodstock, N.Y., founded by the wealthy Englishman Ralph Whitehead. Whitehead had been a student of the eminent Victorian art critic John Ruskin—the generally acknowledged father of the Arts and Crafts movement. Simplicity of design as well as individual craftsmanship in a communal environment inform this version of Arts and Crafts style.



18th- and 19th-century paneling typically has a frame consisting of stiles and rails of different widths, invariably molded on the inner edges surrounding a fielded or raised panel.



Arts and Crafts paneling is typically square, with equal-width rails and stiles. Panels are sometimes carved, but more often than not they are plain and flat in unmolded frames.

factory-built Arts and Crafts furniture was made of oak, many well-known designers have used other species, such as walnut, mahogany, and cherry.

2. Construction techniques—Although cabinet construction with veneered surfaces is occasionally used for the body of an Arts and Crafts piece, the majority of authentic pieces are made using solid wood and frame-and-panel construction.

Consistent with the directness and honesty that are the hallmarks of this style is the use of slats where a solid piece or a frame-and-panel

section would be overkill. Unlike the furniture of the Gothic Period, turned elements are rare in Arts and Crafts designs. All of this is in keeping with the principle of using the simplest possible methods of work for the most honest and unpretentious result.

Simple does not, however, mean sloppy, especially in terms of the construction of a piece. In fact, because the aim of the Arts and Crafts movement was to design furniture that the maker could be proud of, a nice execution, particularly of exposed joinery, is essential when building a genuine Arts and Crafts piece.

3. Joinery—Without a doubt, the mortise and tenon is the king of Arts and Crafts joints (see the drawings on the opposite page). Dovetailing, doweling, lapped, and housed joinery also are used where appropriate, but in keeping with the demands of strength and honesty, the mortise-and-tenon joint plays a major role in the majority of Arts and Crafts pieces.

Several varieties of tenons are used, including stub, blind, through-, and tusk, but each is used only when and where necessary for maximum strength without compromise. This means that if, for example, a through-tenon is the strongest possible form in a given situation, the design will make a virtue of the necessity by not attempting to hide or disguise the joint. This results in the ends of through-tenons being finished a little proud of the surface, often nicely chamfered and with any wedges thoughtfully arranged for a pleasing visual pattern and the most efficient use.

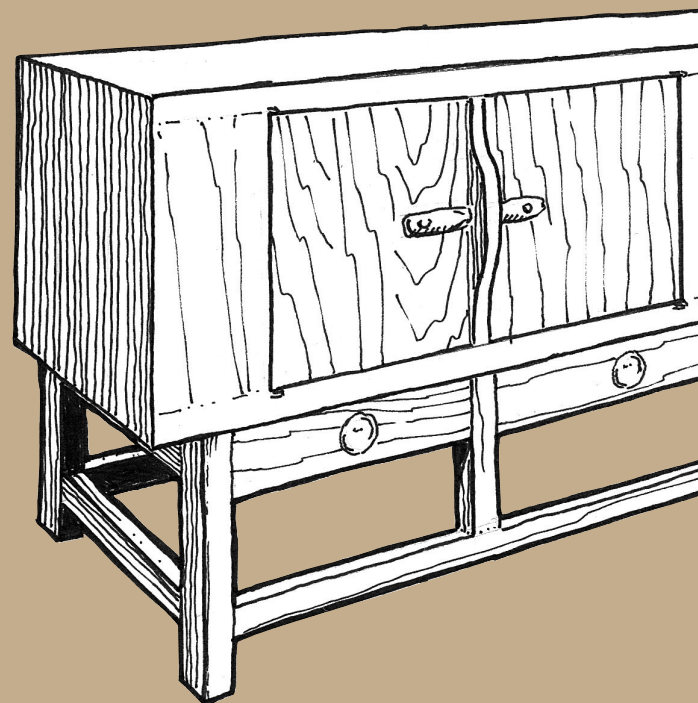
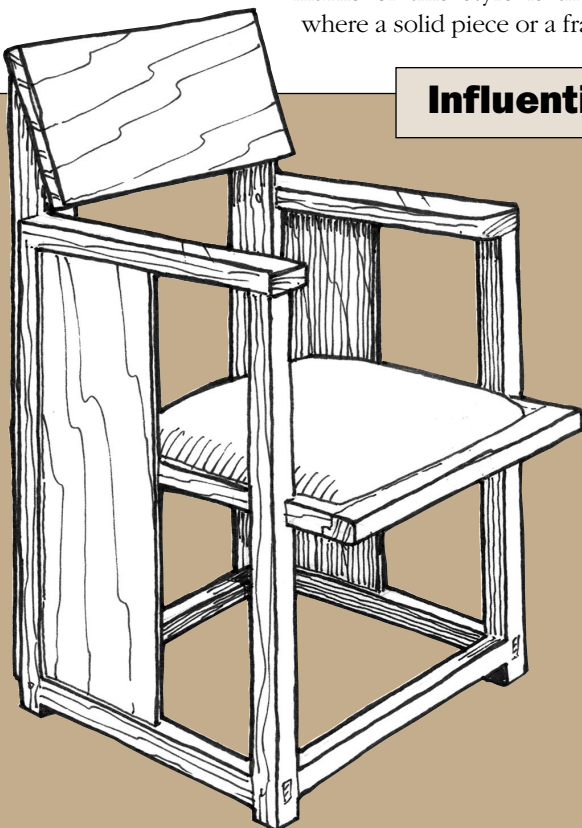
4. Design paradigms—In American Arts and Crafts pieces, whether of the mass-produced variety typified by Gustav Stickley's Craftsman furniture or the higher-end custom designs of the Greene brothers, there is an immediate impression of squareness. This is most evident in the profiles of tops, edges, and other flat surfaces, such as broad chair arms. Molding is almost completely absent,

Influential makers (continued)

FRANK LLOYD WRIGHT

ARMCHAIR, 1904

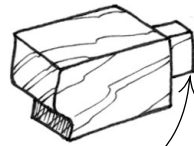
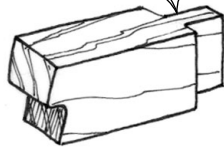
Although not an avowed member of the movement, the architect Wright, like the Greene brothers, designed furniture for his houses—such as this extremely rectilinear pine chair with exposed joinery, which although typically “Wrightian,” is also distinctly in the Arts and Crafts style.



Stronger and more appropriate than dowels or biscuits, mortise-and-tenon joints may be unshouldered (as for seatback slats) or shouldered on anywhere from one to four sides, depending on their intended use and particular design.

BLIND MORTISE AND TENON

Two shoulders
(seat rails)

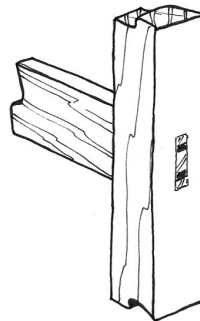


Four shoulders
(stretchers)

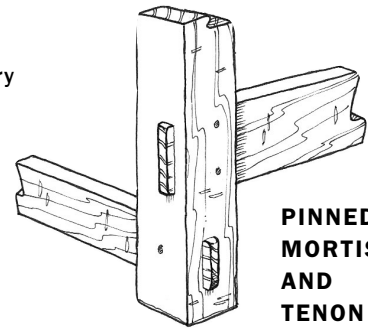


DECORATIVE REINFORCEMENTS

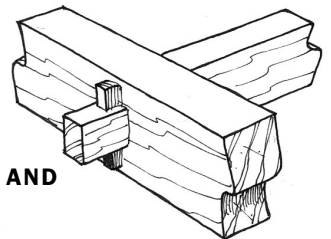
Exposed joinery is a primary decorative element.



WEDGED MORTISE AND TENON



PINNED MORTISE AND TENON



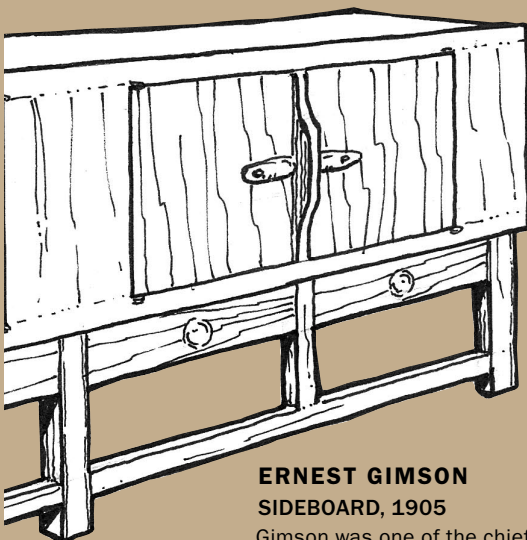
TUSK MORTISE AND TENON

sharp edges are gently relieved but not rounded, and overhangs are kept to a minimum.

Although many details are, in fact, square—such as in paneled framing, where a bottom rail wider than other frame members is rare (see opposite page), and in the design of glazed doors, where all panes are equally square—absolute squareness is largely illusory, and slopes and curves are common. It is not that the style is inelegant—many pieces can be found based

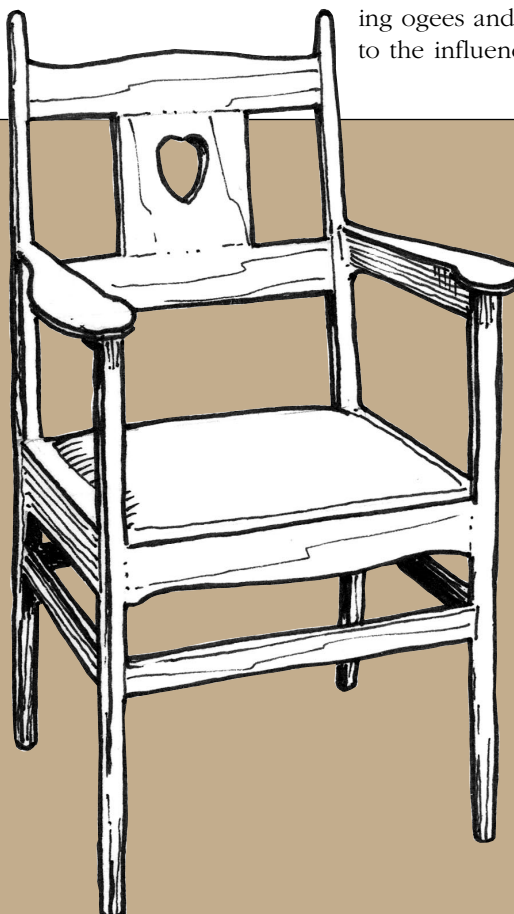
on elegant design paradigms such as the golden rectangle (see p. 14)—but the strength and utility of a piece always dominate.

Both gently and boldly formed curves are common in skirts, chair rails, and the lower edges of cabinet sides, but they are invariably simple and rarely compound, except for occasional tight cutouts on stool bases. Such shapes, including ogees and intersecting arcs, are nods to the influence of medieval Gothic oak



ERNEST GIMSON
SIDEBOARD, 1905

Gimson was one of the chief figures of the Arts and Crafts movement. His sideboard, with its rectilinearity, simple lines, use of native wood (chestnut), and restrained use of minor ovolo molding on the legs, is an expression both of the values of the movement as directly expounded by William Morris and of the related attempt to reintroduce traditional country crafts to high-quality furniture.

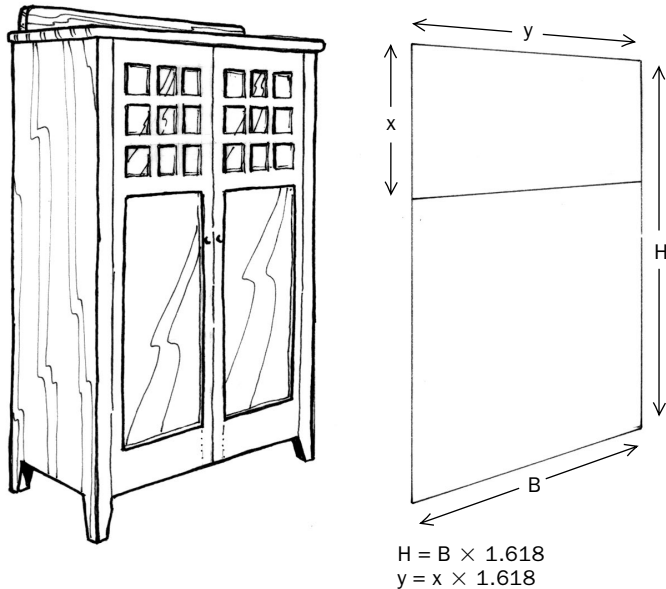


CHARLES VOYSEY
DINING CHAIR, 1907

Voysey was another admirer of William Morris and a leading exponent of the British Arts and Crafts movement. His particularly spare style—a Shaker-like simplicity complemented by more flowing and elegant details such as the heart-shaped cutout and square legs that taper to octagonal feet—was the precursor to the American Mission style popularized by makers such as Gustav Stickley.

DESIGNING USING THE GOLDEN RECTANGLE

The perfect squareness of the upper glazing and the general rectilinearity of this cabinet are based on a sophisticated design paradigm in which the height (H) equals the base (B) multiplied by 1.618, a proportion called the golden rectangle. The upper portion of the cabinet also is a golden rectangle.



furniture, much valued by leaders of the Arts and Crafts style for its craftsmanship and honesty. Curved yet square-edged brackets are another common feature of many pieces.

One other detail that would seem to belie an apparent squareness and angularity is the frequent use of tapered legs. The tapers, however, are usually limited to a short section near the base. Tapering legs like this prevents the piece from appearing too heavy,

but because the tapers are equally formed on all four sides of the leg, a general feeling of squareness persists.

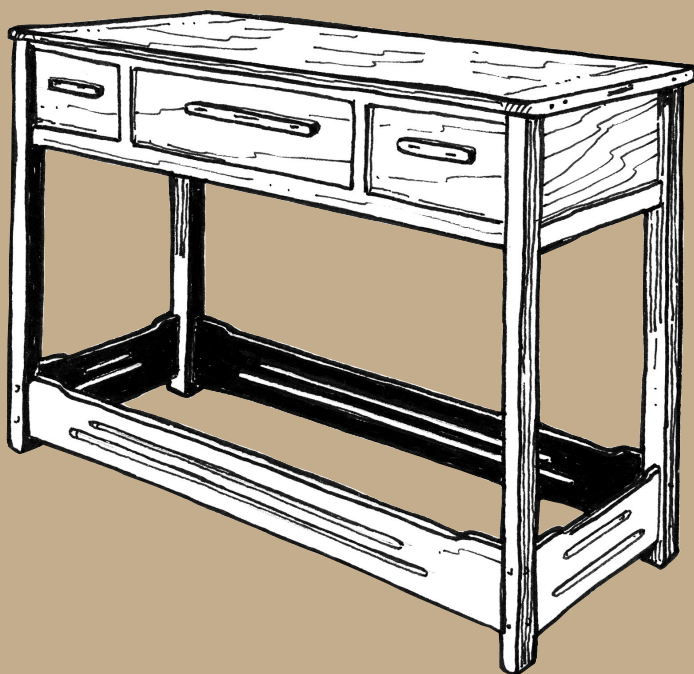
5. Decoration—Despite a superficial plainness characterized by square edges, the lack of molding, the use of a relatively homogenous material, and the flatness of panels, Arts and Crafts furniture often is decorated with a variety of techniques ranging from simple curved cutouts to delicate floral inlays. Reflecting a continuing sensitivity to other styles and fashion on the part of designers such as Harvey Ellis or Charles Rennie Mackintosh, who are perhaps better known for their Art Nouveau styles, the influence of the more flowing, nature-based Art Nouveau style is felt in many Arts and Crafts pieces—for example, in the products of various “utopian” workshops such as the Byrdcliffe Arts Colony in Woodstock, N.Y.—in the form of pastel-colored painted sections, tulip inlays, and lily patterns.

Central to the principle of craftsmanship in this style of furniture is the use of other natural materials, such as reed and rush for seats, leather upholstery, and hand-wrought hardware made from iron or hammered brass. The hardware often is as square and sturdy as the furniture it serves and stands in complete contrast to the elegant and finely wrought shapes found on 18th-century pieces or the overworked fantastic shapes common on much 19th-century furniture. A gratuitous form of decoration in terms of structural function, but one that is consistent with the incorporation of natural materials, is the frequent use of a row of hand-wrought nails as an edge decoration.

6. Finish—It would be inappropriate to finish an Arts and Crafts piece with a glossy lacquer. But while natural finishes like simple oiling and waxing may predominate, other processes, such as filling, staining, and fuming, are common.

Careful surface preparation is most important. In the case of an open-grained wood like oak, a matching wood filler should be used. If oak is filled first, it then may be waxed or perhaps lightly

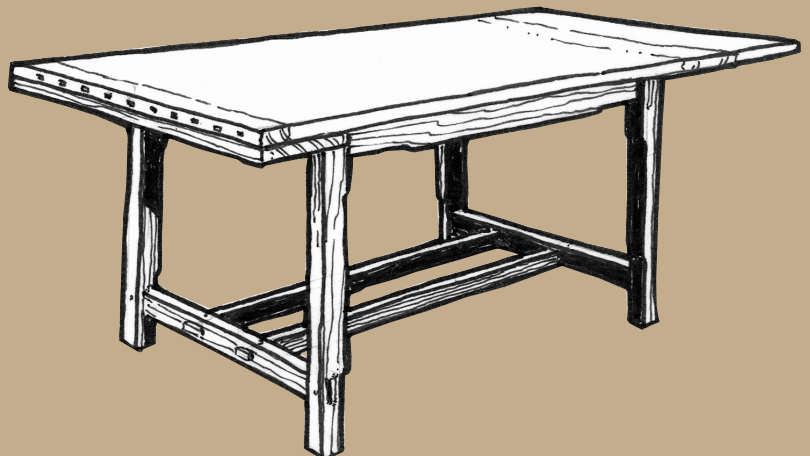
Influential makers (continued)



CHARLES AND HENRY GREENE

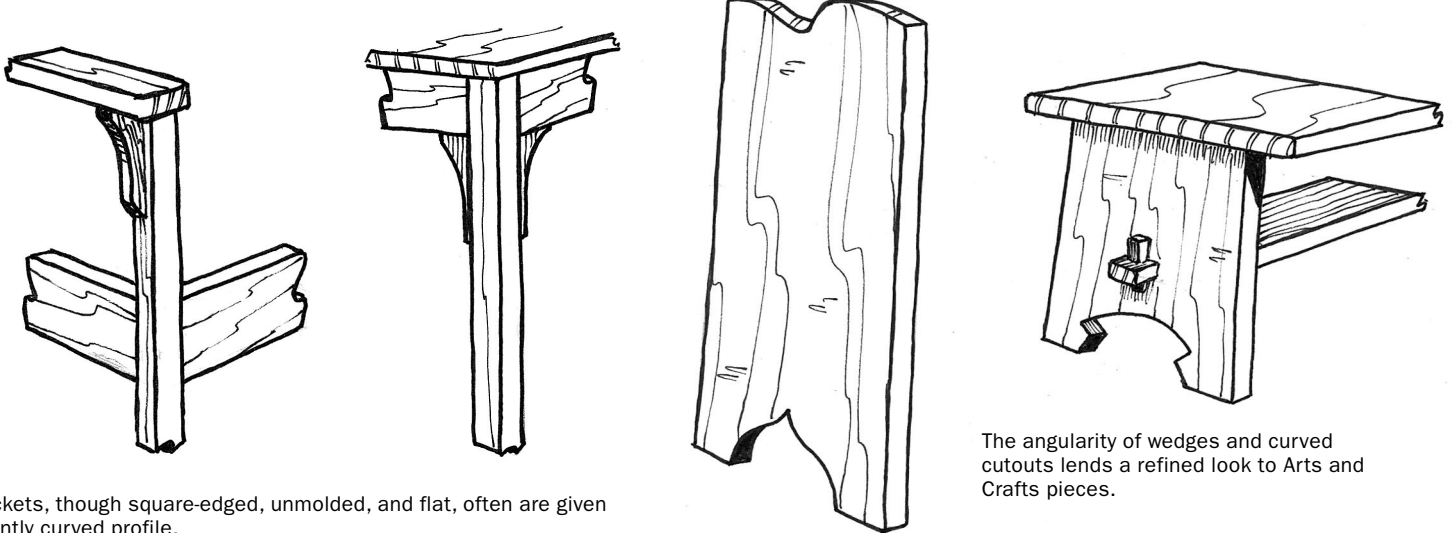
SERVING TABLE, 1910 (left) AND DINING TABLE 1929

Well known as architects, the Greene brothers designed Arts and Crafts furniture recognized for uniquely distinctive details such as the cloud-lift lines seen on various members of their tables and plugged mortises on breadboarded tabletops. Their work represents some of the highest expressions of the American Arts and Crafts movement.



BRACKETS AND CUTOUTS

Not all details are perfectly rectilinear. Small accents, many in the form of brackets or cutouts, enliven otherwise straightforward designs.



Brackets, though square-edged, unmolded, and flat, often are given a gently curved profile.

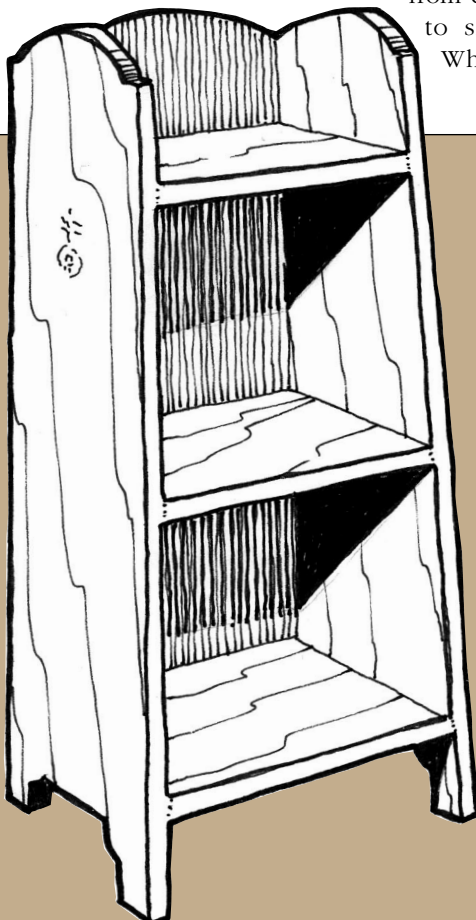
The angularity of wedges and curved cutouts lends a refined look to Arts and Crafts pieces.

oiled and then waxed. If wax alone is used, it should be colored so that the wax-filled pores in the wood do not show white.

Fuming, the process of exposing oak to the fumes of ammonia, is a common method of turning oak darker without producing the irregular color that can result from careless staining. The popularity of fuming, especially among early proponents of Arts and Crafts furniture, resulted from the misconception that genuine Gothic furniture was extremely dark. That darkness, in fact, came from centuries of exposure to smoky atmospheres. When new, however,

most Gothic furniture was brightly painted or valued precisely for its light golden color. □

Graham Blackburn is a furniture maker, author, illustrator, and the publisher of Blackburn Books (blackburnbooks.com) in Bearsville, N.Y.

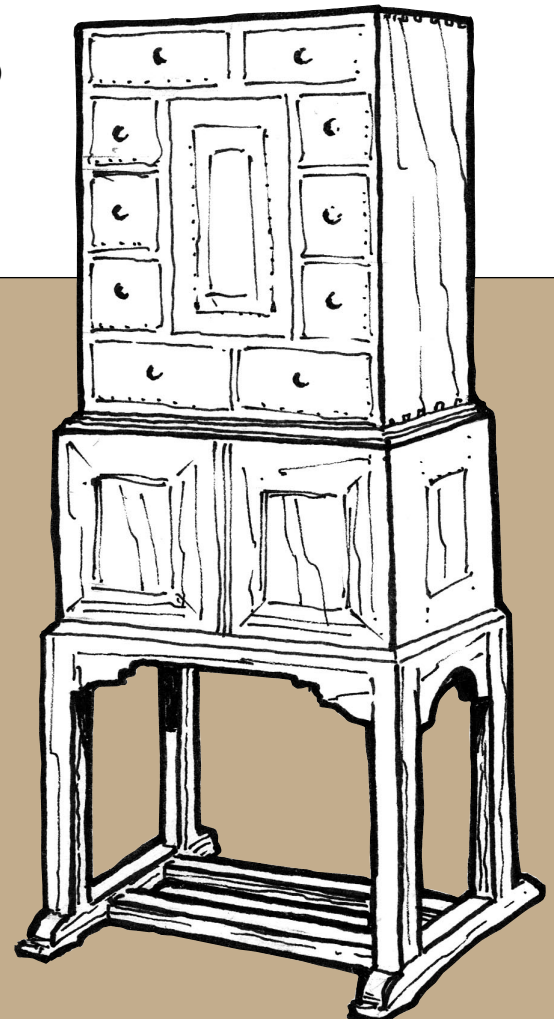


ROYCROFT COMMUNITY MAGAZINE RACK, 1910

In contrast to the previous one-of-a-kind pieces by Charles Voysey, the Roycrofters, founded by Elbert Hubbard—an ardent believer in many aspects of the Arts and Crafts movement not limited to furniture alone—produced extremely simple and unsophisticated “factory-made” pieces in white oak.

SIDNEY BARNSELY CABINET-ON-STAND, 1914

This walnut cabinet-on-stand (with holly and ebony stringing) is in many ways far removed from the output of the Roycrofters and the Stickley shops but owes its essential design to the same principles of honesty of purpose and design shorn of superfluous decoration. Barnsley, his son, Edward, and Ernest Gimson constitute the “grand old men” of the Arts and Crafts movement and were the leading influences.



True Greene & Greene

Learn how the elements work together, and then use them in your furniture

BY GARY ROGOWSKI

The marrying of styles is a tricky business. Add the wrong elements, or too much of one over another, and the results look wrong and out of place. Brothers Charles and Henry Greene, the California architects of the early 20th century, created a marriage of styles that continues to please the eye and capture the imagination 100 years later. They took the plainness and exposed joinery of Arts and Crafts furniture, mixed it with the subtlety of Chinese furniture and the boldness of Japanese temple design, and then with a final flourish threw in a taste of the sinuous lines of

Art Nouveau. The result is a style that has been revered, copied, and rediscovered, but remains uniquely Greene and Greene.

If you are attempting a faithful reproduction of a Greene and Greene piece, you'll want to understand each of the essential elements in order to capture the original spirit. If you are brewing your own blend, you'll need to know how the Greenses combined carefully selected elements to create a single effect.

How the style was born

The Greene brothers began their professional careers steeped in the ideals of the Arts and Crafts move-

Beyond Arts and Crafts

While the Greene and Greene style arose within the Arts and Crafts movement, the brothers added elements from Asian architecture and Art Nouveau. Rounded edges, sweeping curves, and elegant details make their work more refined, organic, and welcoming than the austere Stickley furniture that preceded it. The designers found surprising versatility in a few favorite shapes. On the rocker above, the stepped cloud-lift pattern on the crest rail is classic Greene and Greene. On the mahogany sideboard at right, the cloud lift is used in new and unexpected ways. It is easy to pick out in the backsplash and the corbels, but the linen-fold pulls and the fruitwood inlay on the doors are wonderful variations.



ment. This era in design emerged as a reaction to the crush of the Industrial Revolution—with its machine-made, often low-quality products—and the overwrought frilliness of the Victorian era. With a start in Europe, the movement found ready followers in America including the entrepreneur and furniture maker Gustav Stickley.

Stickley started a magazine, *The Craftsman*, and it provided the Greene brothers with ideas, perhaps a mirror to hold up to their own work, and certainly a perspective on design that was new and exciting for the time. The Crafts movement, both in this periodical and in shows and expositions in Europe and America, was an all-encompassing view of life. It promoted an honesty of approach as a moral truth and used a simplicity of line and form as a dictum. It also began a movement toward the architect as artist for interiors and functional items. Whereas the architect once designed only buildings, now he designed interiors, fabrics, lighting, windows, and furniture, a whole fabric for living.

However, while the Craftsman style had a certain severe, almost medieval, character about its solid planks, exposed joints, and straight lines, the Greene brothers added



SOFTER JOINERY

Exposed joinery is a hallmark of Arts and Crafts work, but the Greenes made it more welcoming. They used a unique finger joint (above) on drawer boxes and carcase joints. The bridge joint (far left) is a variation. Ebony pegs come in all shapes and sizes, sometimes covering screws, sometimes used just for effect. Ebony splines (near left) highlight joinery and soften its transitions. Despite the novel joinery, the pieces remain sturdy a century later.



THE CLOUD LIFT

Used in myriad ways, the cloud lift offers a novel way to create a taper, and adds to the soft landscape of stepped surfaces. By using negative and positive variations of the form, the Greenes added complexity and richness to a chair back (left), while maintaining harmony. Note the variations on the table (above), in the breadboard top, the drawer pull, and the stretcher below the drawer. In every room of a Greene and Greene house, there is a theme. The beams over the inglenook (below left) proclaim that a single-step cloud lift is king in the living room, and a small carved detail connects the furniture and cabinets: It is a zigzag (below right) highlighting the line of the cloud lift.



joinery, carvings, and inlay. As a result, their work has both a firm grounding in honest construction methods and a sense that great care has been taken, with no detail left unconsidered.

The essential elements create a landscape

life. From Japanese temple carpentry, they used corbels and large timbers to give their work a sense of strength and foundation. They added organic and flowing shapes found in Chinese furniture: the cloud-lift form, overhanging tops, and rounded edges and corners that gave their work lightness and richness. Their furniture also showed the influence of Art Nouveau designers such as Mackmurdo and Mackintosh, who borrowed curved lines and organic shapes from nature. The Greene brothers turned these seemingly disparate elements into one seamless style.

Because the work of the Greenes was done principally for the wealthy, they could afford to add a wealth of detail in the stylized

If architecture is rightly called frozen music, then the furniture and interiors of Greene and Greene are part of the symphony. The Greenes emphasized the landscape of each piece. It's part of the texture of each piece that when two parts meet, there is no flush surface. Each part has its own distinct proportion and a shadow line is created at every turn. Rails step back from legs; drawers step back from rails. Some drawers are left completely proud, jutting out from the work in an architecture of forms. It may be only the slightest of differences, but each surface stands alone in the topography. And the Greenes chose finely grained woods that would not distract from that landscape: walnut, teak, mahogany.



THE SWORD GUARD SHAPE

A Japanese sword guard (called a tsuba) is the common motif in the dining room of The Robinson House, which has been perfectly restored and installed at The Huntington museum's Scott Gallery in Pasadena. The dining table's veneered top (above) is cut in the tsuba shape. Splines and pegs mark the transitions between the pieces of solid-wood edging. Nothing in a room escaped the Greenes' attention. They designed the tsuba shape into the cut glass in the built-in cabinets (top right), and into the base of a hanging light fixture (below). The tsuba and the cloud lift are relatives, and the dining chairs' back splats (right) can be viewed as either one.



Deep, rich color was the goal, and sometimes pigments or chemical stains were used to darken the wood. A satin oil finish added a soft glow to smooth, stepped surfaces and rounded edges.

Joinery and pegs stand proud—Once hidden, precise joinery was now a design element in Arts and Crafts furniture, with its emphasis on visible craftsmanship. But the Greenes took it further, making it part of the textural landscape. Finger joints are left raised and shaped, bridle joints barely jut through and then get rounded over. The plugs are also an opportunity for exploration. They run the gamut from round to dead-on square to rectangular.

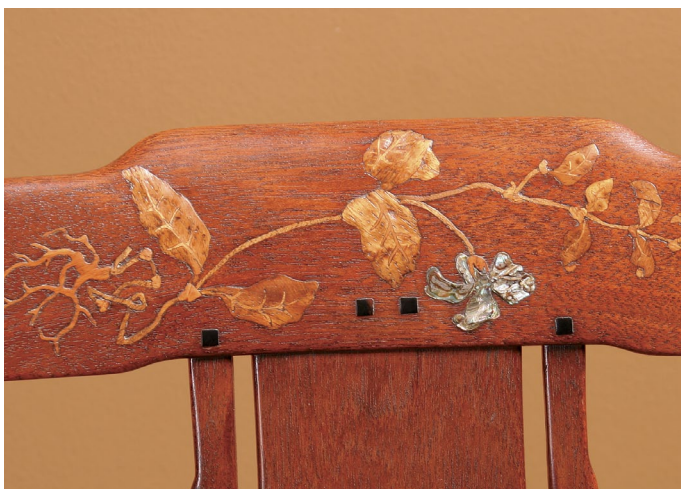
Breadboard ends serve a dual purpose—Almost every solid top or shelf is finished with a breadboard end. This cross-grain cap helps to keep a panel from cupping, partly by covering the end grain and cutting down moisture exchange. But breadboard ends also add another surface to the style, often just slightly raised from the top and always protruding at the ends.

Favorite forms—The cloud-lift form may be the element most often associated with Greene and Greene. The variety of this Chinese detail, its unexpected use, and the grace it bestows on their



PIERCED ELEMENTS

The matching furniture from The Thorsen House dining room shares these wide lower stretchers (far left) decorated by long parallel slots, a common Greene and Greene element. Sawn corbels, though not pierced, per se, create negative space where rails meet legs (above left). The front apron of a floor stand (near left) is broken by a unique bit of fretwork, while the side apron has a more common piercing.



designs is unmatched. It is amazing what an artist can do with a single versatile motif, using variations to create richness and harmony at once. The Greenses did this with the Japanese tsuba (sword guard) shape, theming whole rooms around this distinctive detail.

Soft edges seem hand worn—Each furniture part and detail is carefully treated with rounded edges or a taper or both. They have the look of gentle wear, like beach sand on driftwood. Parts are also subtly changed through their length, sometimes tapering just so slightly, other times boldly bumping out to create a thick and massive effect. These details show once again the handwrought quality of the pieces and how they aim to recall a sense of antiquity.

How to borrow the style

The Greene brothers chose their elements well and had a masterful control of them. They were able to combine a variety of details in one piece and still have it sing on key.



INLAY AND OVERLAY

Wealthier clients were willing to pay for further refinements. Organic designs, inlaid impeccably using beautiful woods, metals, and other materials, were the result. In a bedroom of The Gamble House, a matching chair (above) and desk (left) contain typical examples. As usual, the inlay is left a bit proud of the surface, adding to the overall texture. A stairway from The Libby House (right) is decorated by a floral appliqué, simply cut from sheet brass and pinned to the post.





Two modern takes

Modern makers have interpreted the Greene and Greene style in their own furniture. While not intended to be faithful reproductions, these two pieces include many of the classic elements. In author Gary Rogowski's sideboard (left), he reinterprets the cloud lift and long grooves, and adds a fresh Japanese touch: a playful ginkgo-leaf inlay. The flared legs of Darrell Peart's chest of drawers (below) were inspired by Arts and Crafts icon Charles Limbert, whose tapered legs were a signature element of his furniture. Peart's stylized take on Greene and Greene drawer joinery and his curved adaptation of the cloud lift are also harmonious touches.



Successfully using these elements in your own work requires the same care. You might reproduce them faithfully but combine them poorly. Remember that the Greenes usually based a piece, even a whole room, on a single detail. It would be too much to put every Greene and Greene element you've seen into a single piece, blending dissonant details into an off-key arrangement.

When I'm designing in this style, I like to make certain elements recall the style without trying to absolutely mimic them. Cloud-rise details are infinitely adjustable, whether it's the distance between the two lines or where you start and stop the rise.

The stepped surfaces are also important, but be careful with how big you make the steps. A ¼-in. rise between breadboard ends and a tabletop can be a disaster if you're always setting wine glasses down on it. The same is true with raised plugs and joints. A little bit of rise to a plug can be more attractive and friendlier to the touch than a large, carved, textured one. Subtle effects should be just that, and they actually will have more impact. Remember that the purpose of these details is not only to show your craftsmanship but also to draw people to a piece, to make it warmer and more inviting. □

Gary Rogowski runs The Northwest Woodworking Studio, a school in Portland, Ore.



Where to see Greene and Greene

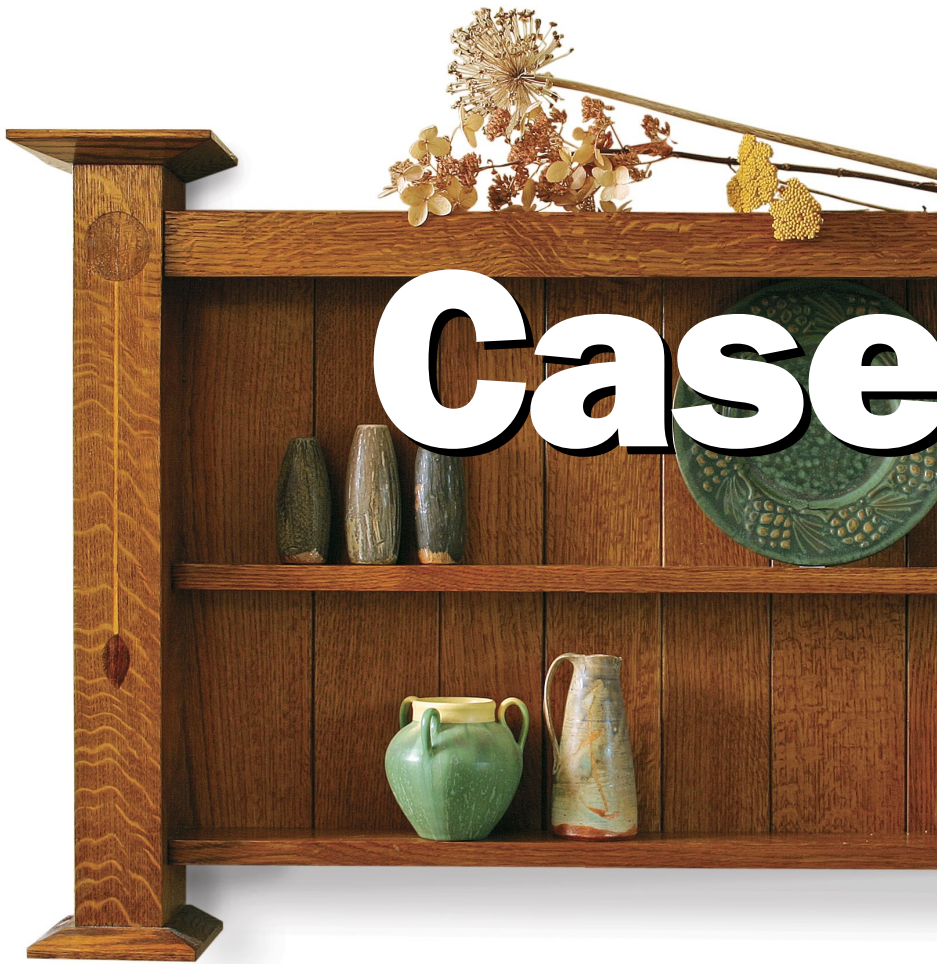
Any discussion of Greene and Greene furniture soon leads to The Gamble House (gamblehouse.org) in Pasadena, Calif. It is the best-preserved of the "ultimate bungalows" the brothers created at the height of their careers. The Greenes designed everything inside

and outside these homes, from the architecture and furnishings all the way down to carpets, lighting, cut glass, millwork, and clever mechanics like hidden doors.

So we headed to Pasadena to photograph some of the best surviving examples of Greene and Greene furniture—in the house they were designed for. While in town we made another critical stop at The Huntington (a wonderful 200-acre combination of galleries, library, and botanical gardens: huntington.org) to photograph the Greene and Greene exhibit in the Scott Galleries of American Art. There we found furniture from The Thorsen House, a complete dining room from The Robinson House, a staircase rescued from The Libby House, and a few more pieces from the Gamble—together forming a broad sampling of the brothers' best work.

If you are ever in the Los Angeles area, make a point to visit these places. You'll never forget the experience.





Casework

24 Greene and Greene
Blanket Chest

32 Display Cabinet

40 Wall Shelf

46 Arts and Crafts
Sideboard



Greene and Greene Blanket Chest



It's all about the details.
Our expert shows
how to get them right

BY DARRELL PEART

I've long been drawn to the work of the brothers Henry Mather Greene and Charles Sumner Greene, the early 20th-century architects who designed and furnished some of the country's most important Arts and Crafts bungalows. Their furniture stands apart for its elegant fusion of Japanese-inspired detail with solid, practical Craftsman design.

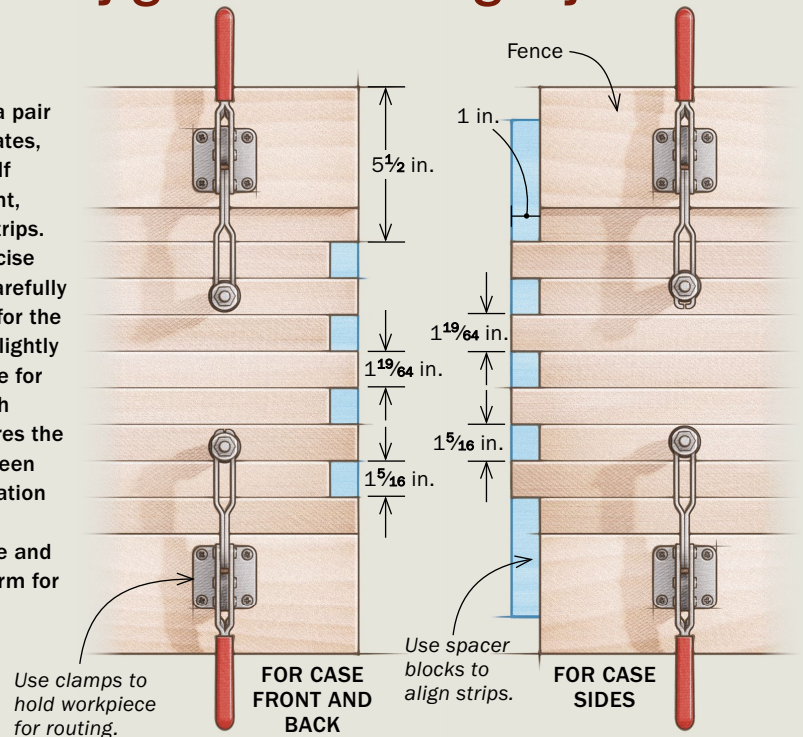
The brothers designed blanket chests for two California homes—the Pratt House in Ojai and the Thorsen House in Berkeley. When I designed my chest, I used details from each of these two pieces, including the proud, pegged finger joints and the lid with raised breadboard ends, along with one from a smaller piece by the Greenses—the Ford House letter case. On that piece, two leather straps wrap the bottom so it won't scratch the table it sits on. I thought a similar detail, rendered in wood, could lend visual weight to my chest's base. Taken together, these details make for a fun and beautiful project.



Router jigs nail the finger joints

MAKE TWO TEMPLATES

Peart glues up a pair of router templates, one for each half of the finger joint, from plywood strips. To ensure a precise friction fit, he carefully mills the strips for the finger sockets slightly wider than those for the fingers. Each template captures the workpiece between a pair of registration blocks that are screwed in place and provide a platform for toggle clamps.

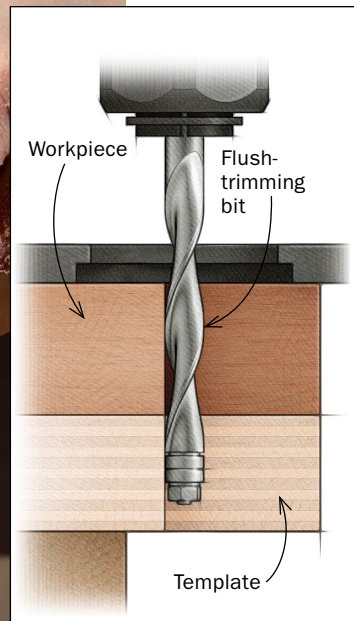


Edge-glue the strips. To assemble each template, clamp two straight cauls to the glue-up surface at a right angle to create a square reference corner (above). Spacer blocks help ensure that the finger sockets are uniformly deep. Apply clamping pressure on top of the glue-up (left) so the surfaces are flush for smooth router travel.

Cut the joints



Route the fingers. After removing the bulk of the waste with a jigsaw, clamp the workpiece into the template jig and use a $\frac{1}{4}$ -in.-dia. flush-trimming bit to complete the finger pattern on the end of each piece.



The case comes together with finger joints

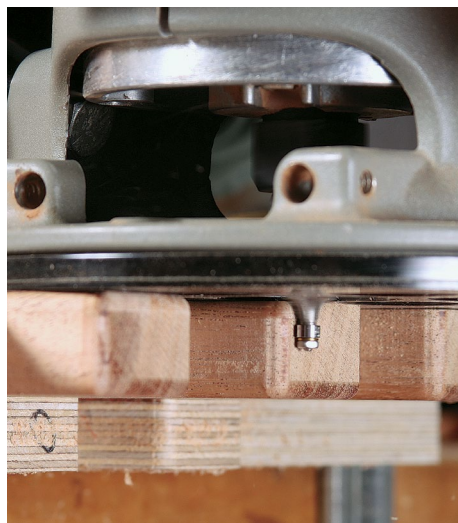
To create the large finger joints on the case, make a pair of routing templates by edge-gluing strips of $\frac{3}{4}$ -in. Baltic-birch plywood or MDF. For a snug fit, cut the strips for the template fingers about $\frac{1}{64}$ in. narrower than the strips for the gaps.

After the glue dries, the templates may need flattening with coarse-grit sandpaper. I use a wide-belt sander here, but a belt sander would also work. Then attach the registration blocks and toggle clamps that lock in the workpiece. Be sure to cut some test joints before using the templates on your project.

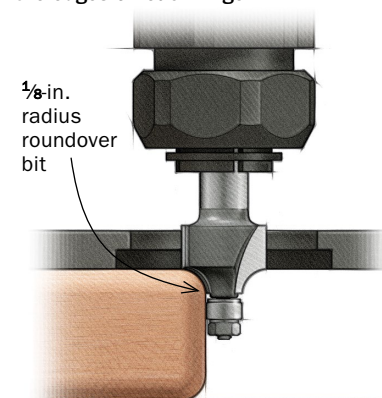
To start the joinery, mark the finger locations on the blanks and jigsaw away the bulk of the waste between them. Clamp each blank to the template and rout, using a $\frac{1}{4}$ -in.-dia. spiral flush-trimming bit with a bottom bearing. This leaves the inside corners on each finger with a $\frac{1}{8}$ -in. radius. To create a matching $\frac{1}{8}$ -in. roundover on the mating fingers, remove the workpiece from the template and rout the finger edges with a miniature bearing, $\frac{1}{8}$ -in.-radius roundover bit (Amana MR0112). The joints should close on dry-fit with medium clamping pressure. If not, carefully clean up the inside corners with a rat-tail file.

The finger joints are reinforced with screws hidden by square ebony plugs. To cut the square holes, I use a hollow punch from Lee Valley. To help align the holes, I clamp a straightedge to the workpiece. After laying out the peg locations, register the punch against the straightedge and strike it with a steel hammer to set it in place. Then use a twist bit inside the punch and drill about $\frac{3}{8}$ in. deep. Remove the bit and punch the tool to the depth of the drilled hole. You can re-insert the bit to remove debris, but don't make the hole any deeper.

Now sand the case parts to P220-grit. I bring the case together in stages, first assembling the two opposing



Soften the edges. Peart uses a bearing-guided roundover bit to ease the edges on each finger.



Punch the peg holes. To create the square mortises for the decorative ebony plugs, Peart uses a hollow punch, which he aligns with a clamped-on straightedge. After seating the punch with a single strike, drill through it to the desired depth. Afterward, strike the punch again to drive it to the full depth of the mortise.

Assemble the chest



One corner at a time. After finish-sanding the fingers and applying a dab of glue on each one, Peart secures the joints with corner clamps, top and bottom (right). With this done, he drills a pilot hole in each finger and drives screws to lock the assembly together.

corners with corner clamps and then bringing the halves together. Because I'll be screwing these joints, I don't fully glue them. I put just a dab of glue on the inside of each finger where it will meet end grain in the gap.

Pre-drill into the fingers for a #6 by 1¼-in. panhead screw. Make sure the screw head is smaller than the ⅝-in.-dia. plug hole. Do not run screws into the top and bottom finger of the front and back panels—these fingers tend to split. Check for square, but don't fret if it's a bit out. Final squaring will be done when the bottom is attached.

The base fingers are tablesawn

The chest sits on a decorative base. The corners of the base are also finger-jointed, and these larger joints are quick and easy to make using a dado set. I make the cuts with the workpiece clamped vertically in a crosscut sled and registered against a stop block. I position the stop block to let me complete the joint with a pair of mirrored cuts, flipping the workpiece between them. This approach works well only if all the pieces are exactly the same width, so take care when milling, and test the setup on scrap.

Start by cutting the centered notch on the ends of the long sides. I do each one in two passes, flipping the board and leaving the stop block at the same setting. To cut the mating finger on the ends of the short sides, leave the dado set's height unchanged and reposition the stop block. Use the cut notch as a reference. It may take multiple adjustments to position the stop precisely. The joint should fit snugly with minimal friction.

Assemble and attach the base

Cut peg holes in the base pieces, and round the fingers with a ⅜-in.-radius roundover bit. To visually suggest that the base fingers bear the chest's weight, I pillow their shape slightly by sanding with a folded piece of P80-grit paper. Use a shoe-shine motion until the roundovers are blended to a gentle arc. Finish-sand



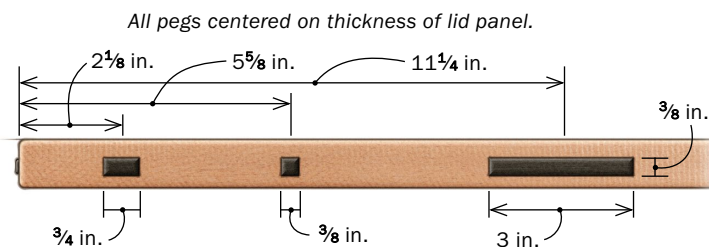
Build the base. Cut the large finger joints at the tablesaw with a dado set, then assemble the base like the case itself: Glue and screw the opposing corners, then bring the two halves together.



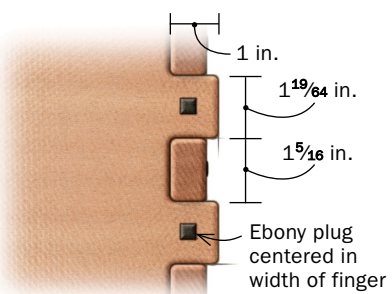
Add the bottom, then the base. With the case upside down, glue and screw the bottom to the case sides. Then set the base in position and screw it to the bottom using the screw blocks.

ARTS AND CRAFTS TREASURE CHEST

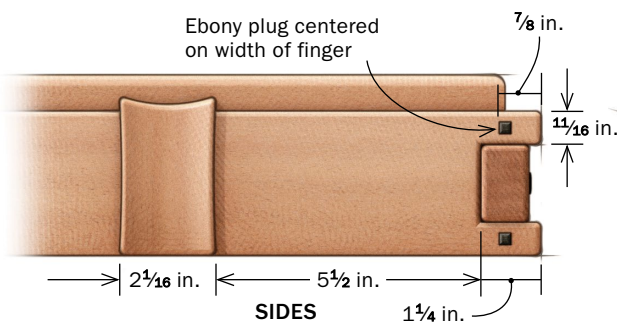
Peart's design for this blanket chest incorporates a number of Greene and Greene details, including the interlocking finger joinery at the case corners, the offset breadboard ends with ebony splines, and the faux leather straps that decorate the base.



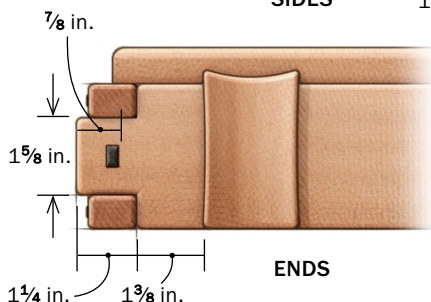
LID DETAIL



FINGER DETAIL

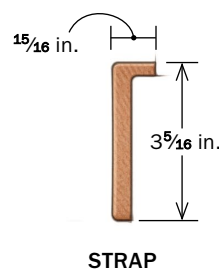


SIDES



ENDS

BASE DETAIL



STRAP

Edge trim, 5/16 in. thick by 1 5/16 in. wide, with 1/8 in.-dia. roundover on bottom

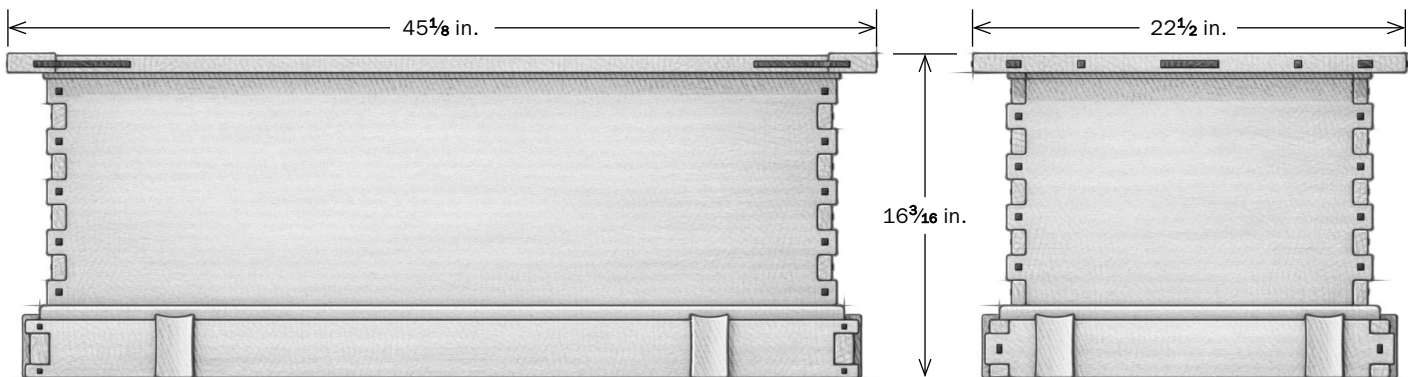
Notch trim for hinge.

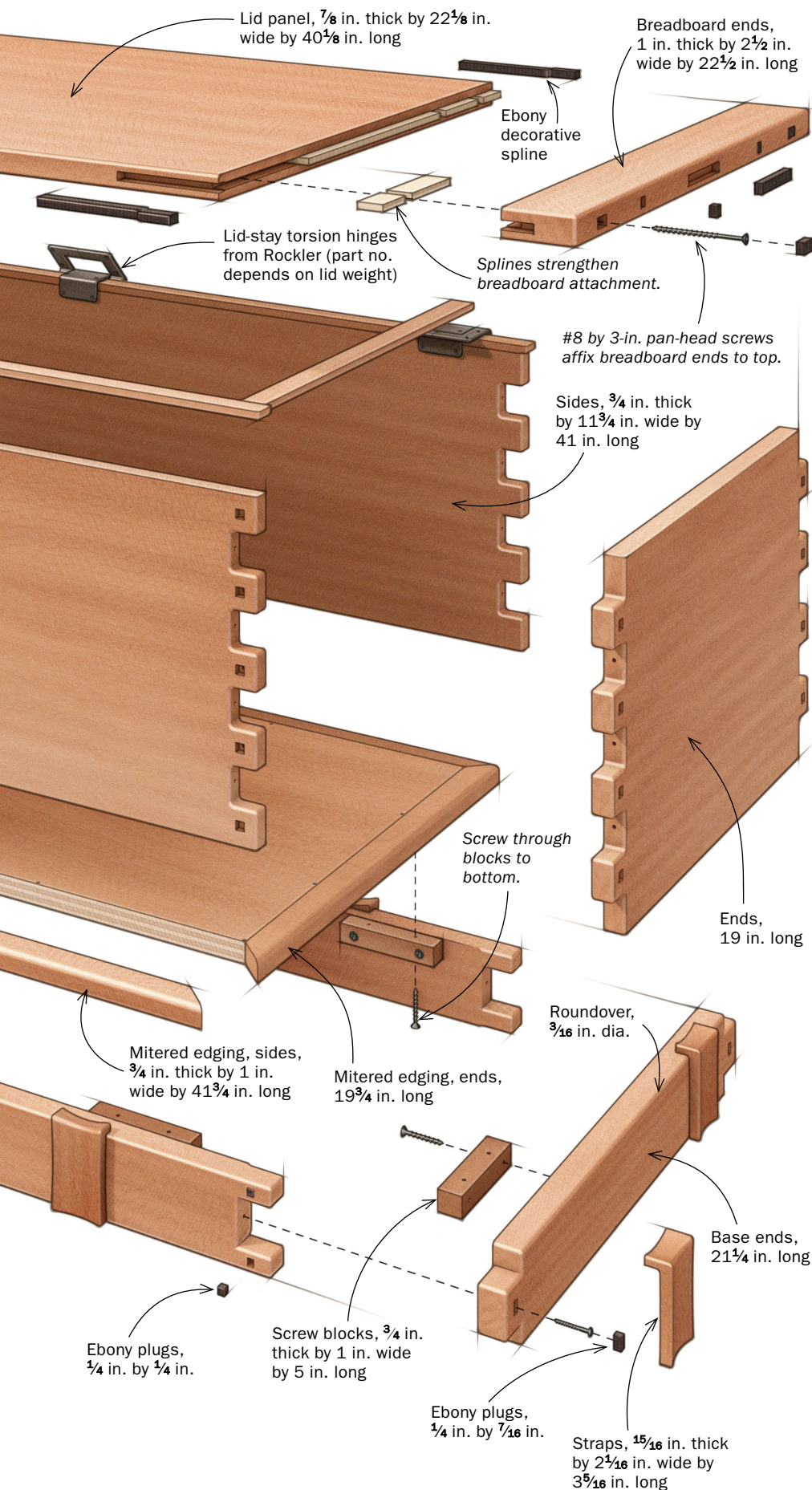
#6 by 1 1/4 in. pan-head screws

Ebony plugs, 5/16 in. by 5/16 in.

Bottom, mahogany plywood, 3/4 in. thick by 17 3/4 in. wide by 39 3/4 in. long, glued and screwed to case

Base sides, 1 in. thick by 3 in. wide by 43 1/4 in. long





the base parts to P220-grit, taking the end grain into P320-grit.

The base comes together much like the chest itself. Apply a dab of glue inside each finger, then clamp. Pre-drill for a screw into the center finger only. Afterward, attach 10 screw blocks around the inner perimeter, setting them about $\frac{1}{32}$ in. below the top edge.

The bottom of the chest is plywood with a solid-wood edging. It is screwed from below to the case, and then the base is screwed to the bottom. To do this, start with the assembled case upside down on the bench. Make sure the case is square, then set the bottom in place and add the base, making sure the overhang is even all around. Trace the position of the screw blocks onto the bottom, and remove the base.

Secure the bottom temporarily by driving screws through it into two opposing corners of the case. Now predrill for the remaining screws. When this is done, back out the first two screws, and remove the bottom.

Now run a bead of glue along the bottom edge of the case. To reseal the bottom, drive the two screws again until they protrude about $\frac{1}{4}$ in. through the panel. With a helper, reposition the bottom using the points of the screws to find their corresponding holes. Drive the first two screws home, then the remaining screws. Now set the base back on the bottom, clamp it in place, and attach it with screws through the blocks.

Make the breadboard ends

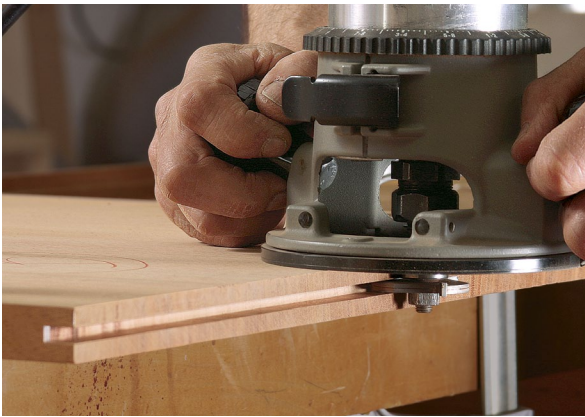
Mill the lid parts to final size, making sure that the breadboard ends are $\frac{1}{8}$ in. thicker than the panel and about $\frac{3}{8}$ in. longer than the panel is wide. Use a three-wing slot-cutter to run a groove for the splines in the panel and breadboard ends. Cut the holes for the square and rectangular ebony plugs on the outer edge of the breadboard end, centering the holes on the thickness of the panel, not the breadboard end itself. Next, predrill for the screws in the center of the holes.

I use multiple splines, leaving gaps between them for the screws. Make sure the spline material is cut so its grain runs in the same direction as that of the panel. Before assembly, rout all the roundovers and sand the panel and breadboard ends. The splines are glued to the panel all the way across, but are only glued in the center 4 in. of the breadboard end. Now drive the screws.

I rout the mortise for the decorative ebony spline with a slot-cutter, referencing off the lid's bottom with the cutter centered on the panel. Square up the inside corners with a chisel. Mill and machine a piece of ebony to fit the cavity snugly and with enough excess width so it protrudes at least $\frac{1}{8}$ in. from the mortise. Relieve

Build the lid

BREADBOARD ENDS



Slots first. To hold the splines that align the breadboard ends, Peart routs slots in the end grain of the lid panel and in the mating edges of the breadboard ends.

the back of the spline on the breadboard end side so the panel can expand and contract without causing the ebony to bottom out. Glue the ebony in on the panel side only. Trim the spline with a $\frac{1}{2}$ -in. spiral straight bit. Make one pass with a $\frac{3}{4}$ -in. bearing, then switch to a $\frac{5}{8}$ -in. bearing and repeat. This will leave the ebony $\frac{1}{16}$ in. proud. Finally, tape around the ebony to protect the surface, ease the edges with a chisel, and sand with P220-, P320-, and P600-grit.

Fasten the straps

The final touch is a series of L-brackets that fit over the base and resemble leather straps stretched taut. Each bracket is shaped with a tablesawn cove on the front face and other curves created by spindle- and hand-sanding. I start with long mahogany blanks for the cove cut. I set the tablesaw blade about $\frac{3}{16}$ in. high and guide the stock between a shopmade pair of parallel



Multiple splines make room for screws. Peart leaves $\frac{1}{2}$ -in. gaps between the splines to provide clearance for the long screws that will help hold the breadboard end in place.



On go the ends. One clamp provides the pressure to secure both breadboard ends. To avoid problems with wood movement, apply glue along the whole length of the slot in the lid panel, but only the center few inches of the slot in the breadboard ends.

SEAT THE DECORATIVE SPLINE



More mortises. When the breadboard ends come out of clamps, rout the mortise for the ebony splines that visually connect the ends to the panel. Peart uses a bearing-guided slot-cutter.



Fit the spline. Bandsaw the inner edge of the spline to roughly fit the stepped contour of the mortise bottom. With the spline pressed into place, pencil a line for bandsawing the outer edge to shape. Trim the excess, but leave it proud. A spiral bit with an extra large bearing follows the irregular surface where the panel meets the breadboard end, trimming the spline uniformly proud.



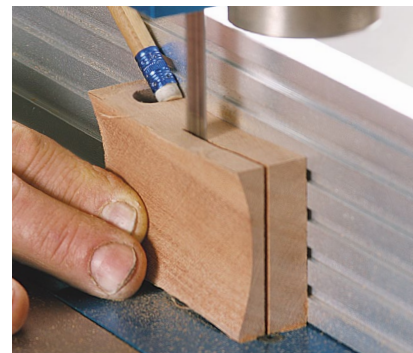


Make the straps

Cut the cove. Using a push pad and push stick for safety, Peart guides the stock over the blade. Taking incremental cuts, he ends with the blade high enough to span most of the stock's width, leaving a narrow flat on each edge.



Cut the short leg of the L. The first step in creating the strap's L-shaped back is removing material at the top. Peart makes passes with a core-box router bit.



Finish the L. Peart makes a bandsaw cut along the strap's length to meet the opening created by the router.



Glue the straps in place. No screws are used to secure the L-shaped brackets.



Install the plugs. After shaping and fitting the plugs, dab with glue and tap home with a small plastic-headed mallet.

fences that straddle the blade at 45° (see top left photo, above). Once the cove is done, crosscut the individual pieces to length.

I cut the L-shape into the back in two steps. First, at the router table, I define the short leg of the L using a $\frac{3}{8}$ -in.-dia. core-box bit. This creates a $\frac{3}{16}$ -in. radius on the inside corner of the L that will mate snugly with the rounded top edge of the base. Make sure to back up the cut and take it in several light passes. Next, mark out for the curves in the sides and top of the strap, and shape them at the spindle sander. Cut the long leg of the L at the bandsaw. To clean up the inside corner, stretch a piece of 80-grit adhesive-

back sandpaper over a scrap with a $\frac{1}{8}$ -in. radiused edge. Run the back of the strap over the paper until the transition is smooth. To make sure each strap fits perfectly on the base, I use another sandpaper trick. On the edge of the case bottom, where the strap will be applied, I stick a narrow strip of P80-grit adhesive sandpaper. In the same location, on the face of the base, I tape a piece of nonadhesive sandpaper, with its back side facing out. Run the strap back and forth across the sandpaper until the paper stops cutting. The strap can now be glued in place. □



Article Extra

Learn Darryl Peart's method for a flawless finish on Greene and Greene furniture.

Darrell Peart makes furniture in Seattle.

Display Cabinet

Versatile cabinet is a lesson on building in the Stickley style

BY MICHAEL
PEKOVICH



VIDEO WORKSHOP

Watch Pekovich build a smaller version of this cabinet from start to finish in a members-only Video Workshop series.

Simple is not always easy. Take Arts and Crafts furniture. Woodworkers fond of the style—with its beefy parts, rectilinear lines, and exposed mortise-and-tenon joinery—may think the furniture is easy to make. But this simple form is unforgiving of mistakes. Make one slip-up in proportions, hardware choice, or finish, and the design falls down. I've been building Arts and Crafts furniture for a long time, and I've worked through the challenges in making a piece that's true to the style.

This case piece is an original design, yet it would not be out of place in an antique Stickley catalog. With its quartersawn white oak, exposed joinery, fumed finish, and hand-hammered hardware, it breathes Arts and Crafts. The leaded-glass doors are typical, too, and add to the handcrafted look. You can have panels

made by a local artist or you can make them yourself (to learn how, see "Leaded Glass", p. 114). If you are interested in building in this style, I hope you'll find a few valuable lessons here. Also, this piece is a versatile one: I designed it to hold books and cherished items, but it could work as a sideboard, too.

When building an Arts and Crafts piece, the most important step is to choose good wood. The tight grain and magnificent ray fleck of quartersawn oak is the primary ornamentation, so don't skimp on the lumber. I found some great boards online that I supplemented with lumber from a local yard.

With a large project like this, I start from the outside and work my way in because it's easier to build the case first and fit the interior dividers after. The top and bottom of the case attach to

Full-size template simplifies the sides

To cut matching mortises that align perfectly, make a full-size template from $\frac{1}{4}$ -in.-thick MDF. The template is quick to make using a $\frac{3}{8}$ -in. straight bit on the router table.

STOP BLOCKS AND A SPACER ENSURE AN ACCURATE TEMPLATE

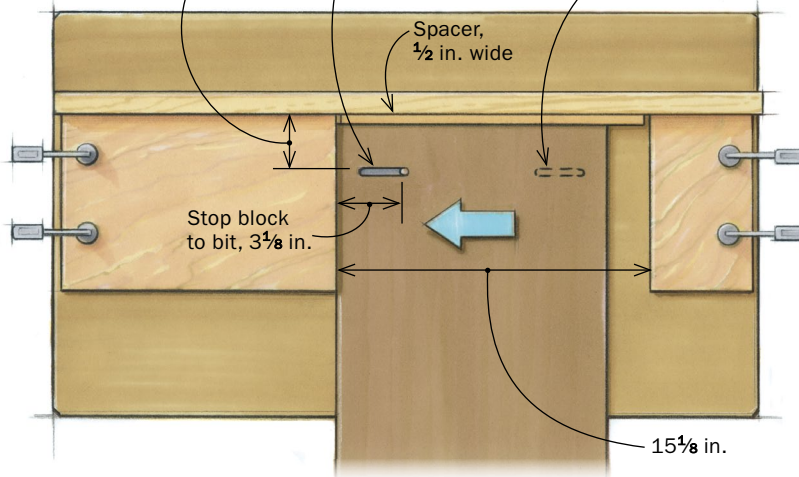


First cuts. Clamp stop blocks on both sides of the bit for the stopped cuts. With the spacer in place (see drawing below), plunge through the template and make one pass in the first mortise slot. Just flip the template to do the opposite slot.

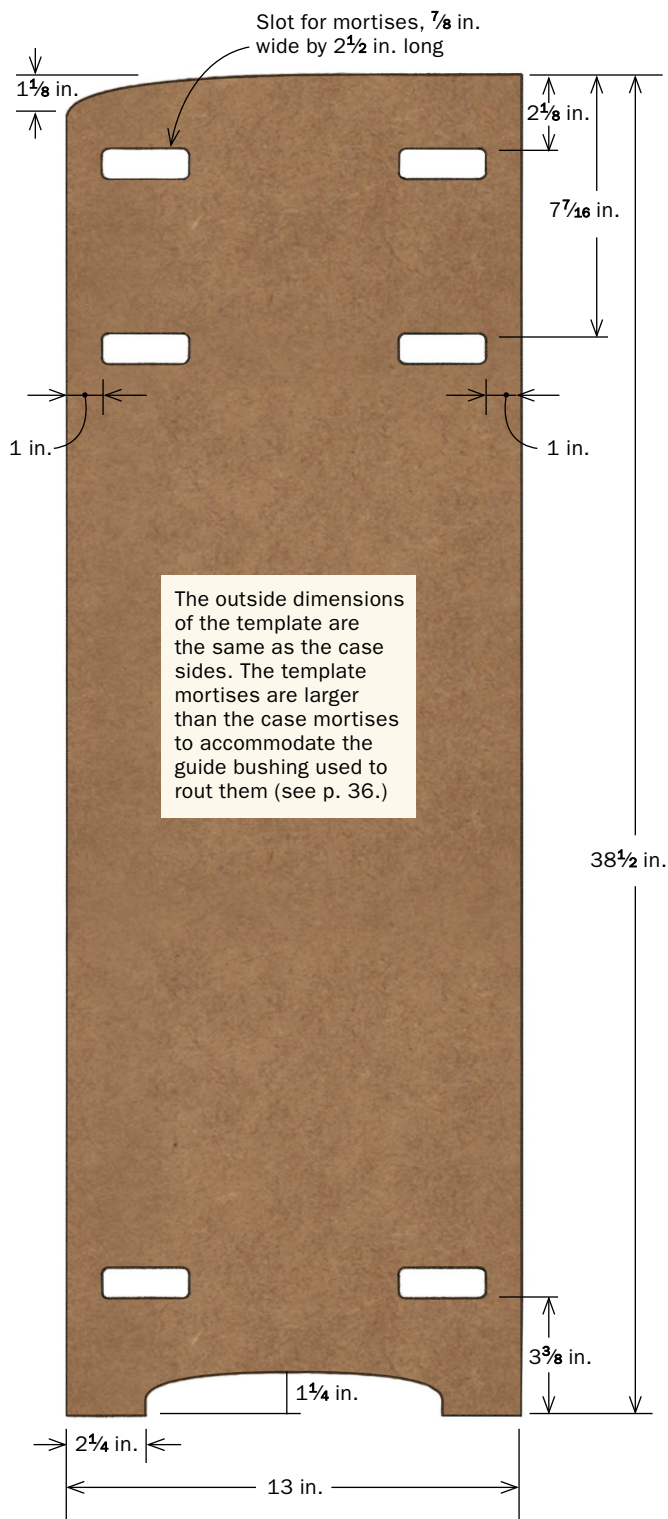
Fence-to-bit distance:
Top mortises, $2\frac{5}{8}$ in.;
divider mortises, $7\frac{15}{16}$ in.;
bottom mortises, $3\frac{7}{8}$ in.

1. Drop the template onto the bit and make the first pass.

2. Flip the template and rout the second mortise.

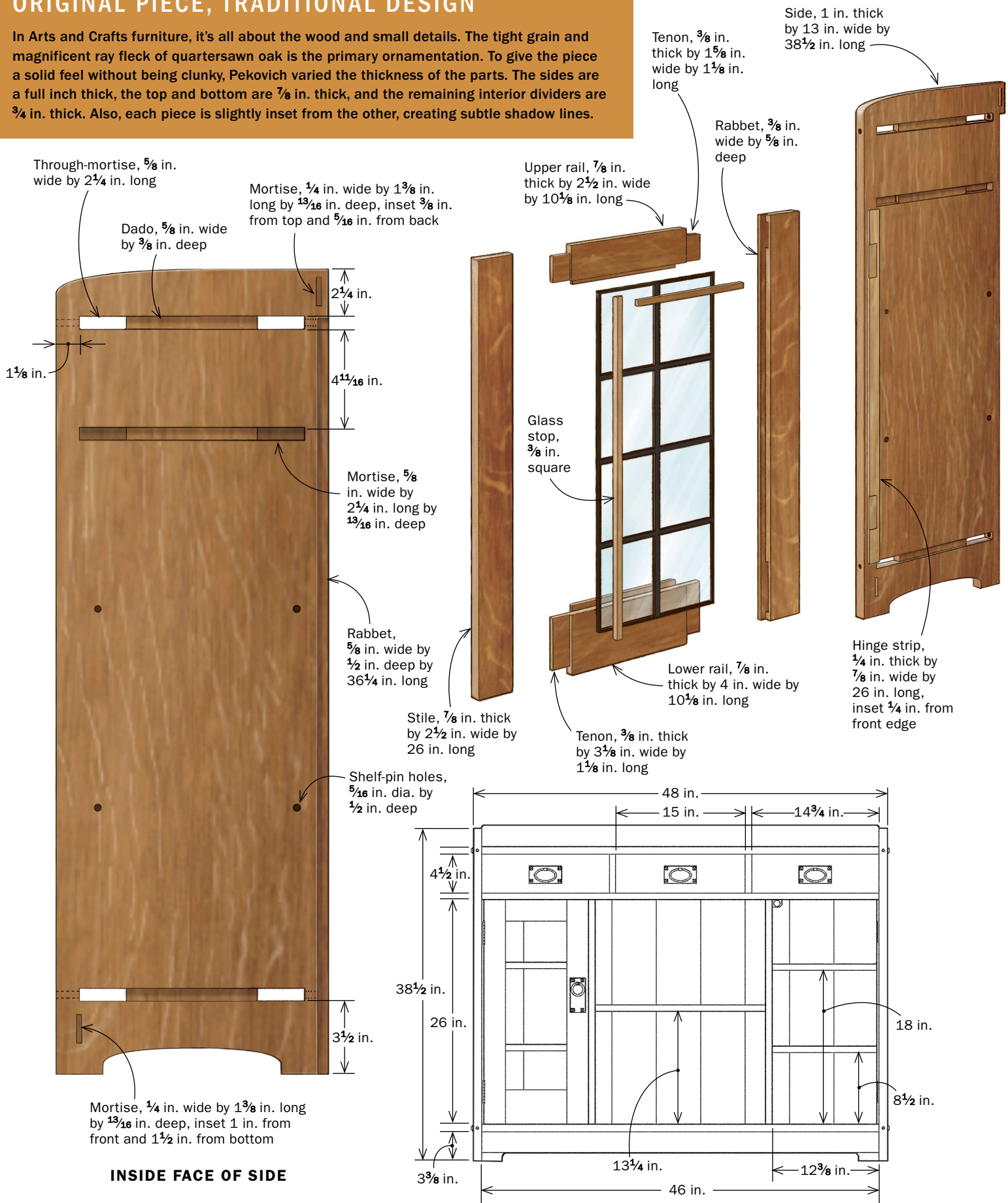


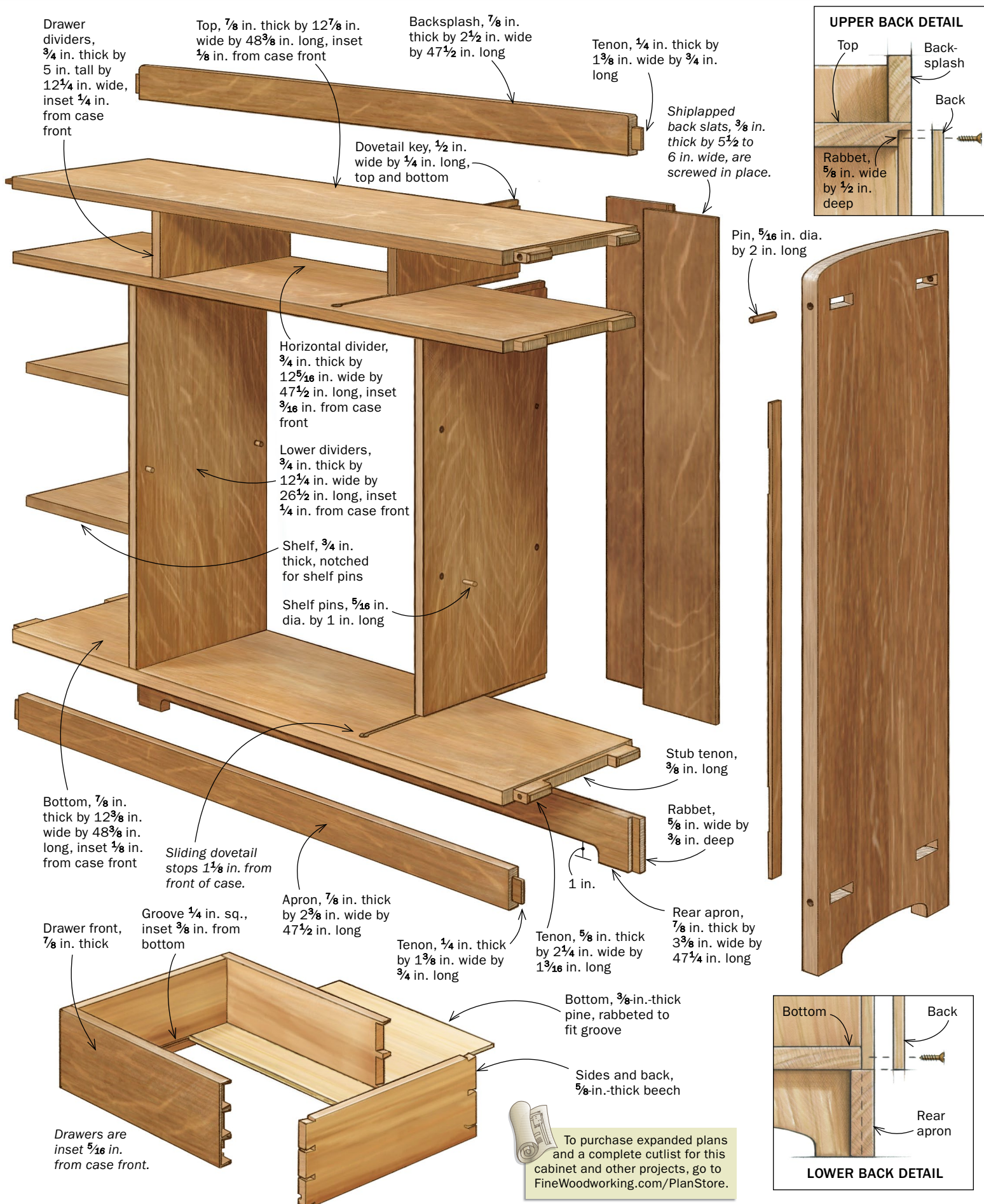
Second cuts. After the first passes, remove the spacer between the fence and template and finish routing the mortise slots. Adjust the fence and repeat the process for each set of mortise slots.



ORIGINAL PIECE, TRADITIONAL DESIGN

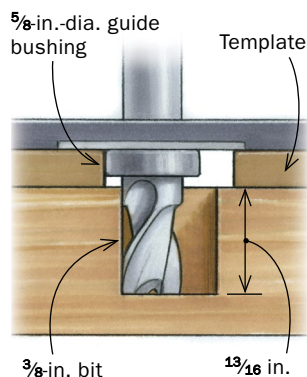
In Arts and Crafts furniture, it's all about the wood and small details. The tight grain and magnificent ray fleck of quartersawn oak is the primary ornamentation. To give the piece a solid feel without being clunky, Pekovich varied the thickness of the parts. The sides are a full inch thick, the top and bottom are $\frac{7}{8}$ in. thick, and the remaining interior dividers are $\frac{3}{4}$ in. thick. Also, each piece is slightly inset from the other, creating subtle shadow lines.





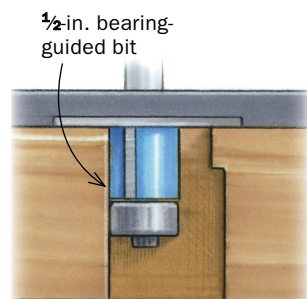
Case joinery

THROUGH-MORTISES WITHOUT MESS-UPS



Start on the inside face.

To make it easier to hold the workpiece and template, Pekovich uses an elevated clamping table. A bushing guides a spiral upcut bit.

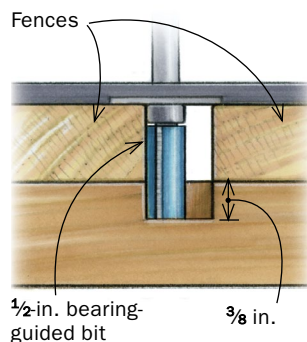


Tame tearout. To complete the through-mortises with no tearout, Pekovich uses a trick. Drill a hole through each mortise (right), flip over the piece, insert a bearing-guided bit in the hole, and rout out the remaining waste (far right).



TIP

Place tape over the divider mortises so you don't drill through them accidentally.



Connect the slots. To rout the shallow dadoes that connect the through-mortises, clamp fences on both sides of the mortises, and use a top-bearing-guided bit.



the sides with through-tenons. To help keep the case square and the wide boards flat, I added a stub tenon between the through-tenons.

The through-tenons are prominent features of the design, so you must get them right. For clean cuts and no gaps, I fitted the router with a guide bushing and straight bit and cut the mortises using a full-size template (see drawing and photos, p. 33). Then I cut the dadoes between mortises for the stub tenons. Finally, I squared up the mortises with a chisel.

To cut the remaining mortises for the backsplash and the lower apron, attach a fence to the router and use a spiral upcut bit. Then square them with a chisel.

Once the mortises have been cut, cut out the foot recess and profile the tops of the sides. Clean up the

TWO-PART TENONS



Dado blade does most of the work. After cutting the tenon cheeks and shoulders with a dado set, cut the through-tenons to width, using a tall fence to support the board. The scrapwood behind the tenons backs up the cut and reduces tearout.

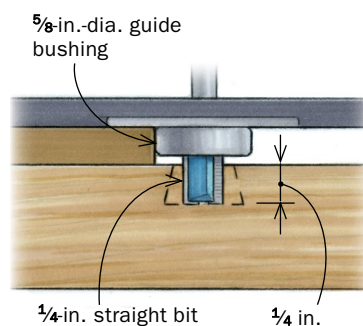
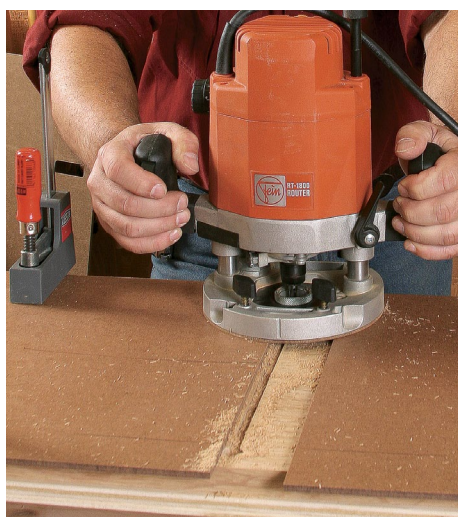


Saw off the stub tenon. Use the bandsaw to cut the stub tenons to length. The fence ensures a parallel cut.

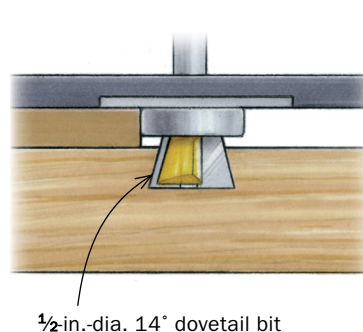


SLIDING DOVETAILS MADE EASY

Use a fence to guide the slot cuts. To ensure that the dovetail slots are parallel, clamp an MDF fence to the workpiece to steer the router's guide bushing.



Remove the waste. Drill a 1/2-in.-dia. hole at the stopped end, then rough out the slot using a 1/4-in. straight bit. The 1/4-in. piece of MDF opposite the fence prevents the router from tipping.



Final cut. Use a 1/2-in. dovetail bit to finish the slot. The hole at the end of the slot lets you drop the bit into the cut before turning on the router. The hole will be hidden by the divider.

cuts with a block plane, a spokeshave, and files. The last task is to drill holes for the tenon pins. For this, I used a doweling jig to help keep the bit aligned.

Crosspieces must line up shoulder to shoulder

Now it's time to cut the tenons on the top, the bottom, the horizontal divider, the back splash, and the apron. These parts have three different tenon lengths among them, but they all have the same shoulder-to-shoulder length. To ensure the case remains square, it is critical to get this dimension exactly right.

To help, I use a trick I learned from Pennsylvania furniture maker Steve Latta. Cut the parts all the same length, and then cut the tenon shoulders using the same setting on the tablesaw. Test the fit, and then

Glue-up without screw-ups

The case glue-up involves eight pieces. That many solid parts can be a pain to assemble and align during a single glue-up. So assemble the piece in stages.



Backsplash and apron first. Dry-fit the case to ensure proper alignment when gluing the backsplash and apron to the case top and bottom. These parts will help keep the case square in the later stages.



Top, bottom, and sides. Use grooved clamping cauls over the through-tenons to get pressure where it's needed (above). Place the case on T-supports to make clamping easier (right). Be sure to keep glue off the ends of the through-tenons.



VERTICAL DIVIDERS



Route the dovetail keys. After cutting the dividers to length, use the dovetail bit to cut the keys. A tall fence supports the long boards and a featherboard keeps the piece snug against the fence.



Long sliding dovetails with no binding. The trick is to slide in the dividers from the back almost all the way without glue, leaving about 2 in. exposed, and then apply glue to that exposed end and into the slot at the front. Now you can drive the divider home with a mallet.

trim the through-tenons to width. Next, cut the stub tenons to length using a band-saw. Once you're sure everything is fitting well, trim the through-tenons to their final length and chamfer their ends.

Now rout the slots for the stopped sliding dovetails that connect the vertical dividers to the top, the bottom, and the horizontal divider. Then cut the rabbets in the sides and top and bottom for the back panel.

Assembly: Keep it square

It's critical that the case remains square as you assemble it. Otherwise, you'll be fighting to fit the doors and drawers. To simplify the glue-up and to help keep the case square, I first glued the backsplash and apron to the case top and bottom, respectively. Then I glued up the sides, top, and bottom.

After the glue is dry, drill holes through the tenons and dry-fit the pins. Cut the pins to length and chamfer the exposed end of the pins before gluing them in.

Once the case is assembled, cut the vertical dividers to length and rout the dovetail keys on the ends, using the same dovetail bit used to rout the slots. After installing the dividers, cut and fit the shiplapped back panels.

Build the drawers and doors

With the case glued up, it's time to build and fit the drawers and doors. All three drawer fronts are cut from one board for continuous grain and color. Original Stickley pieces typically use white oak for the drawer sides as well, but I chose beech because of its dense, fine grain.

The doors are rabbeted for simple leaded-glass panels (see "Leaded Glass," p. 114). I wanted them to be inset $\frac{5}{16}$ in. from the front of the case, which means I couldn't hinge them directly to the case sides. So I added $\frac{1}{4}$ -in.-thick hinge strips to the inside of the case, inset $\frac{1}{4}$ in. from the front edge. The strips provide clearance for the doors to open, and it's easy to cut the hinge mortises prior to installing them.

Details that would make Stickley proud

No matter how true you are to the Arts and Crafts ideals when you build a piece, you can kill the design if you choose the wrong hardware or mess up the finish. For this piece, I chose traditional hand-hammered hardware (see Sources, below) and fumed the wood before applying a topcoat. Fuming may intimidate people, but I've developed a low-tech method (for details, see the story at right).

After fuming, I warm up the wood with a coat of garnet shellac. Then I switch to Waterlox, a wipe-on tung oil varnish. The last step is to rub out the finish with steel wool and apply a dark wax. This fills the open pores of the oak and pops the rays.

Now screw on the back slats, add the glass panels to the doors, install the traditional hardware, and the piece is ready for your living room. □

Michael Pekovich is a furniture maker, instructor, and Fine Woodworking's executive art director.

SOURCES OF SUPPLY

CRAFTSMENHARDWARE.COM

Gustav Stickley large O-Drawer Pull
Gustav Stickley large O-Door Pull

HORTON-BRASSES.COM

1½ x 2½ ball-tip hinges
with dark antique finish
Part No. PB-409B

Fumed finish made easy



Under wraps. Drape plastic sheeting over the piece as a tent. Then put the ammonia in a covered container and slide it under the tent. Wear gloves when you reach under the cover to remove the lid.



Fuming wood involves exposing it to ammonia fumes, which react with tannins in the oak to darken its color. The longer the wood is exposed, the darker it becomes.

I just drape plastic sheeting over the piece and slide in a container of janitorial-strength ammonia available at home centers. It's less noxious than industrial-strength ammonia, but still darkens the wood in a moderate amount of time.

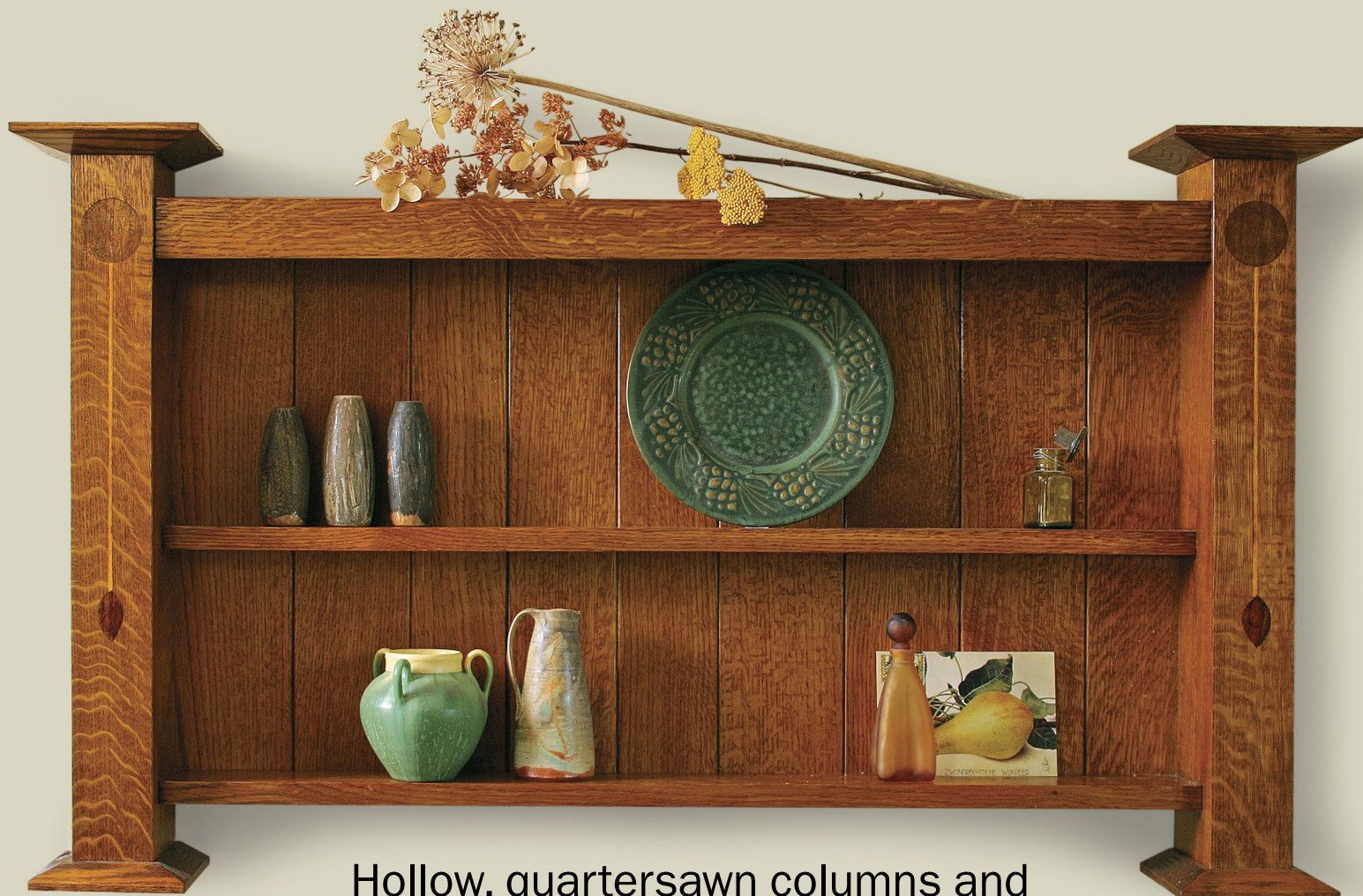
Though my method is low-tech, I still treat the ammonia carefully because it's a toxic chemical that can damage your lungs, skin, and eyes. Be sure to set up the fuming area in a low-traffic, well-ventilated area. Wear goggles and gloves when you're pouring it, and be sure to wear gloves when you take the lid off the container once it's under the plastic. Also, when you remove the sheeting, it's a good idea to run a fan in the space to help ventilate the area. The good news is that the fumes dissipate quickly.

How to dial in the color. The effect won't be apparent until finish is applied, so it's a good idea to throw in a few sample blocks, remove them at hour intervals, and wipe on some finish to preview the final effect.



Warm it up. Fuming imparts a greenish-gray cast to the wood. Pekovich warmed up the look with a coat of garnet shellac prior to applying Waterlox. He rubbed out the finish with steel wool and brown wax.

Wall Shelf



Hollow, quartersawn columns and traditional inlay elevate an easy project

BY NANCY HILLER

While looking through a book on home design several years ago, I noticed a small cabinet hanging above a claw-foot bathtub. With its inlaid columns and beveled caps, the shelf was wonderfully British in style and was quite distinct from American interpretations of Arts and Crafts design. Although the original cabinet had a pair of doors, its shallowness seemed more suited to open shelves.

The design of this cabinet may be simple, but making it involves using a number of valuable techniques such as mitered joints for the columns, decorative inlay, and a finish for quartersawn oak that makes new work look old (see “Safe and Simple Arts and Crafts Finish” pp. 108). Although quartersawn oak is the traditional choice for English Arts and Crafts furniture, this piece would look equally good if it were made of cherry or nonfigured maple.

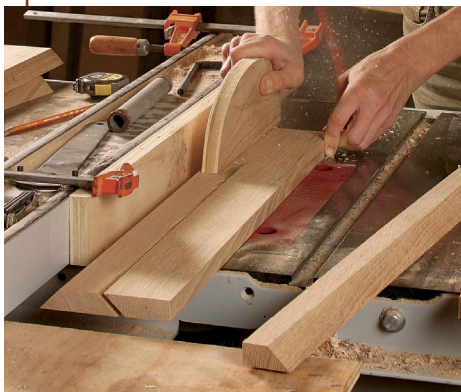
Mitered columns showcase oak grain

The columns are the focal point of this piece. They are hollow, made of three vertical boards mitered together at the front corners so that the quartersawn figure is visible on each face, with a fourth board inserted as a back filler.

Even if you are not using oak, these mitered corners will give the columns a much cleaner look than simple butt joints. While you certainly could use a single,

MITER AND GLUE UP HOLLOW COLUMNS

This method of construction allows the hallmark Arts and Crafts ray-fleck figure to appear on each face.



Attach an auxiliary fence. Using a supplemental fence on a right-tilt saw prevents the thin, already mitered edge from creeping under the sliding rip fence.

thick block of wood for the columns, doing so seems clumsy for a delicate piece of furniture, and the columns would be less stable when subjected to seasonal changes in humidity.

Cut the miters in one pass on the table-saw, holding the board down firmly all the way along the cut. If it lifts even a little or wanders away from the fence, the mitered edge will not fit tightly. After cutting the miters, you can go ahead and cut the pieces to length. Dry-clamp one of the columns to work out any kinks in the process. Now you are ready to glue them.

There are a number of ways to approach this glue-up, but the method I use has proven efficient and easy for somebody working alone, and it yields great results. I use Ulmia picture-framing miter clamps because they are lightweight and easy to handle. While the pointed ends of the wires do leave small indentations in the wood, the coarse grain of the oak distracts the eye enough that the marks disappear when filled with wood putty.

Match the putty to the piece only after any dyes or stains are applied. If you don't want to buy Ulmia clamps or if you are using a finer-grained lumber such as maple or cherry, you can use tape or picture-framer's miter clamps to avoid these marks.

As soon as each column's miters are clamped, insert and clamp the filler board



Start clamping at the front of the column. Because the pieces that form the column are now cut to length, make sure to get the ends level with each other.

at the back. After the glue is dry, run the back face of each column over the jointer to level the joints.

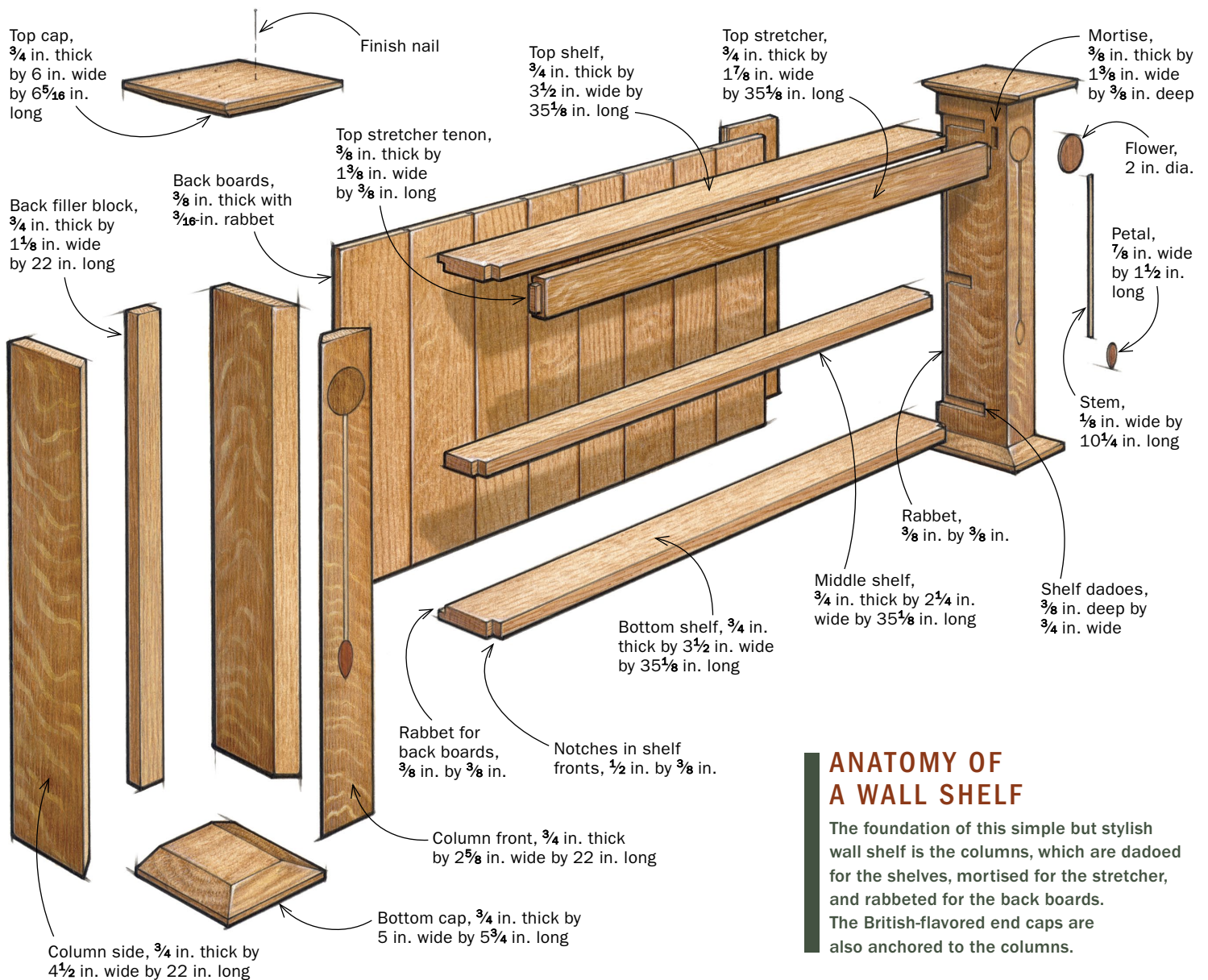
Rout the shelf dados, rabbets, and stretcher tenons

The shelves will be housed in stopped dados routed into the columns. Mark the columns and rout the dados while the two columns are clamped together. When marking the dados, there are two things you must remember: Because the center shelf is set back more than the other shelves, its dado begins farther back than the dados for the top and bottom shelves; and all of the dados are stopped short of the shelf fronts to accommodate the notch in the front of the shelf.

Cut the dados in one or two passes using a $\frac{3}{4}$ -in. straight bit, guiding the router

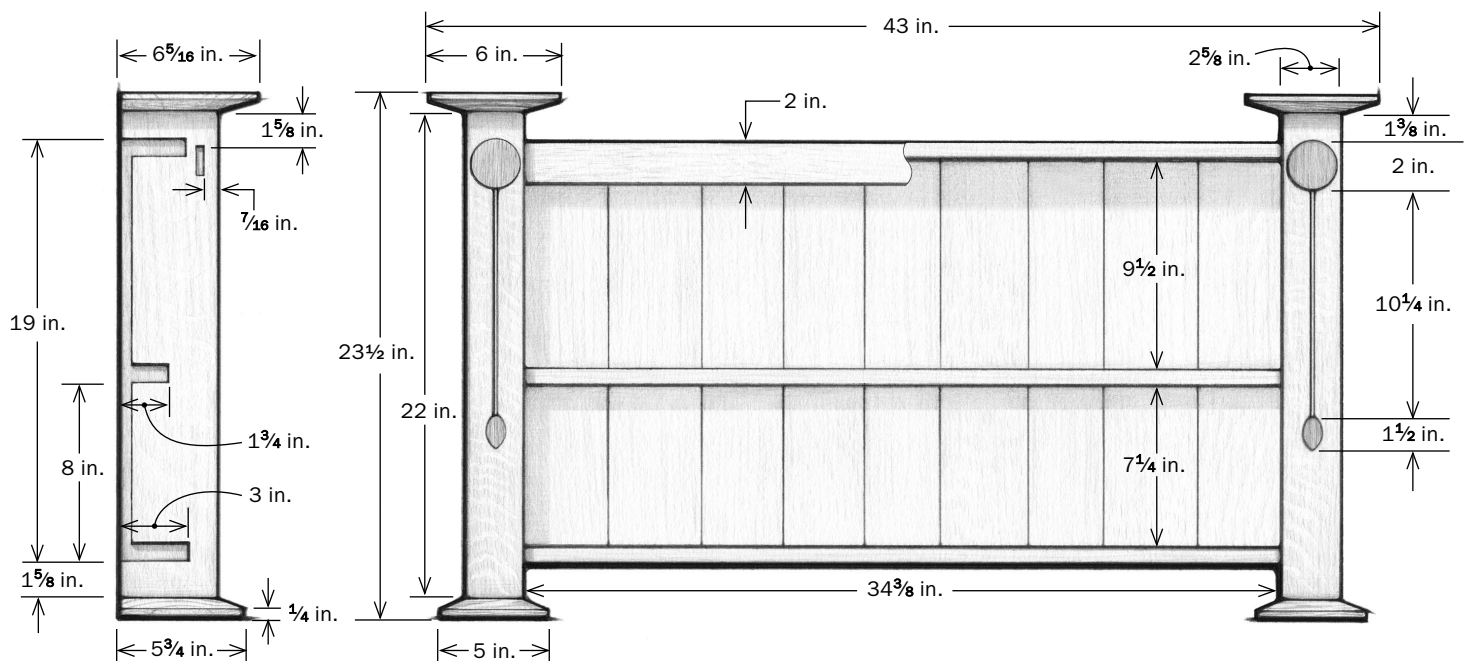


Insert the filler piece in the back. Once the back is in place, use bar clamps to apply pressure.



ANATOMY OF A WALL SHELF

The foundation of this simple but stylish wall shelf is the columns, which are dadoed for the shelves, mortised for the stretcher, and rabbeted for the back boards. The British-flavored end caps are also anchored to the columns.





CUT THE DADOES AND RABBETS



Route shelf dados while columns are clamped together. Clamp a straightedge to the columns to guide the router (left). Use a chisel to square up the front edge of the dados by hand (above).

with a straightedge clamped to the work. With a chisel, square up the front ends of the dados.

While milling stock for the shelves (after you have finished cutting the dados), be attentive when you get close to $\frac{3}{4}$ in. thick and keep checking the stock against the dado. The fit should be hand-tight, requiring some pressure to push the stock home but not so tight as to need heavy pounding with a mallet.

Next, rout a rabbet for the backboards on the underside of the top shelf and on the upper side of the bottom shelf. The columns also need a rabbet to hold the backboards. When cutting the rabbets in the columns, stop them in the upper and lower shelf dados. Check how everything lines up.

The top stretcher will be tenoned into the columns. The small mortises for these stub tenons can be cut using a router guided by its own fence or just drilled out and then finished with a chisel. I cut the stub tenons by hand with a backsaw.

Fit the shelves

When the piece is finished, there will be three distinct shelf setbacks. The top shelf will have a stretcher in front of it, so even though the top and bottom shelves are



Route a rabbet for the backboards. A rabbeting bit works well, with the guide bearing running against the side of the column. Stop the rabbet in the shelf dados.

cut to the same depth, the top shelf will sit nearly at the front of the column. The bottom shelf, which does not have a stretcher, will be set back about $\frac{3}{4}$ in. more, and the center shelf will be the farthest back.

Cut the shelves to size, remembering to rip the center shelf narrower than those at the top and bottom in order to accommodate the extra setback as well as the backboards. Mark out for the notch on the front edge and use a backsaw to remove the waste, or you can cut these notches

and the joints for the stretcher on the table-saw. Test-fit the shelves in their dados.

Create the decorative inlay and assemble the case

I do my inlay with the aid of a magnifier that mounts to my workbench. The first step is cutting out templates (using cardstock) for the flower and leaf. Select a species that will show up against the background wood (for more about the inlay technique, see “A simple inlay technique,” on p. 44).

A simple inlay technique



1
Score the outline. Press lightly at first to avoid getting caught in the grain, then more deeply a second and third time.



2
Remove most of the recess. Rout close to the inlay border, leaving a bit of waste to clean up by hand.



3
Pare to the line. Carving gouges make it easy to clean up and shape the recess accurately.

Prepare the inlays by resawing stock (on the tablesaw or bandsaw) to $\frac{3}{32}$ -in. thickness. Regular commercial veneer is too thin and doesn't leave any margin for error.

Trace the outline onto the inlay stock and cut each part to shape, using a scrollsaw or a coping saw, files, and coarse sandpaper. After the inlays are shaped, mark the position of the flower and leaf on each column, taking care to center them in the width and align each element with the other. You can use double-sided tape to ensure that the inlays don't slip out of position while you are scribing around them. Score the outline with a sharp knife or awl. Carefully rout out the main portion of the recess, using a $\frac{1}{4}$ -in. straight bit set at just less than $\frac{3}{32}$ in. deep.

Pare away the remaining waste with carving gouges and a knife, making sure the bottom of the recess is uniformly flat. Cut the recess for the stem using a $\frac{1}{8}$ -in. straight bit (also set at slightly under $\frac{3}{32}$ in.), and a router equipped with a fence.

Using yellow glue, with cauls to distribute clamping pressure, glue in the flower and leaf. After the glue is dry, sand them flush. Finally, trim the stem to fit and glue it in place.



4
Rout for the stem. After routing the groove, rip stock to fit tightly into it.



5
Glue in the flower and leaf. Use a caul to apply even pressure. Newspaper prevents the caul from sticking to the inlay.



6
Insert the stem and finish up. Glue and clamp the stem in place (above). Once the glue is dry, scrape and sand the inlay flush (right).



7

ASSEMBLE THE SHELF



Clamping the case. Use enough pressure to pull the shelves into their housings, but avoid excessive strain on the hollow columns (left). Apply finish to the parts before screwing the back boards in place (above).

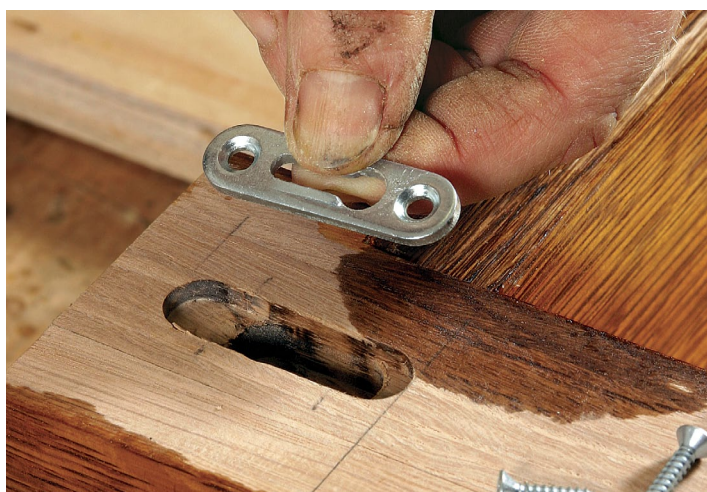
At this point, the piece should be ready to dry-fit. First, sand all of the parts to P180-grit. Dry-fit first and then glue the front stretcher and the shelves into place at the same time. The stretcher should also be glued and clamped to the front edge of the top shelf. When the assembly is dry, sand the entire piece to P180-grit.

While the columns are the visual anchor, the beveled end caps give the piece its British flair. Cut the caps and bevel them on the tablesaw.

Now mill the backboards, rabbeting alternate edges on the tablesaw. Sand the backboard faces and use a block plane to work a small bevel on the front edge of each board. Apply finish to the backboards. Once all the other parts also have been finished, attach the backboards using small screws.

When the shelf is completely assembled, rout the slots for keyhole hanging and install the hardware. Attach the caps to the columns with finish nails.

Nancy Hiller owns and operates NR Hiller Design Inc. in Bloomington, Ind.



Rout two depths for hanging hardware. The first step will hold the hardware, while the deeper step allows the hanging screw to be inserted.



Attach the end caps. Countersink the finish nails and fill the holes with matching wood putty.

Arts and Crafts Sideboard

Traditional joinery and
modern fasteners team up
to simplify construction

BY GREGORY PAOLINI

A sideboard is a welcome piece in the dining room, where its drawers are perfect for linens and silverware, its cupboards accommodate serving trays, and its top is a staging area for the dishes to be served. It's no surprise, then, that sideboards were common in Arts and Crafts dining rooms. The version I make here is scaled down from the original pieces that inspired it, so it will fit into tighter spaces (not everyone has a large, formal dining room these days). However, it retains their muscular design and is made from quartersawn white oak, just like the originals.

When it comes to joinery, Arts and Crafts furniture relies heavily on the strength of the mortise-and-tenon. It's the primary joint in this sideboard, too, which is made almost entirely with frame-and-panel construction.

It's not difficult to cut a bunch of mortise-and-tenon joints, but taken together, those joints can create serious headaches while assembling a piece of furniture with as many parts as this sideboard. To avoid problems, I broke the sideboard down into subassemblies that can be added one at a time. I also joined these subassemblies with screws, which makes the glue-up much easier.

Cut all of the casework joinery first

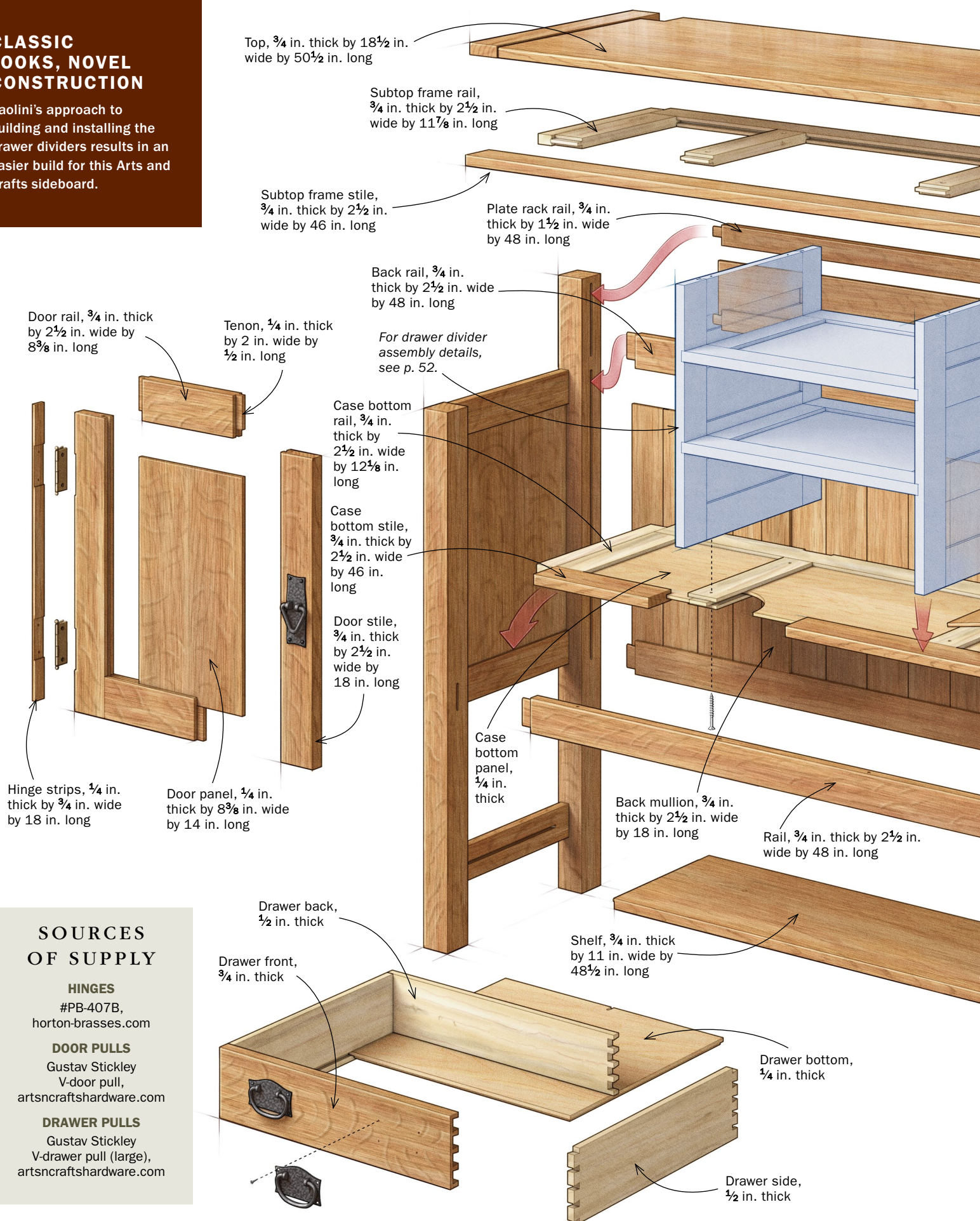
I begin by cutting all of the mortises. I use a router and a 1/4-in.-dia. spiral upcut bit, with an edge guide to keep the bit cutting in a straight line. There is nothing new about my technique.





CLASSIC LOOKS, NOVEL CONSTRUCTION

Paolini's approach to building and installing the drawer dividers results in an easier build for this Arts and Crafts sideboard.



SOURCES OF SUPPLY

HINGES

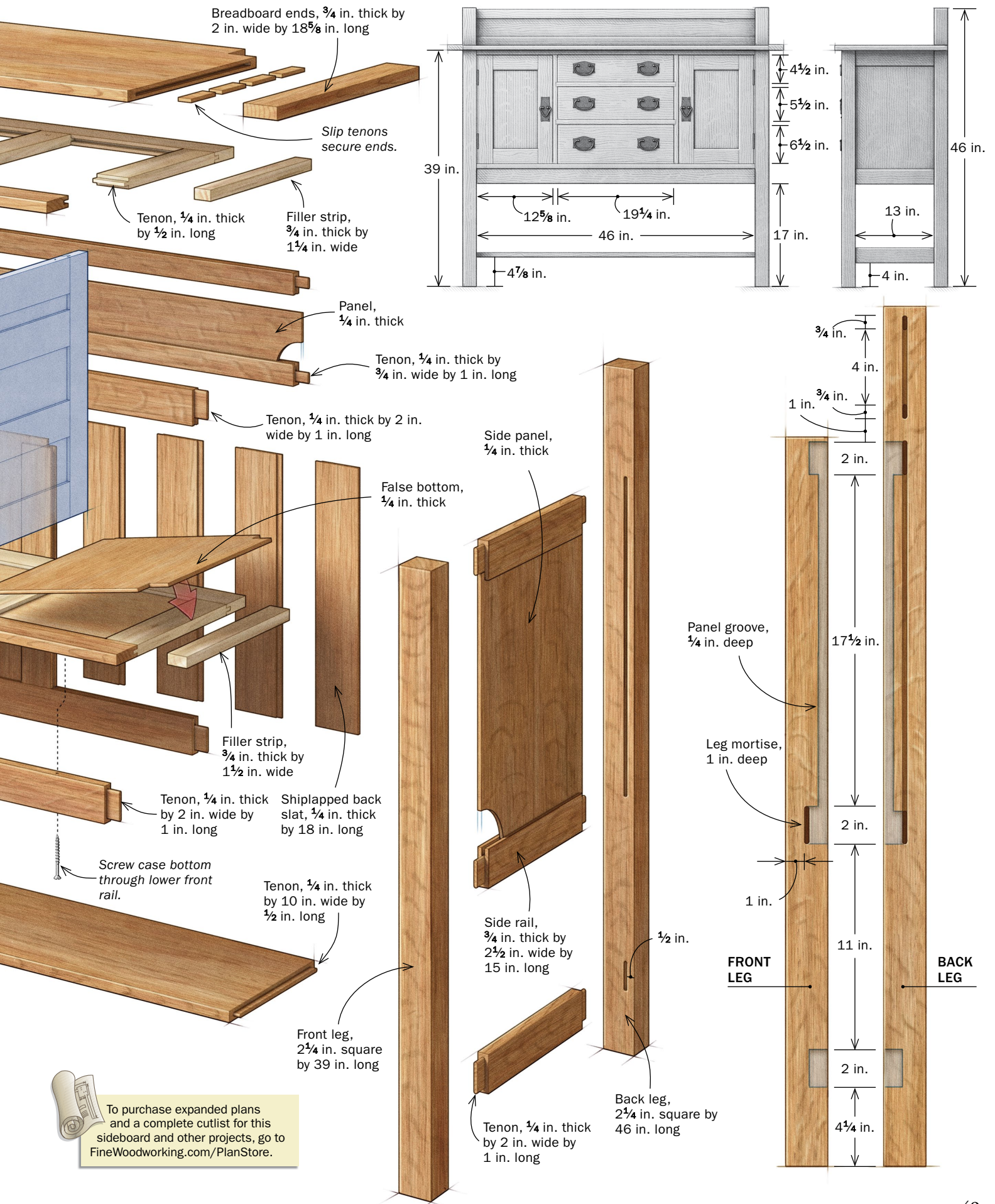
#PB-407B,
horton-brasses.com

DOOR PULLS

Gustav Stickley
V-door pull,
artscraftshardware.com

DRAWER PULLS

Gustav Stickley
V-drawer pull (large),
artscraftshardware.com



To purchase expanded plans and a complete cutlist for this sideboard and other projects, go to FineWoodworking.com/PlanStore.

ONE JOINT TO BUILD IT ALL

Mortise-and-tenon joinery is the bedrock on which Arts and Crafts furniture is built, and this side-board is no different. Add some grooves and you have everything you need for the frame-and-panel construction.



Rout the mortises and stopped grooves. Use a $\frac{1}{4}$ -in.-dia. spiral upcut bit. The router's edge guide locates the bit and keeps it cutting straight (above). Cut through-grooves for the panels at the tablesaw (right) using a standard-kerf blade. Make the groove in two passes, registering the opposite face on the fence for the second cut. This centers the groove on the part's thickness.

Plunge to the full depth at each end of the mortise, and then use a series of passes to gradually rout the waste in between.

The legs have stopped grooves for the panels. Rout these after the mortises. Don't change the edge guide location, because the panel grooves are in line with the mortises. Cut to their final depth in multiple passes. Now rout the stopped grooves that hold the shelf. The remaining grooves are through-grooves, cut at the tablesaw using a standard-kerf blade. You can cut the full $\frac{1}{4}$ -in. width of the groove with a single fence setup by flipping the workpiece so that the opposite face is against the rip fence for the second cut.

I cut the tenons at the tablesaw using a miter gauge and a dado set. Then I cut all of the panels and back slats to their final dimension. Now you're ready for assembly.

Assemble from the outside in

The general assembly procedure is this: Glue up the outer frame of the case first, including the ends and the back. Next, drop in the case bottom and the drawer-



Quick tenons with a dado set. Cut the end of the tenon first. Register the opposite end of the board against a stop block to cut the shoulder (left). This ensures that all of the tenons are the same length. Paolini uses a utility knife to knock off the corners (above), allowing the tenons to fit into the rounded mortises.

GLUE UP THE CASE

This is where things get nontraditional. Assembly is from the outside in, which works because the drawer dividers, case bottom, and subtop are screwed to the casework.



Glue up the end assemblies. Put them in clamps and let them sit overnight before continuing the glue-up.



Put in the back. The mullions are already glued in place. Because the slats float in the grooves, hold them in the side panel as you lower the tenons into their mortises.



The shelf and plate rack come next. Then put in the remaining back slats, and spread glue on all of the exposed tenons before adding the second end assembly.



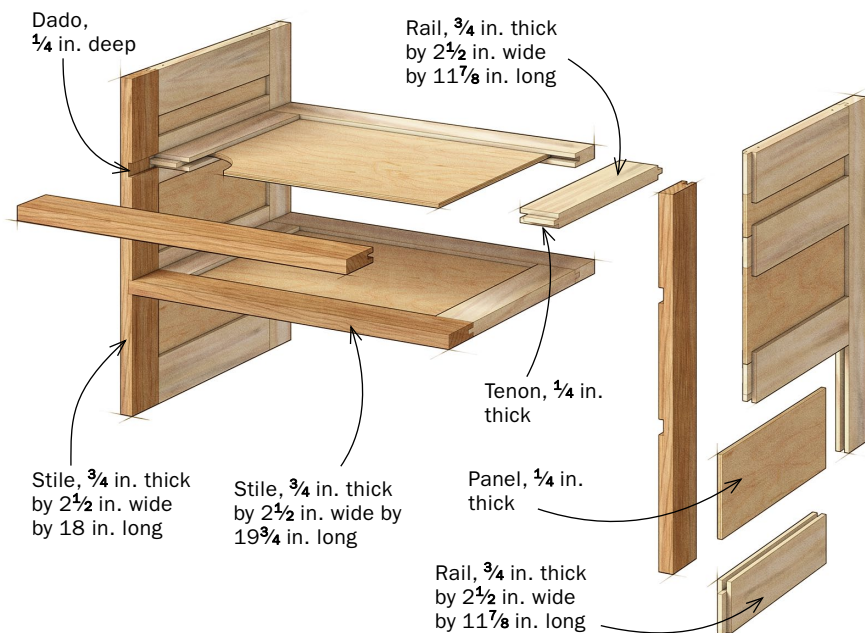
Clamp everything together. Do this on a flat, level surface, and check that the case is square. Let the glue dry overnight before removing the clamps.



Drop in the case bottom. Attach it by screwing up through the front rail. In the back and on the sides, it simply rests on the lower rail of the frame.

ADD THE DRAWER DIVIDERS

This assembly is completely independent of the main case, so it can be built, glued up, and installed after the case has been put together.



Build the drawer divider assembly. After gluing up the horizontal dust frames and panels, glue them into the dados cut into the frame of the vertical partitions (above).



No joinery means easy addition. The drawer-divider assembly sits on the case bottom. Lower it into place (left) and then clamp it there. Lay the case on its back, and attach the divider assembly with screws driven up through the case bottom (above). Two screws on each side are enough.



FINISH THE CASE

After the subtop frame is attached, drop solid-wood bottoms into the case, add hinge strips, and attach the top. Then make and fit the doors and drawers.



Set the subframe on top. The filler strips are glued to the end assembly (left). After screwing the subtop to the drawer divider assembly, lay (do not glue) the false bottoms on the case bottom (center). Then glue hinge strips—mortise them first—to the legs (right). Finally, place the top on the case (below), and secure it from below with screws.

divider assembly. The subtop frame goes on next, followed by the top. The doors and drawers come last.

Start by gluing up the two end assemblies. After the glue dries, connect them by gluing in the back, the plate rack, the shelf, and the front rail. This is a lot of joints at once, so use a glue like Titebond Extend, which has a long open time.

With the case in clamps, glue up the subtop frame and case bottom. The case bottom is a frame-and-panel assembly, while the subtop is just a frame that's covered by the sideboard's top. Glue the filler strips to the end rails.

Set the case bottom in place, and secure it with screws from beneath, through the front rail. Glue up the drawer divider assembly and set it down on the case bottom, securing it with screws from below. Install the subtop by screwing it to the drawer-divider assembly, and gluing the filler strips to the case. Place the top over it all and secure it from below with screws.

The doors can be hung now. Make and mortise a hinge strip and then glue it to the leg. Make, hang, and fit the doors. Finally, make and fit the drawers. □

Gregory Paolini is the author of Arts & Crafts Furniture Projects (The Taunton Press, 2015), which goes on sale in March 2015.





Seating

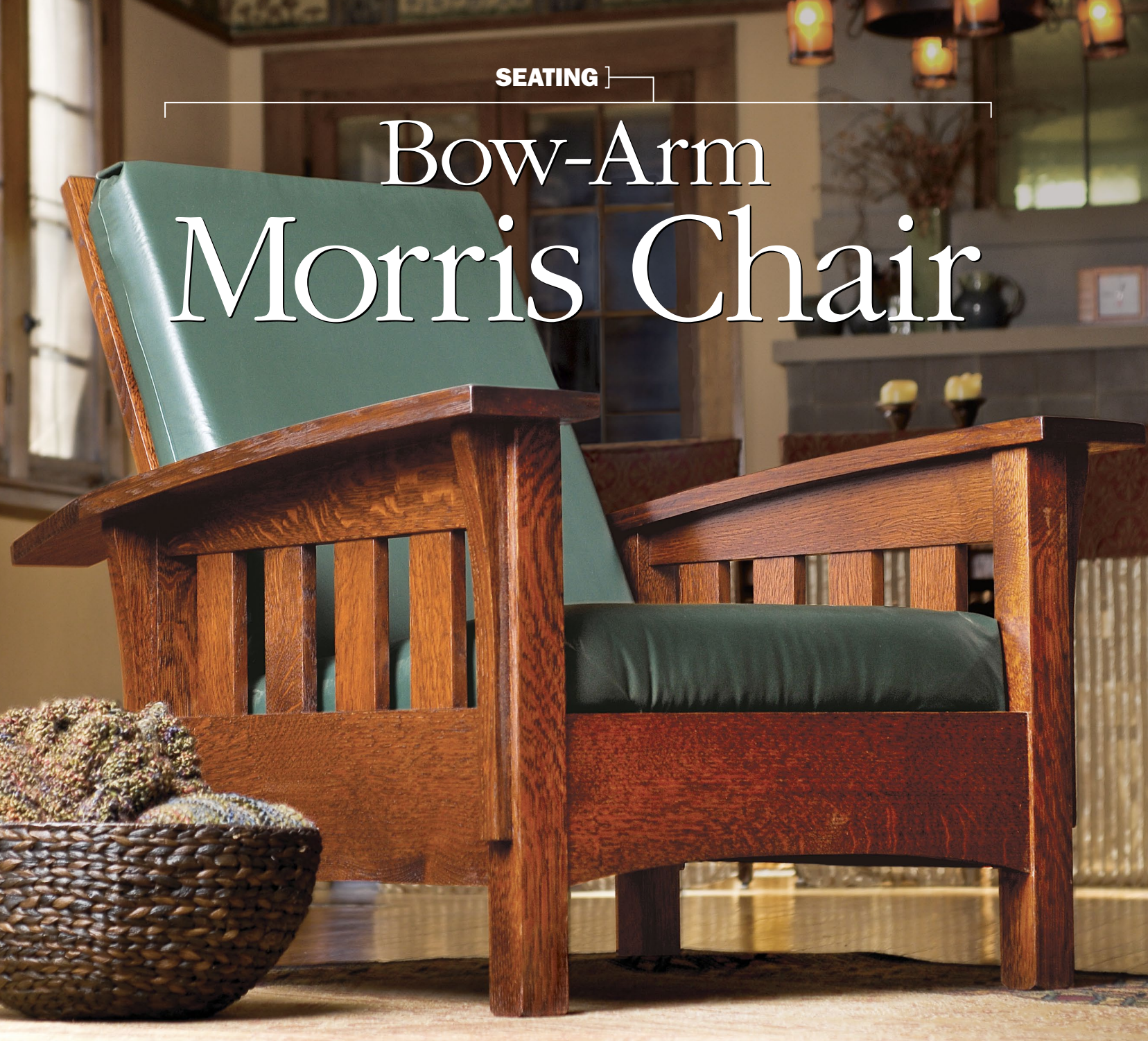
56 Bow-Arm
Morris Chair

64 Prairie Settle

72 Side Chair



Bow-Arm Morris Chair



Lamination
puts beautiful grain
and a graceful curve
within arm's reach

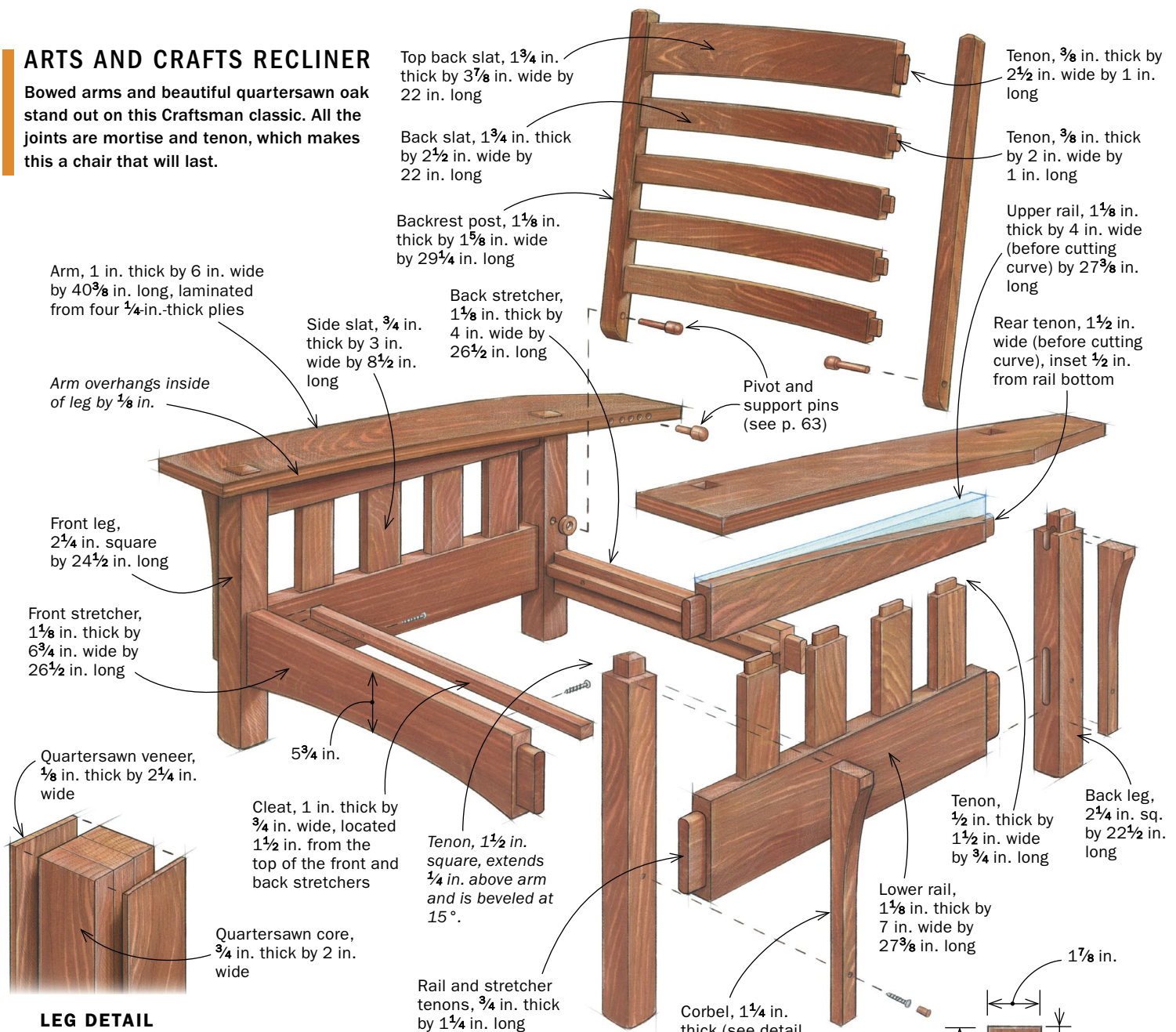
BY GREGORY PAOLINI

Craftsman furniture is known for its straight lines, quartersawn oak, and sense of earthen mass and solidity. No piece displays those features better than a Morris chair, with its large, square legs and wide arms decked out in beautiful ray-fleck figure. The gracefully bowed arms of this version, designed by Brian Murphy of American Furniture Design and related to a design by Gustav Stickley, lighten the mass just enough to give it the feel of irresistible comfort. Throw in a reclining back and firm, but giving, cushions, and you have a chair that you'll never want to leave.

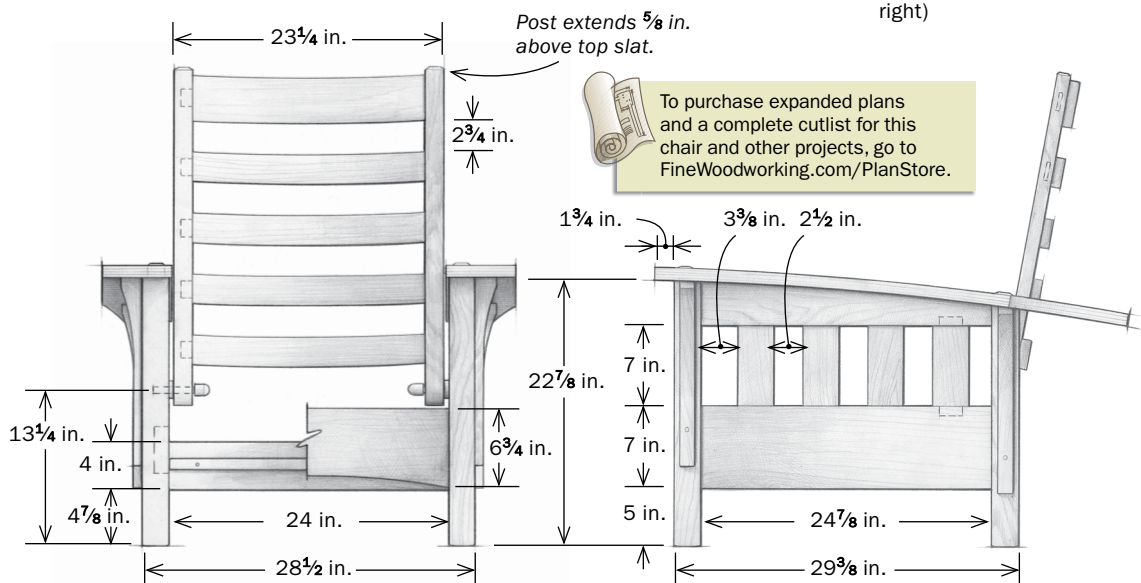
For the most part, the construction is straightforward. But the most distinctive part of the chair—its arms—presents two big challenges: making bowed arms with attractive grain, and cutting a mortise-and-tenon joint on the curved arms and side frame. I'll show you how laminating the arms gets you around those challenges. And I'll show you how to

ARTS AND CRAFTS RECLINER

Bowed arms and beautiful quartersawn oak stand out on this Craftsman classic. All the joints are mortise and tenon, which makes this a chair that will last.



LEG DETAIL



To purchase expanded plans and a complete cutlist for this chair and other projects, go to FineWoodworking.com/PlanStore.





TIPS FOR ACCURATE JOINTS

Every joint in this chair is a mortise and tenon, the traditional Craftsman joint. They must fit well to get a square and strong chair. Here's how to cut the joints accurately with two common tools: a router and a tablesaw.



Start with the right bit. When routing mortises, Paolini matches the straight bit's diameter to the mortise's width so he doesn't have to move the router side to side and risk tilting it out of square. Two fences (one the router's edge guide; the other clamped on) keep the router on track.



get striking quartersawn grain everywhere it counts, including a simple and authentic method for making a leg with four quarter-sawn faces.

Legs that look good from every angle

The legs of a traditional Morris chair have four quartersawn faces. Lumber like that doesn't grow on trees, but it can be made in the shop. There are several different methods to achieve the look, but the one Stickley used, which is the easiest by far, is to glue up a core of quartersawn lumber and then laminate two quarter-sawn veneers over the flatsawn edges of the core.

After the glue is dry, trim the veneers flush to the core with a router and flush-trimming bit. Then crosscut the bottom of each leg to square it up. Don't worry about the tops right now.

Mortises, then tenons

When making a mortise-and-tenon joint, I usually start with the mortises. It's much easier to fit a tenon to a mortise than the other way around. You can cut all of the mortises now, except the four in the arms. They're laid out and cut after you make the

tenons on the tops of the legs.

Remain consistent with your reference edges. When cutting the mortises on the legs, for example, reference the same fence against the outside face of each one. Otherwise, the position of the mortises will vary, resulting in sloppy joints and possibly a chair that's out of square.

Now cut all of the tenons, except those on top of the legs, at the tablesaw. Cut a full tenon on the back of the upper rail; you'll just saw away part of it later.

Router-cut mortises have round ends, so I round the tenons with the rasp portion of a Nicholson 4-in-hand file. Its smooth edges



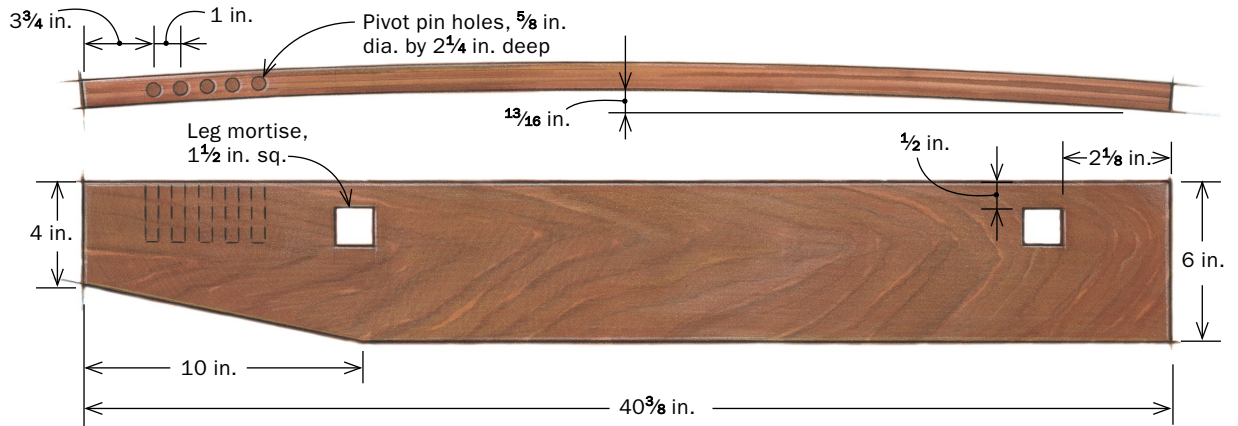
Double the parts for stable routing. Thin pieces, like the side posts, don't provide a stable surface for a router. Clamp two or three of them together to get a wider bearing surface.



Tenons at the tablesaw. First, cut the shoulders a hair deeper than the cheeks using a combination blade. Then, use a dado set to cut the cheeks. Support the piece with the miter gauge.

HOW TO LAMINATE THE ARMS

The bow of the arms needs to match the curve cut onto the upper rails and legs. Use a full-scale drawing of the arm's profile to make the bending form and you'll get a great fit.



Resaw the plies. Start the cuts on the tablesaw and use the kerfs to guide the bandsaw blade as you finish the cut freehand.



Build the form layer by layer. Make the first layer at the bandsaw, cleaning it up with sandpaper. Glue and screw on each successive layer and rout it flush.



Finish the form. Screw a melamine fence to the rear of the form and a stop to its front edge. Packing tape keeps the glue from sticking to the form and stop.

won't mar the tenon shoulders, and its aggressive teeth make quick work of the rounding.

The tenons on the lower side rails will interfere with those of the front and back stretchers where they meet inside the legs. The best way around this is to insert the side rails into their mortises and trace the front and back mortises onto them. You'll need to trim the tenons' thickness about $\frac{1}{8}$ in. in those areas.

Drawing brings arms and legs together

The upper rail and the tops of the legs must be curved to match the bow of the arms. The easiest way to do this is to make a full-size drawing of the arm's profile. You'll use this drawing to make a pattern for marking the curve on the upper rails and legs and to make the bending form used to laminate the arms. Here's an easy

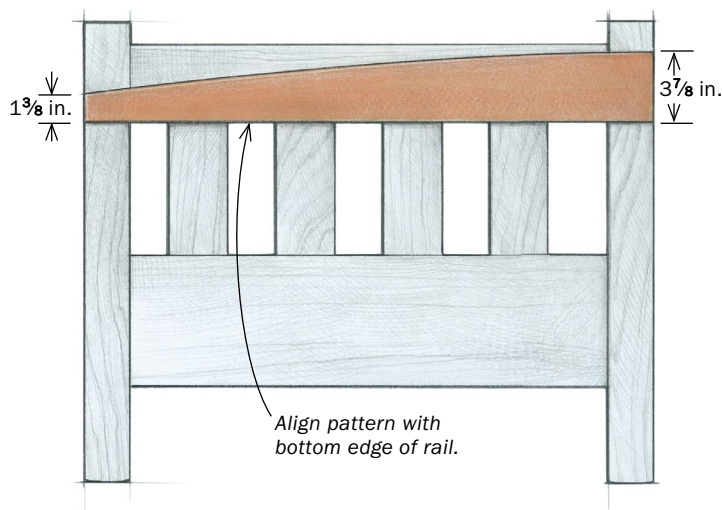


Clamps, clamps, clamps. After coating the plies with glue, press them against the stop and fence. Add a flexible caul on top and start clamping next to the stop. Work progressively down along the form. Place a clamp every 2 in. You'll need two dozen.



■ ■ SAME PATTERN FOR THE SIDES

The hardest part of building this chair is fitting the arms to the sides. The tops of the upper rails are curved, and so are the tenon shoulders. Make a pattern of the upper rails and use it to mark the curve. It's easier to align and hold in place than one of the arms.



Mark the curve. With the sides dry-fitted, align the bottom of the rail pattern with the bottom of the rail and mark the curve on the legs. This locates the tenon's shoulders on the legs. Then disassemble the sides, realign the pattern on the rail, and mark its curve.

way to make the full-size drawing of the profile. Spring a batten between two nails located at both ends of the arc. Push the center of the batten up to the high point of the arc and trace the line.

To make the pattern for marking the curve on the legs and upper rail, use graphite paper to transfer the arm's profile (see drawing, p. 59) to a piece of MDF. Cut the curve on the bandsaw and use files and sandpaper to smooth it.

Laminated arms are a cut above

Because the bowed arms are so prominent in this design, the figure and grain that shows on the top of each arm must be just right. Arms sawn from solid lumber would have a wild, distracting grain pattern. But laminating the arms allows you to control their look, choosing your best stock for the top and orienting it for the best effect. A laminated arm is also more stable than one cut from solid lumber, and concerns about short grain weakness disappear.

Laminating form keeps plies in line—Bent laminations can be tricky, but they don't need to be. A fence and a stop on the form keep the plies aligned, and a simple caul applies even pressure over them. Using the right kind of glue will prevent the



Cut the tenons. Start by cutting the shoulders square. Cut the cheeks with a dado set. Then chop and pare away the waste with a chisel as shown to define the curved shoulders.

plies from creeping after you remove them from the form. Start by making a laminating form. First, transfer the arm's profile to a piece of 3/4-in.-thick MDF. The pattern for marking the curve won't work here, because the arms are longer than it.

Cut close to the line of the curve on a bandsaw and sand or file down to the line. You need eight 3/4-in. layers to get a form 6 in. wide. Use the first layer to make the remaining seven.

Screw a fence to the side of the form and a stop to its front end. They will keep the plies aligned as you glue up the arms. Cover all of the working surfaces with packing tape to prevent glue from sticking to them.



VIDEO WORKSHOP

Watch Paolini build this project from start to finish in a members-only Video Workshop series.

MORTISE THE ARMS

The most accurate way to locate the arm mortises is to mark directly from the leg tenons. That way, you're not guessing where they should be.



First, cut arms to size. After scraping the glue from one edge and jointing it, rip the arm to width with the concave side up. Crosscut the arms to length, using a sled and small shim to get a square cut.

Low-stress resawing—It takes a finely tuned bandsaw to resaw wide lumber. To make things easier, I begin resawing at the table-saw and finish up at the bandsaw. The tablesaw removes most of the material and its kerfs help me guide the bandsaw blade through the arm. After resawing all of my laminates to $\frac{5}{16}$ in. thick, I plane them to $\frac{1}{4}$ in.

The right glue for laminations—The best glue for laminating curved parts is urea formaldehyde. It has a long open time and doesn't creep once dry. Those benefits outweigh its longer drying time. It is, however, a known carcinogen, so wear gloves and use a respirator or work in a well-ventilated area.

I use a piece of whiteboard for a caul, because it bends well and is glue-resistant. Available at home centers, whiteboard is $\frac{1}{8}$ -in.-thick Masonite covered on one side with white thermofoil.

Once both arms are laminated, scrape the glue from one edge, joint it, and rip the arm to width on the tablesaw, concave side up. Then cut the arm to length using a crosscut sled and a shim to get a square cut on the end.

Curved arms mean curved sides

To mark the curve of the arm on the upper rails and legs, dry-fit the side assemblies together. Align the bottom of the pattern with the bottoms of the rails. The ends of the pattern will align with the outside edges of the front and rear legs. Mark the curve on the inside and outside faces of the legs. And mark the inside of the legs on the pattern so you can realign it to mark the rail. Disassemble the side, and mark the curve there, too.

Cut the curve on the upper rail on the bandsaw. When you do this, the back tenon will be cut down to its final width. To cut the tenons on the legs, first use a combination blade to cut all four shoulders square to the leg, in line with the highest shoulder (the one of the front of each leg). Then use a dado set to cut the



1



2



3

LOCATE AND CUT THE MORTISES

1. Lay the side assembly on your bench and stand an arm on the tenons, flush against their shoulders. The front mortise is $2\frac{1}{8}$ in. from the front edge. Use that measurement to align the arm before transferring the tenon locations to the arm. Lay out the underside, too.

2. Now clamp the arm in a vise so the mortise area is level and use a Forstner bit to remove the waste. To avoid tearout, go halfway from one side, flip the arm, and complete the cut from the other side.

3. Use a chisel to chop away the waste and square the corners. As you did when drilling, go halfway from one side and finish up from the other.

ASSEMBLE THE BASE

Glue up the base before making the back, so you can take measurements for the back directly from it.

Work in stages. Assemble the sides first (right). The slats don't need glue if they fit snugly. Glue the rails to the legs and leave the clamps on overnight. Next, glue up and clamp the stretchers. Attach the arms (below), brushing glue on them and on the leg tenons. Leave the clamps on for 24 hours.



cheeks. To cut down to the curved shoulder lines on the sides and back of the leg, use a chisel and mallet. I back-bevel the shoulders to ensure a tight fit with the bottom of the armrests.

Through-tenons require careful layout—Dry-fit and clamp the side assemblies in preparation for cutting and fitting the arm mortises. Then clamp an assembly on the bench, inside face down with the tenons overhanging the edge. Set the arms on the tenons and press them snug against the shoulders. Mark the fronts and backs of the mortises directly from the tenons. Remove the arms and mark the mortise sides. Use a Forstner bit to remove most of the waste from the mortises, then pare down to the lines with a chisel. Next, chamfer the tenons that come through the arms. Cut them $\frac{3}{8}$ in. proud of the arms and bevel them at 15°.

After the arms are fit and the tenons chamfered, lay out and drill the holes for the back support pins. A drill press will ensure that they're perpendicular. Be sure to bore the holes before cutting the outside back corner of the arm.

While you're at the drill press, drill the holes for the pivot pins in the legs.

Shape corbels to fit the arms

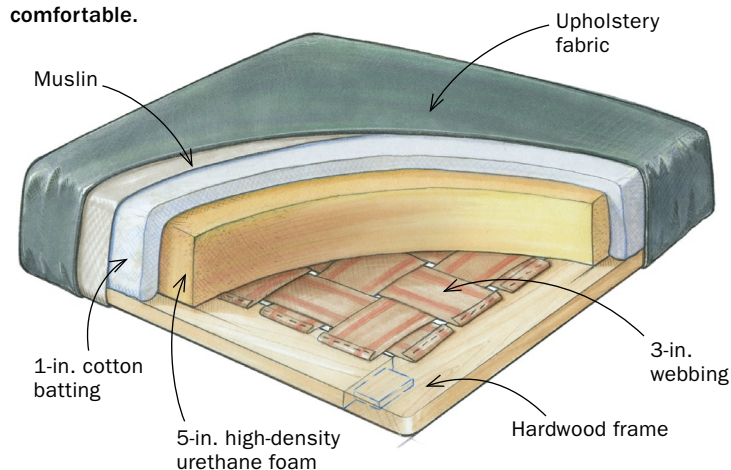
With the arms temporarily in place, you can fit and attach the corbels. I make a pattern for the corbels, mark out four, and cut them out at the bandsaw.

The front and back corbels are the same length, but they hang down lower on the rear legs because of the arm's curve. The corbels are centered on the legs, and their tops need some shaping for a snug fit against the bottom of the arm. After they're shaped, predrill them and the legs for screws, and use a Forstner bit to create a countersink for the screw head. Put a bit of glue on the corbels and screw them in place. Plug the countersinks with shopmade tapered plugs to get a good grain match.

Next, cut the arc on the front stretcher, and screw the seat-frame cleats to it and the back stretcher. Then glue up the base.

CUSHION ANATOMY

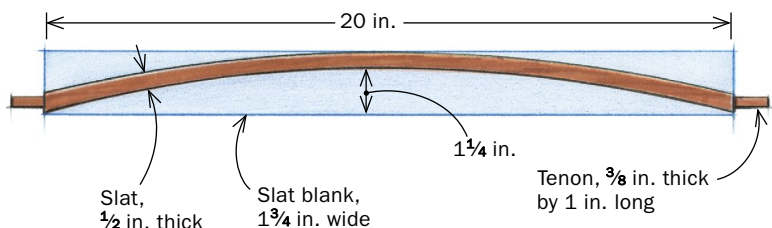
Ask your upholsterer to make a layered cushion like this one. It's firm and durable yet comfortable.



Over and under. After stapling four courses of webbing across the frame's opening, weave webbing through them to create a strong but comfortable base for a cushion.

■ THEN MAKE THE BACK

Cut the tenons before shaping the slats. Using a half-pattern to mark the curve of the slats will ensure that they're symmetrical.



Cut the slats. Bandsaw and smooth the curves after cutting the tenons. Because the slats are curved, they tend to flex a little under clamping pressure. Hardwood spacers limit the force of the clamps.

After the glue dried, I made a hardwood frame with webbing for the seat cushion because I sent this chair to an upholsterer, and a hardwood frame is better than the plywood frame some upholsterers use. I used ash to make the frame, joining the parts with mortise-and-tenon joints. The length and depth of the frame should be 1/4 in. undersize to allow room for upholstery to be wrapped around the sides and stapled to the bottom.

Back slats: Tenon the curve

I cut the tenons on the back slats at the same time as the other tenons because it is much easier to cut tenons on a square piece than on a thin, curved piece. Use a pattern to lay out the curve and then cut it at the bandsaw. I cleaned up the sawmarks with a stationary belt sander, but a spokeshave or sanding blocks also works.

Authentic look without the fumes

Stickley's furniture is well-known for its rich brown finish, which can be had by fuming with industrial ammonia. But you can forgo the ammonia and still get a great finish. After sanding this chair, I applied an antique cherry aniline dye. I let it dry overnight and then applied a dark walnut oil-based pigment stain. I finished it off with Minwax Polycrylic water-based polyurethane.

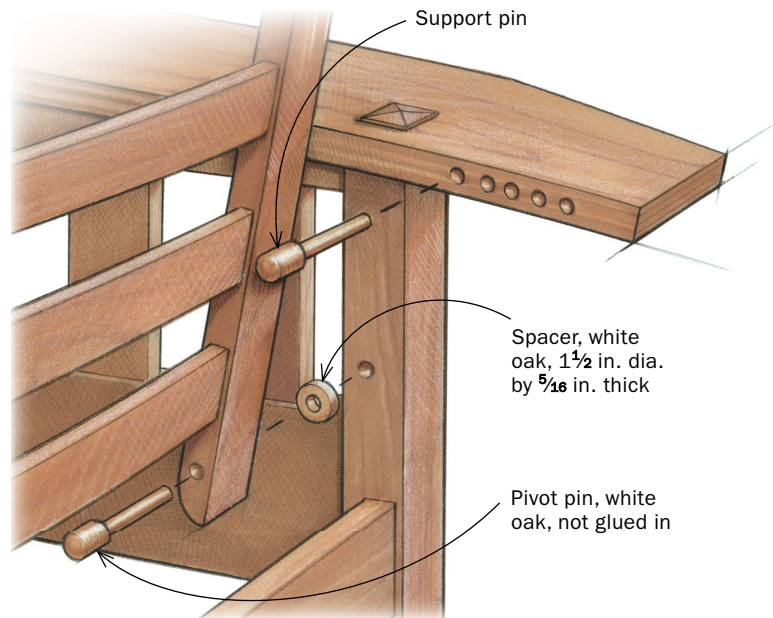
When the finish is dry and the upholstery done, bring your chair into the house, put it in a welcoming spot, and take a moment to enjoy its grace and beauty. Then take a seat—and maybe a nap—to enjoy its comfort. □



Article Extra

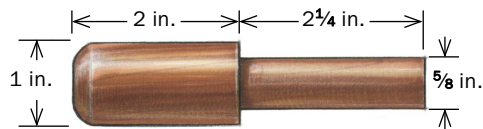
Get the complete finishing recipe for Paolini's Bow-Arm Morris Chair.

Gregory Paolini makes Arts and Crafts style furniture in Waynesville, N.C.

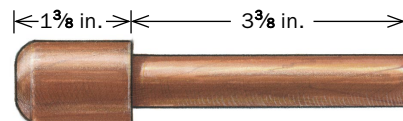


PIVOT AND SUPPORT PINS

Even a novice can turn these pins. Check the diameter of the shaft with a 5/8 in. open-end wrench. Use a gouge until you're close, and finish up with sandpaper.



SUPPORT PIN



PIVOT PIN



SEATING

Prairie Settle

New take on a classic design —
construction is as simple as ever

BY KEVIN RODEL

This settle is a perfect example of the low horizontal lines—reminiscent of the broad horizon of the Midwest—that characterize Prairie-style furniture. Even though the heyday of the Prairie School of architecture and furniture (largely credited to Frank Lloyd Wright) lasted only from about 1900 to 1915, the strong lines and characteristically unadorned style make it as popular today as it was back then.

The basic form is classic, but a few details make this settle uniquely mine. I added the scoop-out on the feet, the hip-roof shape on the arms and corbels, the pyramid-head pegs, and the slight extension of the back of the side arms beyond the long arm. But the most distinctive part of this settle is the square cutouts in the slats.

Although the overall size and the number of parts involved make

this piece seem like a more advanced project, it's very straightforward. Most of the construction involves simple mortise-and-tenon joinery. The corbels are the most complex part, but I'll show you an easy way to make them quickly and consistently.

The dimensions of the piece are standard to the period and type of furniture but can easily be changed to accommodate different body types or room sizes. The height of the settle can be adjusted by changing the length of the leg posts and the placement of the horizontal pieces. The length is modified by changing the length of the long rails and the number of slats in the back and/or the spacing between them.

There are upholstery options to consider: attached, integral spring-form cushions, or loose cushions. I like the loose cushions

because the upholstery method is easier for an amateur. If you use fabric covers, you'll need an upholsterer to sew the cushions. If you use leather, you can have an upholsterer sew them or lace them yourself, as I demonstrate on FineWoodworking.com.

While this settle is made of quartersawn fumed white oak and is upholstered with leather, don't feel limited by my choices. The form's strong lines and a wide choice of fabrics allow this piece to look great in almost any wood species and in a variety of settings.

First things first: the leg posts

It is difficult to find quartersawn 12/4 oak, but if the posts have a face with ray fleck, I put it on the sides of the piece, so the nicest faces can be seen in pairs. After dimensioning the posts, lay out the mortise locations and corbel grooves as well as the stub tenon shoulder line.

If you don't have a dedicated mortising machine, you can cut consistent mortises using a simple router-box jig (for more on this jig, see "Side Chair," p. 72). Cut all mortises as sets to keep router-setting changes to a minimum.

The grooves for the corbels can be cut either with a dado blade on the tablesaw or with a router and edge guide. The router method is slower, noisier, and messier, but the dado blade leaves a larger area to clean up by chisel at the end of the groove.

The stub tenon on the post top is square and centered on the post and is easily cut on the tablesaw.

This is also a good time to cut the mortises that will house the raised ebony plugs. The small scoop-outs on the post bottoms are optional, but I do it as a signature detail on almost all of my work. Finally, I break all the edges, sand off any layout lines, and finish-sand to P220-grit. Because none of the joints are flush, sand all the parts before assembly so you don't have to sand into corners later. The completed settle will get just a final touch-up sanding.

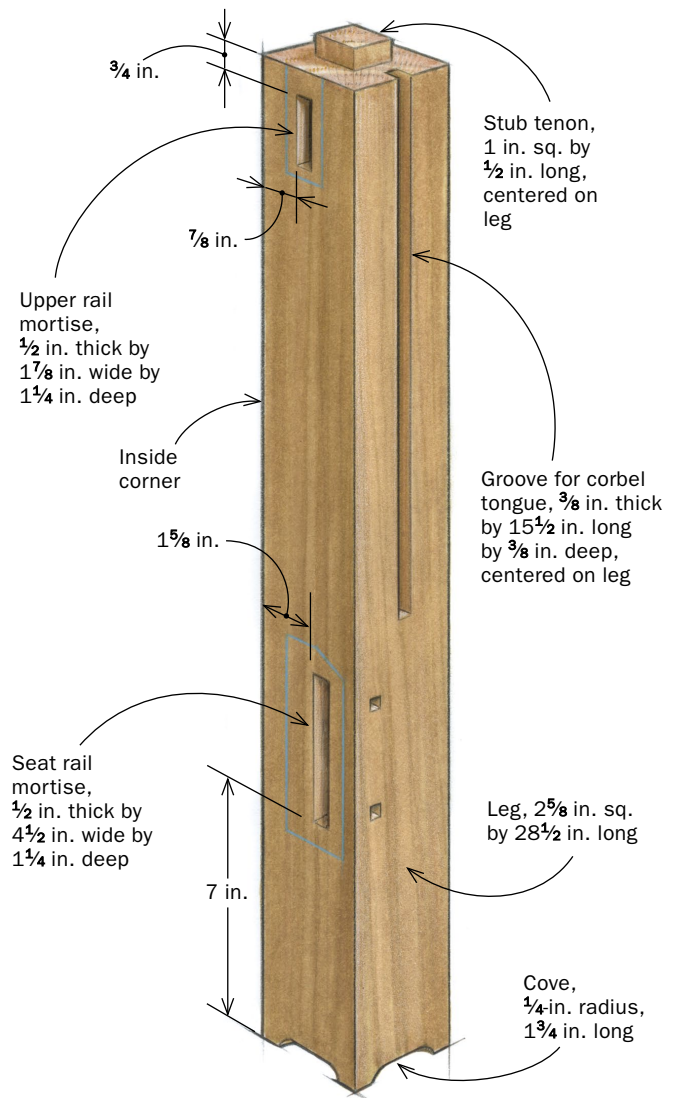
Tackle the rails next

With the posts complete, proceed to the horizontal elements that are tenoned into the posts: three long and four short rails. The length is determined by taking the between-post dimension and adding the tenon lengths. If you wish to make your settle longer or shorter, now is the time to do it.

How to cut tenons on long rails—I cut tenons on the tablesaw, using a method that works well on the front and back rails, and any other pieces that are too long and heavy for a tablesaw tenoning jig. I cut shoulders and cheeks with the pieces flat on the saw table with the rip fence as a stop for the tenon length. The upper and lower rails are different thicknesses, so their tenons are cut with different blade heights. But it is critical that all the shoulder locations are the same, so the rip-fence setting will not change.

Start with the bottom rails. Because these tenons are offset, you'll have three blade settings: a shallow 1/4-in. shoulder and cheek cut on the front face, a deeper one on the back face, and another setting for the edge shoulder cuts. I cut the shoulders

LEGS ARE THE FOUNDATION



Stub tenons on the tablesaw. The tenon at the top of each leg post is formed with a series of passes on the tablesaw, using the rip fence as a stop and rotating the post.



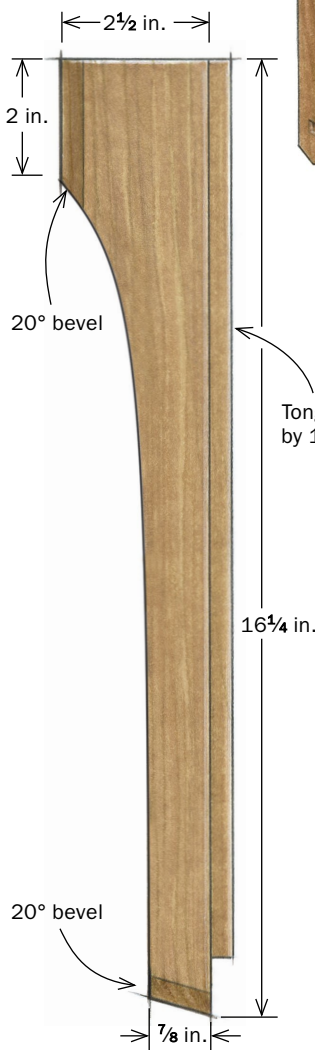
Coves lighten the feet. With the leg post in a vise, using a handheld laminate trimmer (with a 1/4-in. bearing-guided cove bit), move in at one pencil mark and out at the other.

Arts and Crafts sofa

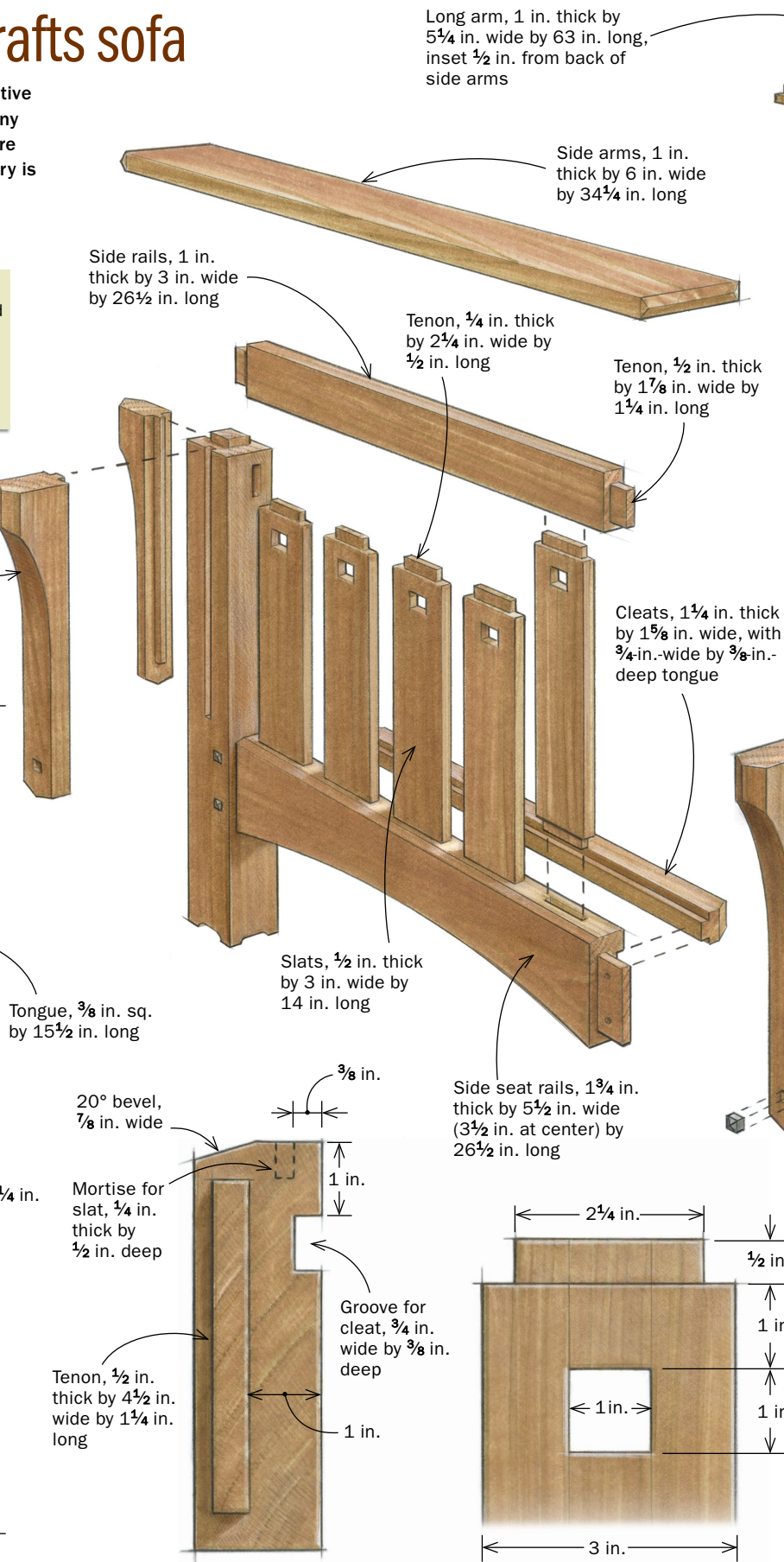
While the details—decorative corbels, pierced slats, ebony plugs—are refined, they are easy to execute. The joinery is straightforward, too.



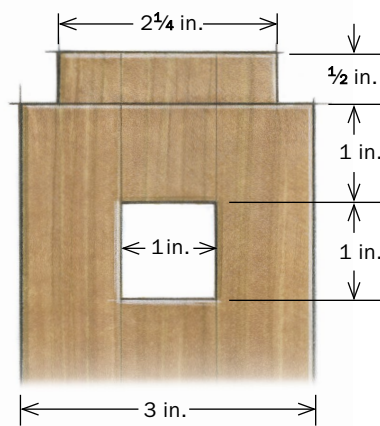
To purchase expanded plans and a complete cutlist for this Prairie settle and other projects, go to FineWoodworking.com/PlanStore.



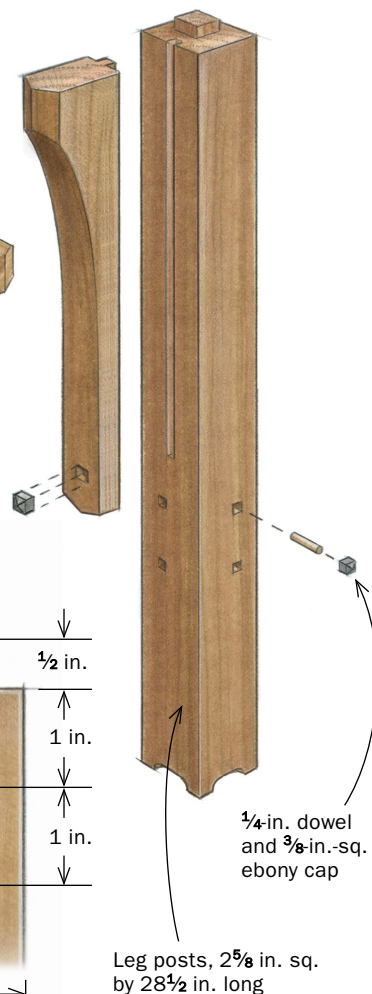
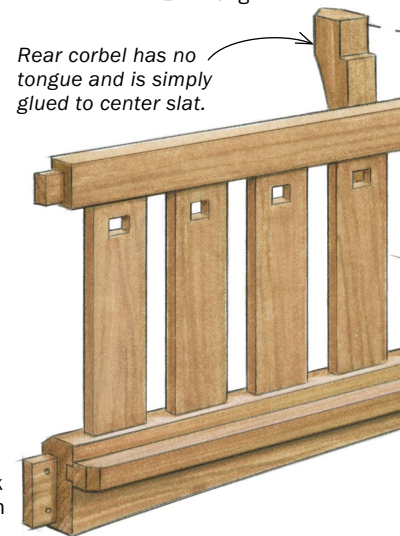
CORBEL DETAIL



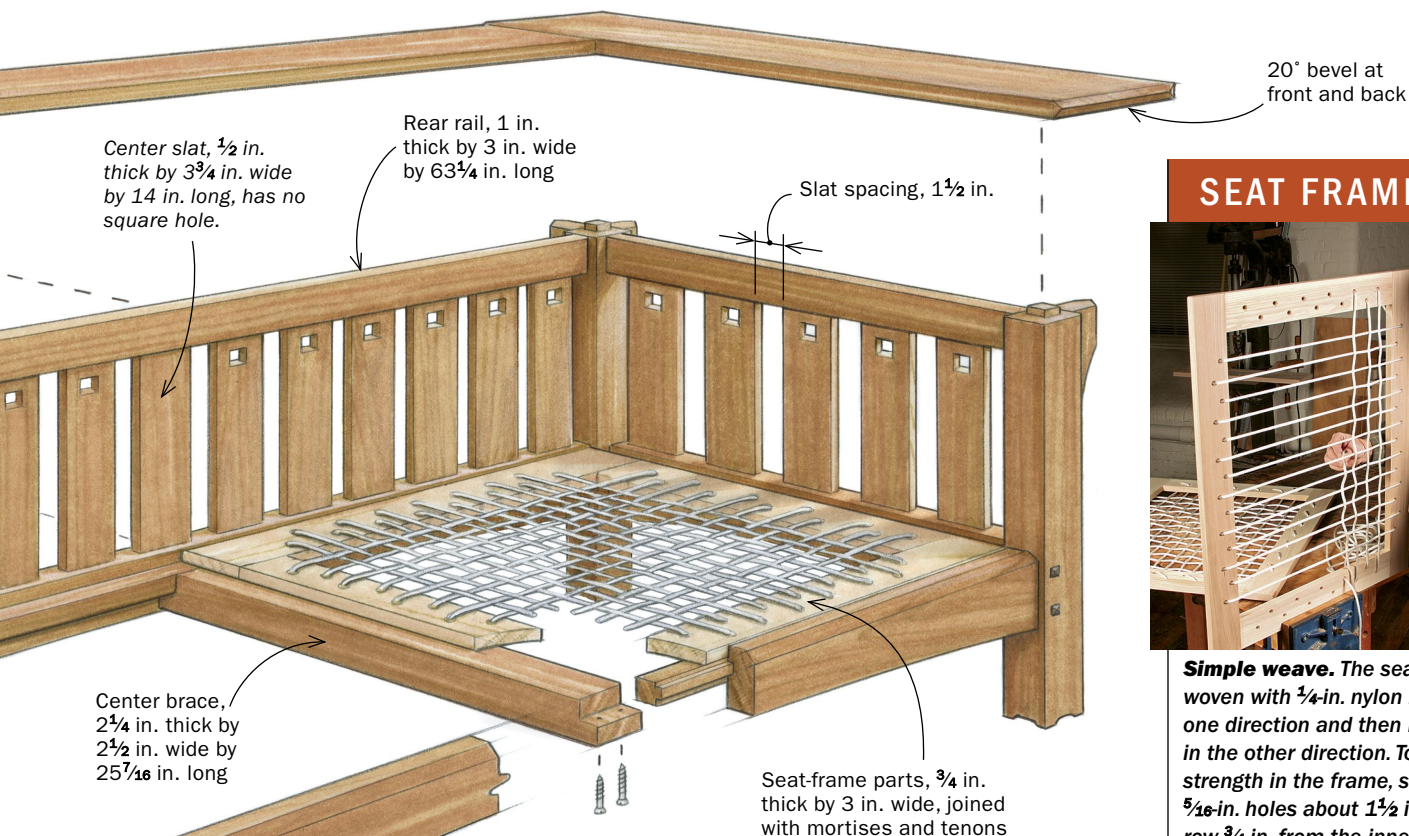
SEAT-RAIL DETAIL



SLAT DETAIL



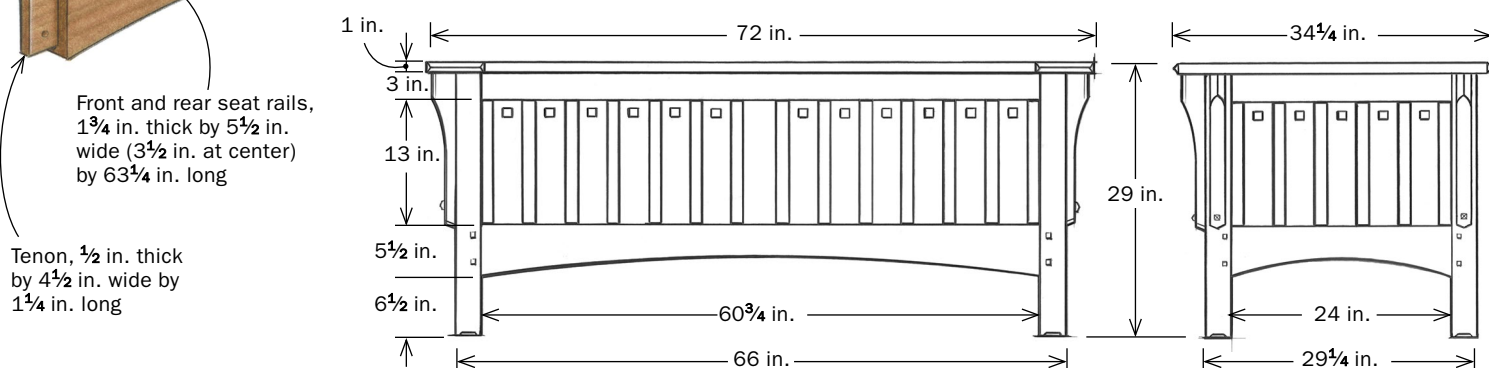
LEG POSTS



SEAT FRAMES



Simple weave. The seat frames are woven with $\frac{1}{4}$ -in. nylon rope, first in one direction and then in and out in the other direction. To maintain strength in the frame, stagger the $\frac{5}{16}$ -in. holes about $1\frac{1}{2}$ in. apart, one row $\frac{3}{4}$ in. from the inner edge and the outer row $1\frac{1}{2}$ in. from the inner edge.



CONSISTENT CORBELS



A simple jig. Once the corbel stock is rough-cut close to the line with the bandsaw, screw it directly into a shaping jig (left). The holes will be concealed when the corbels are in place. Then use a top-bearing-guided router bit (Amana #45468) to match the corbel to the template (center).



Tablesaw creates the tongue. Make the side shoulder cuts, flip the corbel curve up, and rip perpendicular cuts to remove the rest of the material.

RAILS GET TENONS AND ARCHES

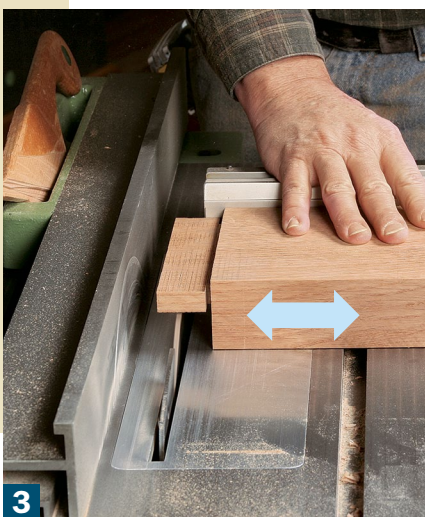


1

Easy tenons on big pieces. Keep the pieces flat on the tablesaw. Using the miter gauge for control and the rip fence as a stop, make all the shoulder cuts (1), adjusting the blade height as needed. Make a series of passes to waste away material (2). Last, slide the tenon horizontally across the blade to clean up the cheeks (3). The rip fence will keep you from going too far, so once you begin don't move it.



2



3

and cheeks in the same operation. After I make the first shoulder cut, I make a series of passes through the waste material of the cheek. Then I slide the rail back and forth over the blade to clean up the waste. Once the cheek is clean, I flip the board, adjust the blade height, and cut the other side.

If you have a good dado set that won't give a sloppy cut, you can use it here, but I don't bother. Now do the upper rails the same way, adjust the blade height, and move to the edge shoulder cuts.

Mortise for the slats—Now that the tenons have been cut on the horizontal pieces, cut the small mortises for the vertical slats. Clamp the corresponding sets of upper and lower rails together, inside face to inside face, making sure the upper edge of the bottom rail and the bottom edge of the upper rail are in the same plane, and

mark the mortises on both pieces. The center slat is a bit wider than the rest and doesn't have a hole, which makes the math easier. The corbel that will attach to the back of the center slat disguises the difference in width and covers where the hole would have been. I cut the mortises with a router, using a fence riding along the inside face of each rail, and then I chisel the mortises square.

Bevel the lower rails and run a groove for the seat cleat—

The upper rails are complete, but the lower rails need a few details. The lower rails get a bevel of about 20° to their upper outside edge. Using a dado set, cut a groove (to hold a cleat that supports the seat frames) around the inside face of the lower rails.

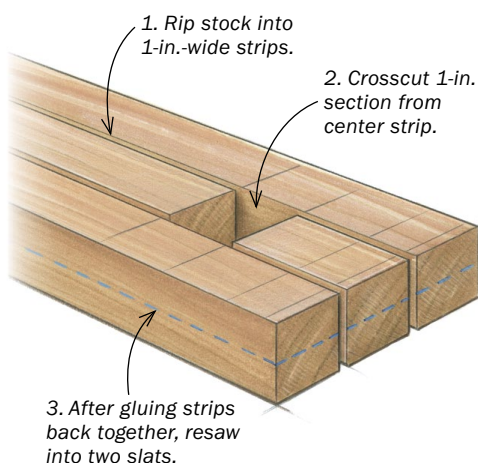
Arches—At this point you can cut the arches along the bottom edges of the four rails. I draw the arch on a 1/4-in. Masonite template, bandsaw close to the line, and file and sand the rest of the way. Then I use the template to trace and rout the arches on the workpieces.



Template ensures smooth arches. After tracing the shape of the template (above), bandsaw close to the line, and then use a top-bearing template-guided router bit (Amana No. 45468) to shape the arches (right). The rails are thicker than the bit, so you'll have to make two passes, the first with the bearing riding the template and the second with it riding on the just-shaped part of the rail.



SLATS MADE SIMPLE



Cut slat stock into five pieces. First, make two 1-in. rip cuts through the stock (left). Then crosscut the center strip in two places, cutting out the area of the square hole (above). Make sure to mark the slats before cutting them so reassembly will be easy and the grain will match.

Move on to the vertical slats

Now it's time to make 23 vertical slats, 22 with square holes and one slightly wider (the center slat in the back) without a hole. To minimize waste, increase consistency, and save time, I make 11 slat blanks from 5/4 stock, rip the blanks into three strips, lightly joint all the sawn edges, cut the holes on the tablesaw, reassemble the pieces, and then resaw them into 22 slats. Mill the odd slat without a hole to the same thickness and length but about 1/2 in. wider.

Careful marking and organization are the keys to keeping this process quick and painless. First, lay the 11 blanks out on a bench and joint one edge (either all the right edges or all the left edges). With a square, draw a tentative end cut line across the top face of each blank. Move down 1/2 in. and draw the tenon shoulder line, move down 1 in. and draw the top of the square hole, and finally move down another 1 in. and draw the bottom of the hole.

Once you resaw the slats you should have 22 of them. Don't forget to mill the wider center slat to the same thickness as the rest. Now cut the tenons on the ends of the slats, using the same quick method you used on the rails.

Putting it all together

Start with the two sides. Glue and clamp the slats into the side rails, and then add the leg posts. While these are drying, glue together the remaining slats and the long back rails.

When all these subassemblies have cured, glue the seat frame cleats into the grooves, then glue the back subassembly and front rail to the two sides.

With the basic framework complete, it is time to attend to a few more details: the center brace, corbels, arms, and ebony plugs.

Center brace—Because the center brace is never seen, it can be made from lower-grade stock. Notch the upper face of each end of the brace to fit around the seat-frame cleats that are glued to the rails. The top face of the center brace should be level with the top faces of the frame cleats. Screw and glue this brace from underneath at the settle's center point into the underside of the seat frame's cleats.

Corbels—The corbels are largely decorative but do give some support to the arms. I use a template made of 1/4-in. Masonite to draw the shape of the corbels onto the stock. Then I rough-cut



Reassemble the pieces. Glue all the pieces back together, using the cutoff from the center strip as a spacer. Rotate the cutoff 90° to keep it away from the glue squeeze-out. When the glue is dry, mill the blanks lightly to clean them up, and rip them to exact width.



Resaw the stock to double the count. Before resawing, cut the 11 blanks to length. Mark a line 1 1/2 in. from the top of the square hole, and make the top cut first so all the holes will line up. With the top cut made, cut the blanks to length. Now resaw them to make 22 slats, mill them flat and smooth, and cut all their tenons.

ASSEMBLE THE FRAME



Start with the sides. The first assembly consists of the short horizontal rails and the vertical slats (above). Rodel uses the arch cutoff to aid in the glue-up and measures diagonals to check for square. While the sides are still in clamps, add the leg posts to complete them (right).



with the bandsaw along the curved sides and use the tablesaw to crosscut the wide end square before attaching the corbels to a jig and trimming them flush to the template.

Using the tablesaw, cut the tongue along the straight side simply by cutting two rabbets along each side and leaving the tongue in the center. The center corbel for the back doesn't get a tongue because it is glued directly to the back slat rather than inserted in a groove. So cut off the extra tongue material at this point. Cut the tongues on the other six corbels. Cut off the lower section of the tongue to match the length of the groove. Finally, cut the corbels to their finished length with a 20° bevel cut. Bevel the upper 2½-in. facing edge to a centerline, 20°, either by handplane or tablesaw. Lay out and chisel a recess for an ebony plug at the lower end, sand, and attach. The odd corbel in the center back needs to be notched to fit over the upper back rail. Its bottom edge is beveled at 20° in the reverse direction of the other corbels to fit snugly over the beveled upper edge of the bottom rail. This tongueless corbel is glued directly to the hole-free center slat.

Arms—The arms and long back piece are the *pièce de résistance* of this design, so use your best figured stock here. To cut the mortises in the side arms, use the same router method that was used to cut all the slat mortises in the rails. The 30° bevel on each end of the side arms is cut on the tablesaw. The sawmarks on the end grain can be removed with a file and some light sanding.

With the side arms complete, cut the tenons on the back and presand all edges before gluing.

It is usually best to cut mortises first and fit tenons to them. But attaching the arm assembly to the framework is an exception; the



Move to the back and full frame. Assemble and glue the long rails to the vertical slats. Once this assembly is dry, working with one side on the floor, add the back assembly and front rail to the side assembly (above). Turn the frame upright, add the second side, and clamp (right).



ADD CORBELS AND ARMS



Glue the arm assembly together. Use a spacer stick between the side arms at the open end to make sure the clamps do not pull the arms out of square (left). To cut the mortises, use a small handheld router to waste away material close to the line, and then clean up the mortise by hand (above).

tenons had to be made first. Set the arm assembly on the frame to locate the mortises for the four leg-post tenons, then cut them.

Ebony plugs—For the decorative ebony pegs, I take $\frac{3}{8}$ in. square and $\frac{1}{2}$ in. square stock, and use a disk sander to shape a shallow pyramid head on one end, lightly sand, and then cut off by hand the length of peg needed. With some glue in the recess, tap the peg into place.

Now you can start finishing the settle while working on the seat frames and cushions. After fuming (see “Authentic Fumed Finish,” p. 112), I use Tried & True Danish Oil for the first coat, followed by two to three coats of Tried & True varnish oil.

Get ready for the upholstery

The first step is the woven-cord seat frame. I use ash for the frame stock, but any strong hardwood will do. The two frames (with mortise-and-tenon joinery) sit on the cleats and meet in the center, overlaying the center brace. Dry-fit the frame, then lay out the hole pattern. I use $\frac{1}{4}$ -in.-dia. cord (available at hardware stores), so I use a drill press to drill all the $\frac{5}{16}$ -in. holes. A countersink gives the holes a slight bevel to prevent wear on the cord. You'll use about 60 ft. of cord per frame.

With the holes drilled, the frame glued up, and the edges broken, clamp the frame into a bench vise and weave. It will be slow going at first, but it will speed up as you use more cord. Lace all of the horizontal rows, pulling tight as you complete each row. Then, on the verticals, weave the cord back and forth through the horizontal rows and again pull tight as you go. Tie off the ends with a simple overhand knot, keeping the knots on the underside. The finished web should be fairly stiff. You can screw these frames to the cleats or leave them loose. At this point, you can make the cushions or pick them up from the upholsterer.



Glue on the corbels and arms. Before attaching the arm assembly, glue the six corbels to the leg posts and one to the wide center slat in the back. When dry, attach the arm assembly to the frame (left). The large amount of glue surface makes this a strong joint all around. Make sure to use enough clamps on the long back to apply consistent pressure.



CUSHION SIZES

The cushions are medium-density foam with a cotton batten material glued to it. The upholstery is a high-quality supple leather.

Bottom cushion foam:
30½ in. by 26 in. by 5 in.

Back cushion foam:
30½ in. by 11½ in. by 4 in.

Side cushion foam:
20 in. by 11½ in. by 3 in.

Article Extra
Watch Rodel craft the leather cushions for this piece.

Kevin Rodel designs and makes furniture in Brunswick, Maine. To see more of his work, go to kevinrodel.com.



SEATING

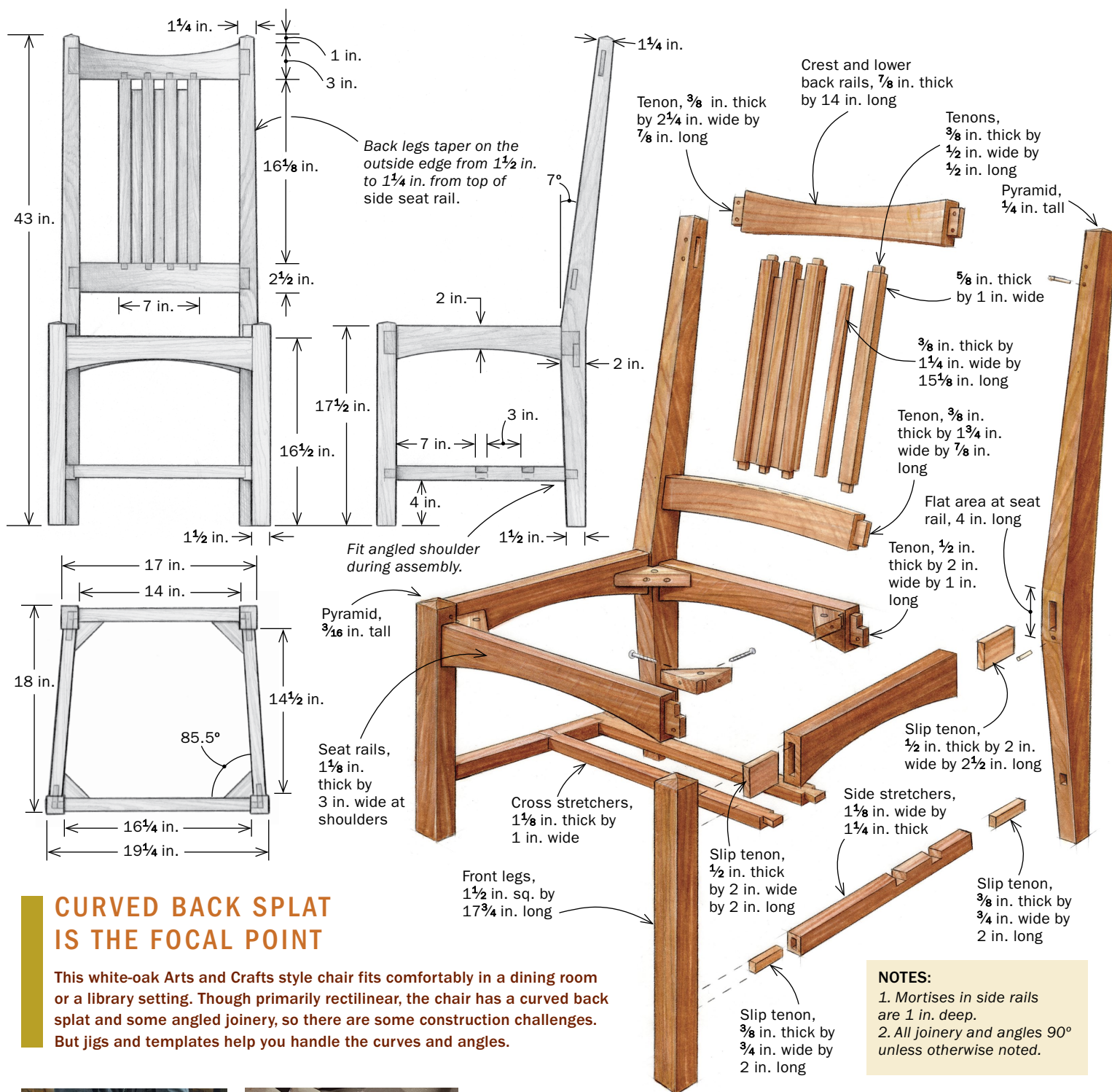
Side Chair

With templates for
curves and joinery,
you can make a
roomful of chairs

BY KEVIN RODEL

I designed this chair in 1993 for a design competition sponsored by the Maine Arts Commission. My intention was to design a chair that would be sturdy, comfortable, and clearly derivative of Arts and Crafts styling, but still compatible with contemporary interiors. Since then I have made many of these chairs with very little design change, including one set ordered by Disney Films in 1999 for the movie "Bicentennial Man." This version is made of white oak, though I've made the same chair in cherry and walnut.

Because I wanted the chair to function either as a dining chair for long, leisurely meals or as a reading chair for a desk or library table, an upholstered seat was a must. The degree of back slope, depth of seat area, arch or curvature of the back rest, and other critical dimensions also contribute



CURVED BACK SPLAT IS THE FOCAL POINT

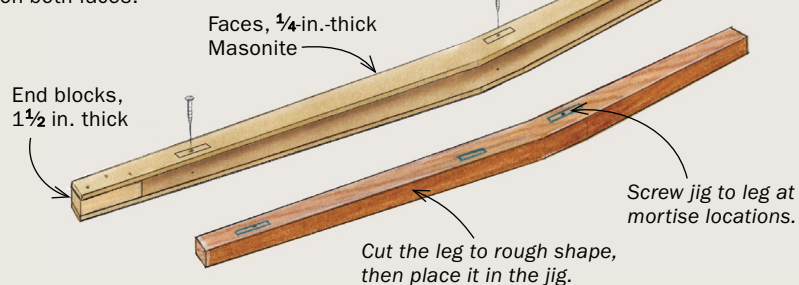
This white-oak Arts and Crafts style chair fits comfortably in a dining room or a library setting. Though primarily rectilinear, the chair has a curved back splat and some angled joinery, so there are some construction challenges. But jigs and templates help you handle the curves and angles.



Clamp the jig to a bench to rout the leg shape. A long bearing-guided bit can do the job in one pass; a shorter bit requires you to flip the jig and make two passes.

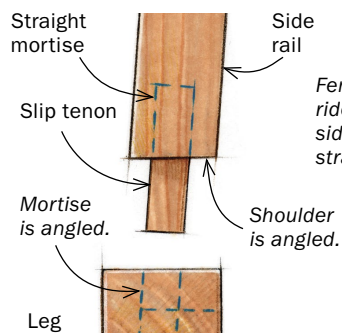
TWO-SIDED JIG FOR ROUTING BACK LEGS

Each leg is secured in the jig by screwing into the areas to be mortised, so mark out mortise locations on both faces.



Router box simplifies mortising

This jig allows you to cut angled and straight mortises in the legs with a plunge router. It also allows for mortising for the slip tenons in the ends of the side rails.



ANGLED-JOINT DETAIL



Fence, 8 in. long, rides along box sides to ensure straight cuts.

Wood screw

Aluminum bar stock to fit router baseplate

Notch for end-mortising, 1 1/4 in. wide by 4 in. long

Plywood sides, 3/4 in. thick by 4 7/16 in. wide by 26 1/4 in. long

Bottom, 1 1/4 in. thick by 3 1/2 in. wide

Wedge leg in box for mortising. Adhesive-backed sandpaper prevents the wedges from slipping.

to the comfort. I use jigs to duplicate curved and angled parts, as well as to create accurate angled joinery. These jigs will come in handy if you decide to build a set of chairs.

Shape the back legs using a template

First, trace the back legs on the stock using a full-size template made from 1/4-in.-thick Masonite. Rough-cut the legs to shape using a jigsaw or bandsaw, being careful to leave the line. The only cuts that should be exactly to the line at this point are the top and bottom cross-grain cuts.

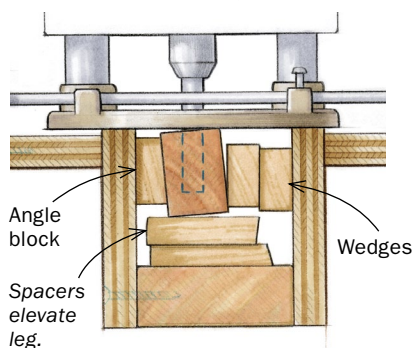
For final shaping, mount the back legs in a template-routing jig (see p. 73) that works with both legs. Use a large-diameter, bearing-guided straight bit (1/2 in. or more). Amana makes a 1 1/8-in.-dia. by 1 1/2-in.-long bit with a top-mounted ball-bearing guide (part No. 45468) that allows you to shape the leg in one pass.

Once you have both rear legs shaped, cut the front legs to length. Now you're ready to lay out and cut the mortises.

USE AN ANGLE BLOCK FOR SIDE-RAIL MORTISES



Angle block orients the leg at 85.5°. Set the block against one side of the leg before adding the wedges. Then cut the mortise with a plunge router.



USE THE BOX FOR END GRAIN, TOO

The front and back rails meet the legs at 90° and have standard tenons. But the side rails meet the legs at an angle. Instead of cutting angled tenons, mortise for slip tenons.



Start by angling the ends of the rails. Cut the side rails to length at 85.5°, paying careful attention to the orientation of the angle cuts.

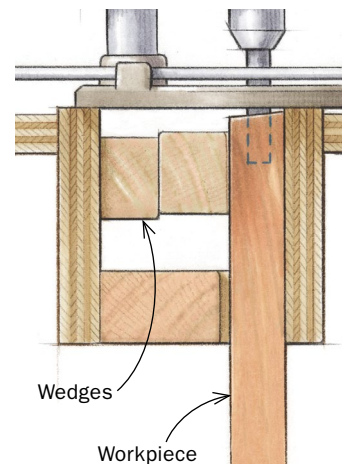
Angled mortises made easy

It is certainly easier to cut right-angled, 90° mortises and tenons. But to conform to the body, the chair must have some angled joinery. I've limited the angled joints to the side rails and the lower side stretchers.

The easiest and most consistent way to cut the angled joint is to bore the mortise in the leg at the required angle. Then you can simply crosscut the ends of the adjoining rails at the same angle, cut a straight mortise into the end grain of the rails, and



Square up the mortises. Use a chisel and mallet and pare to the line.



Mortise the ends of the rails. These mortises are easily cut by wedging the rail vertically in the router box.

glue in a slip tenon. The angled mortises in the front and rear legs can be cut using a plunge router and a router mortising box (see photos and drawings, opposite page). You can use the mortising box, a mortiser, or chisels to cut the straight mortises.

Now add the decorative details on the rear legs. Taper the outside faces on the bandsaw and plane to the line. Cut the shallow pyramid heads on both the front and rear legs. Finally, cut the mortises for the square pegs in the crest rail.

Side rails meet the legs at an angle

With the legs complete, begin working on the seat rails—front, back, and side. The rail-and-seat structure takes the brunt of the load, so use care when fitting the tenons.

The front and back rails meet the legs at 90° and have standard tenons. The side rails, which are angled into the front and back legs, are attached with slip tenons.

Cut the side rails to length at 85.5° at the shoulder line (left photo, above). The rail should look like a long, thin parallelogram, not a trapezoid. Next, lay out and cut the mortises on the ends for the slip tenons (see photos and drawing, this page) using the router box. After mortising, fit and glue the slip tenons into the side rails.

Template ensures consistent curves in all of the chair rails

You want the arches in the rails to be consistent, so cut them to shape using templates made of ¼-in. Masonite. You'll



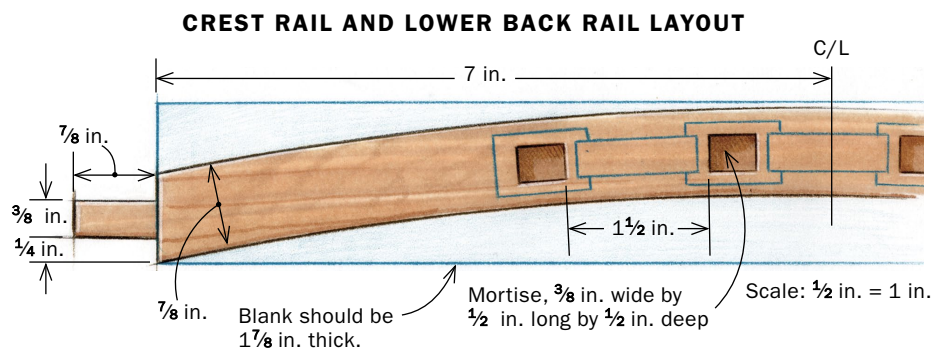
Glue the slip tenons in the side rails. The tenon should fit with a bit of hand pressure. If you have to beat on it with a mallet, the fit is too tight; if it drops out, it is too loose.



Now rout the side-rail arches. Rough-cut the curve on the bandsaw. For consistency, screw a router template to the tenons, and secure the assembly to the bench for routing.

Make the back-rest assembly

The rails of the back rest are curved on the front and back faces, and the crest rail is arched on its top edge. Both rails are mortised to hold the back splat, a curved assembly of narrow strips.



CUT THE JOINERY BEFORE SHAPING THE UPPER RAILS



Cut the tenons and the inside curve of the rails before mortising. Mark the locations of the back-splat mortises using a template and drill them out on the drill press (left). A curved fence helps support the tall workpiece. Next, following the lines marked from the template, square up the mortises (right).



Arch the top of the crest rail next. Re-use the rear seat rail template to trace the arch along the top of the crest rail, then rough out the shape on the bandsaw.

need three templates for the seat-rail arches: one each for the front, sides, and back. Use the templates to draw the arch on the seat rails, then use a bandsaw to remove most of the waste. Now use a bearing-guided straight bit to template-route the arches.

The two curved back rails require a few more steps than the seat rails. Mill up extrathick blanks and cut the offset tenons on the ends. For consistency, it helps to make a template showing both the inside and outside curves of the rail (see drawing, left). Trace the concave curve first, then remove the waste with a bandsaw, and clean up the surface using a spokeshave or sandpaper. If you prefer, you can use the template to make a jig to clean up the surfaces using either a router or shaper. Now use a marking gauge to scribe the 7/8-in. thickness of these rails, referencing off the just-milled front faces.

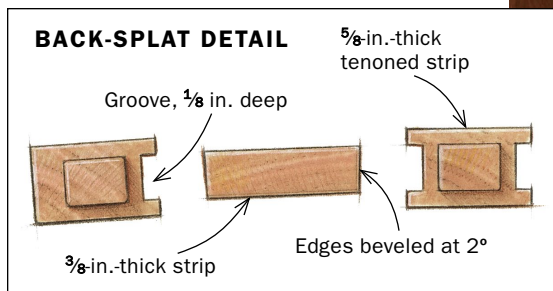
Before shaping the crest and bottom rails further, lay out and cut the four small mortises for the back splat (see photos, left).

The next operation is to arch the top of the crest rail using the same method and template used to shape the back seat rail (save the cutoff). Finally, cut the convex curves of the crest and bottom rails on the bandsaw, just leaving the line. Clean up these faces with a disk or belt sander.



Finally, cut the curves on the backs of the top rails. Leave the scribe line, and clean up the surfaces with a belt or disk sander.

MILL AND GLUE UP THE BACK SPLAT



Tenoned strips are grooved on both sides. Cut and fit the 5/8-in.-thick strips into the mortises in the rails, then rout the 3/8-in.-wide groove, 1/8 in. deep, into their edges. The outside strips are grooved only on the inside.



Bevel the thin strips. After ripping the 3/8-in.-thick strips to width, joint a 2° bevel on their edges to allow the splat to curve.



Use the crest rail and the bottom rail to guide the glue-up. Apply glue with a syringe to avoid squeeze-out. Do not glue the splat to the rails yet. Once the back splat has dried, go ahead and glue it to the crest and bottom rails, then assemble the rest of the chair back.

Back splat serves as the focal point

The back splat is a curved assembly of 1-in.-wide strips, with three 1-in.-sq. openings at the top, that conforms to the shape of the crest rail and the back rail. For this element, you'll need two blanks, 3/8 in. and 5/8 in. thick and wide enough to cut the required number of strips.

Dry-fit the crest rail and the back rail into the legs and measure vertically between them. Add 1 in. to that measurement for the 1/2-in. tenons, and cut the 5/8-in.-thick blank to length. Now cut 3/8-in.-thick tenons on each end, rip the board into four 1-in.-wide strips, and then cut the remaining tenon shoulders on the strips. Next, cut the grooves for the 3/8-in.-thick

strips, beginning 1 in. from the top shoulder line, and square up the top edge with a chisel.

Now cut the 3/8-in.-thick blank to the same length as the grooves, rip it into strips, and joint a 2° bevel along each edge of the thin strips. Sand all the parts to P220-grit, and glue up the back splat using the crest rail and bottom rail as glue-up jigs. To avoid squeeze-out, use a glue syringe to apply the glue.

Glue up the front and rear assemblies

While the back-rest assembly is drying, glue up the two front legs and the front seat rail. Notch the tenon on the front rail to give clearance for the side-rail tenons.

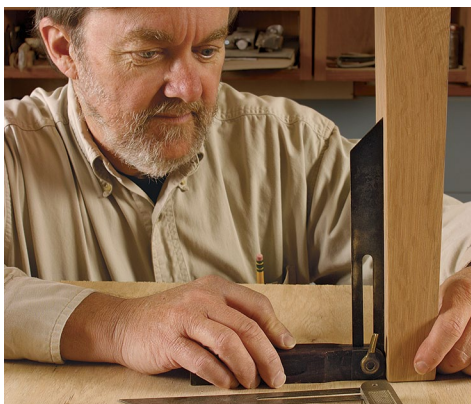
Be sure the legs are parallel with no toe-in or splay as you clamp up the assembly. Reinforce the joints with a 3/16-in.-dia. dowel hidden on the inside face.

When the glued-up back splat has cured, remove the crest and back rails, apply glue to the mortises, and glue these parts together. To help with the clamp-up, use the arch cutoff as a caul.

Allow this assembly to dry, then glue it and the back seat rail to the rear legs. Again, reinforce the rear seat tenons on the inside with a 3/16-in.-dia. dowel. While you are at it, install the 3/16-in. pegs in the tops of the rear legs through the 1/4-in.-sq. peg holes to reinforce the crest rail mortise-and-tenon joint.

Fit the lower stretchers

The lower stretchers help stabilize the chair against racking forces. The side stretchers attach to the legs with slip tenons, and the cross stretchers connect to the side stretchers via half-lapped dovetails.



Cut the rear shoulders first. The rear shoulders of the stretchers are angled 85.5° horizontally. In addition, they must be angled vertically to match the leg taper. Start by dry-clamping the chair, and set a bevel gauge to the vertical angle (left). To cut the rear shoulder on the tablesaw (right), tilt the blade to 85.5° , then use the bevel gauge to set the angle of the miter gauge.



Creep up on the fit. Reset the miter gauge to 90° , leaving the blade tilted to 85.5° , and cut the front shoulders. Leave each stretcher a little long and take light cuts until the ends align with the mortise locations.

Install the lower stretcher assembly

The lower stretcher assembly not only helps stabilize the lower part of the chair against racking forces, but the exposed dovetail joints also add a decorative twist. The side stretchers connect to the legs with slip tenons, and the cross stretchers are attached to the side stretchers with half-lapped dovetails.

With the chair dry-fitted and clamped together on a flat surface, measure and cut the lower stretchers to width and thickness. The side stretchers meet the legs at compound angles with slip-tenon joinery. The mortises are already cut. To cut the compound angle on the ends of the stretchers, set a bevel square to the angle formed where the inside face of the rear leg and the flat surface meet. Set the tablesaw's miter gauge to that angle,



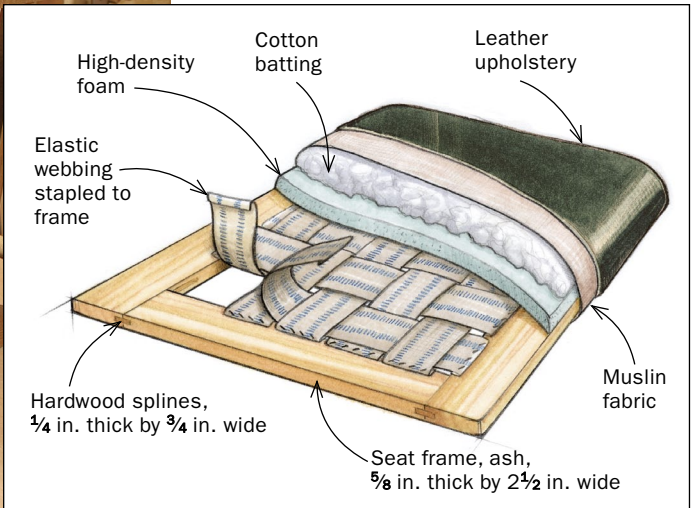
Install the cross stretchers after glue-up. Cut the half-lapped dovetails on the cross stretchers, then scribe them onto the side stretchers.



Screw in the corner blocks. The blocks help reinforce the corner joints and serve as anchors for the seat frame.

SLIP SEAT COMPLETES THE CHAIR

The chair has a leather-upholstered seat, installed after the chair has been fumed and finished. The frame is screwed to the corner blocks between the rails.



set the blade to 85.5° (double-check that angle with another bevel gauge), and cut the compound angle on the rear end of one stretcher. To cut the opposite stretcher, reset the miter gauge past 90° to the same angle in the other direction. Now cut the forward ends of the stretchers at 90°—with the miter gauge at 90° and the blade still at 85.5°—sneaking up on the length until they just fit.

Next, cut a 3/8-in.-wide mortise, centered in the end grain of each stretcher and about 3/4 in. deep. Dry-fit the slip tenons. When the fit is perfect, you can glue up the chair.

While this glue is setting, you can mill up the two cross stretchers. Once the stock is milled to width and thickness, locate where each cross stretcher will meet the side stretchers. Cut each one to length, leaving them about 3/8 in. extralong on both ends.

Hold a cross stretcher in place, and locate the shoulder cut by scribing a line on the underside where it meets the side stretcher. Cut a half-lapped dovetail on each end of each cross stretcher. Set the

cross stretchers in place, then scribe and cut out the dovetail slots in the side stretchers using a handsaw and chisels. Once the dovetail sockets have been cleaned out, glue the cross stretchers in place.

After the glue has set, sand all the stretchers flush on their upper faces, and go over the chair thoroughly for any residual glue squeeze-out and touch-up sanding. Finally, make up the corner blocks and screw them to the inside corners, flush with the upper edges of the front and rear seat rails. Add an additional screw hole up through the body of the corner blocks before attaching them. This will be used to attach the upholstered slip seat to the chair.

The very last item before finishing is installing the pyramid-shaped decorative pegs in the crest rail. I use ebony.

This chair is fumed (for more on fuming, see *Authentic Fumed Finish*, pp. 112) with a topcoat of Tried & True linseed oil. The seat is upholstered in leather from Dualoy Inc. (dualoy.com). □

Kevin Rodel is a furniture maker and teacher in Brunswick, Maine.







Tables

82 Coffee Table

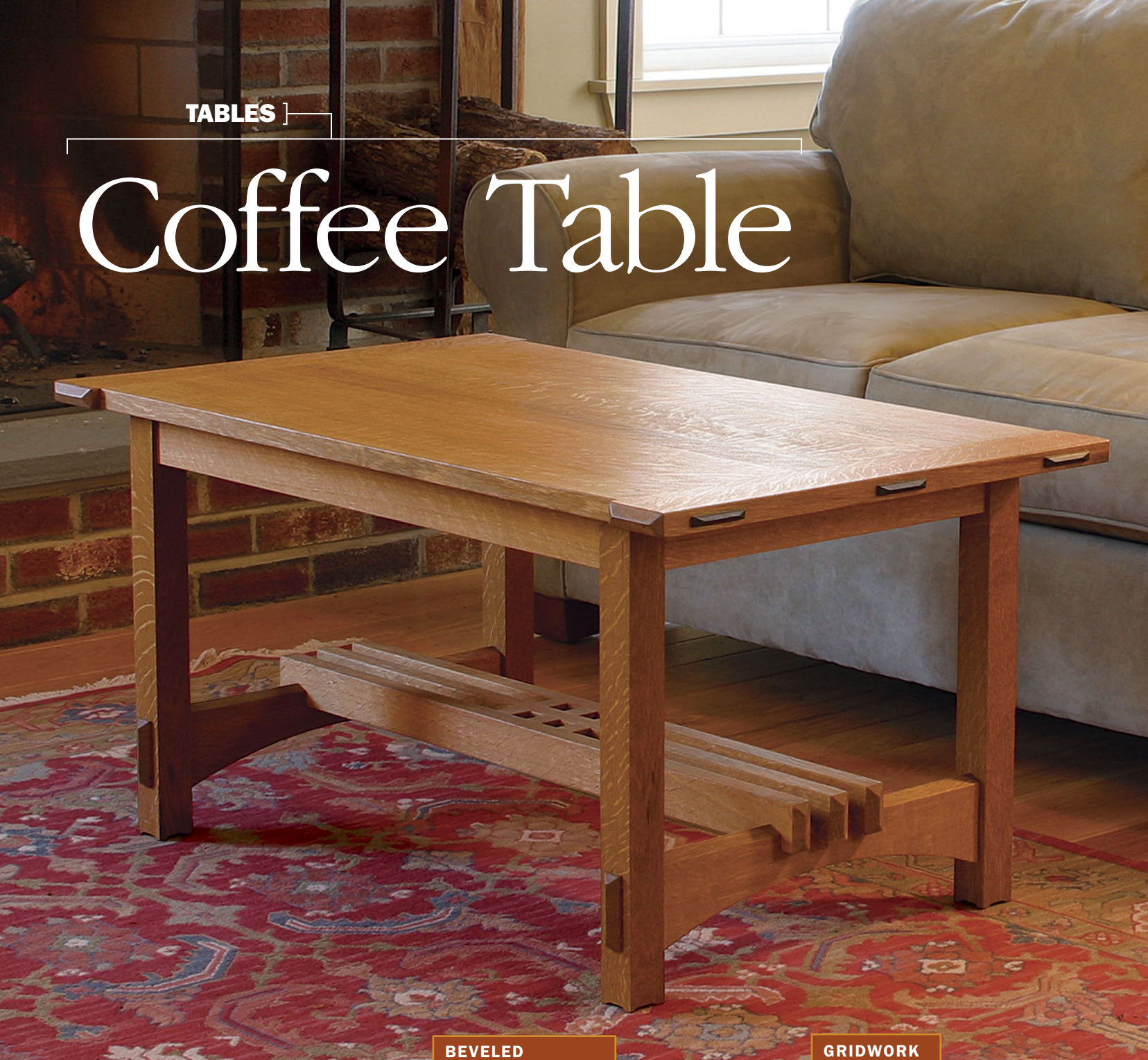
90 Hayrake Table

98 Limbert-Style
Table



TABLES]

Coffee Table

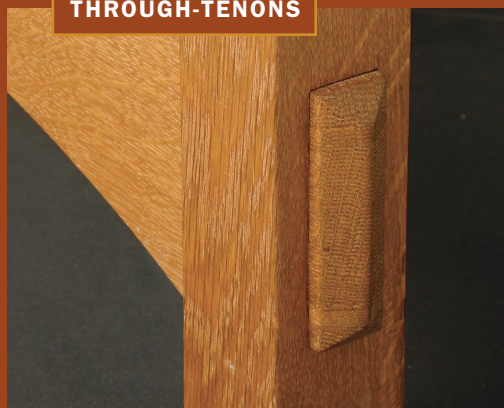


BEVELED
THROUGH-TENONS

GRIDWORK
STRETCHER

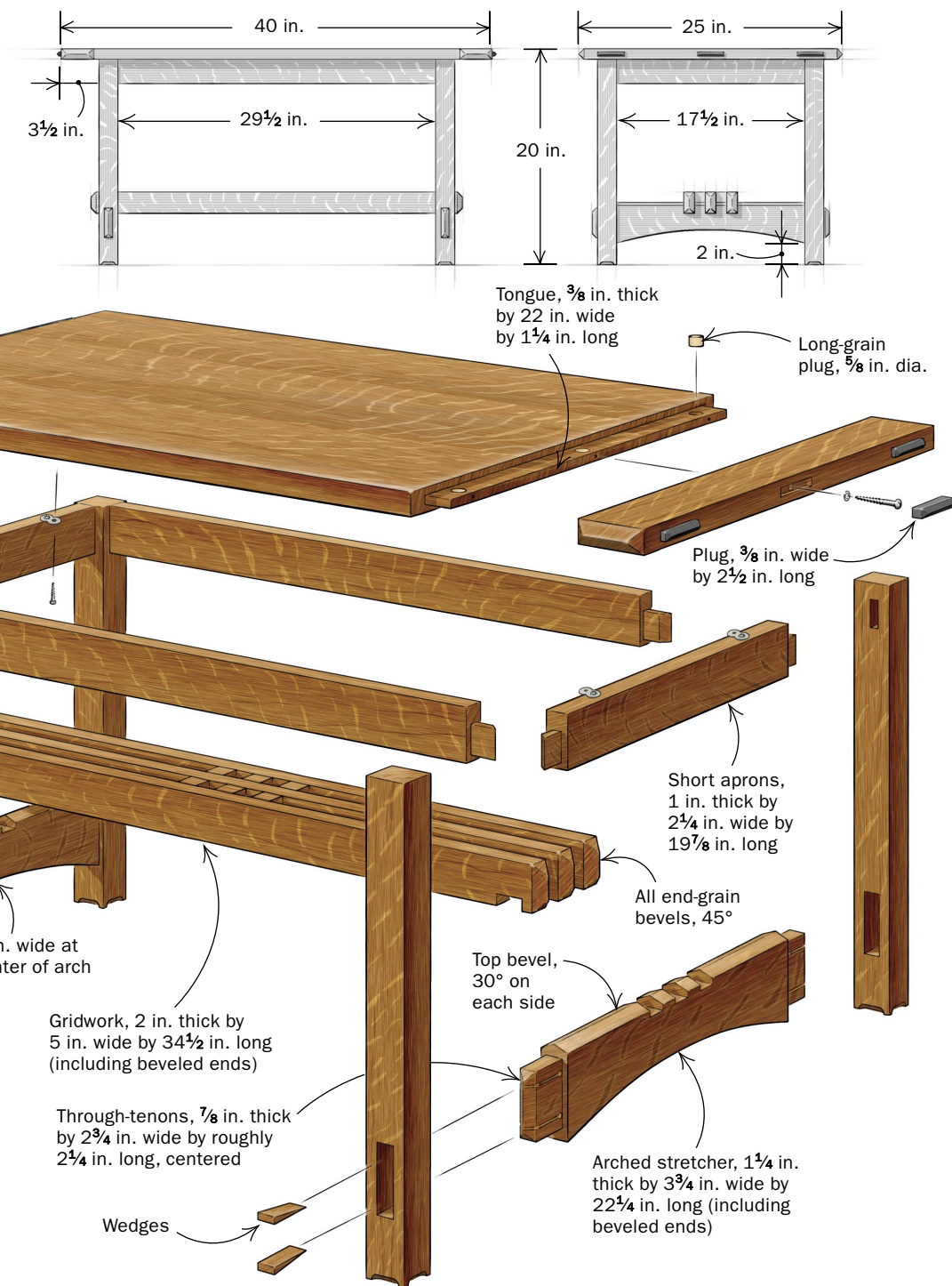
Harmonious
details will work
in tables of
many sizes

BY KEVIN RODEL



INSIDE THE JOINERY

This Arts and Crafts coffee table is made of fumed or stained white oak. The two ends of the base—with their beveled and wedged through-tenons—are built first, and then connected by the gridwork stretcher. The top receives breadboard ends with decorative ebony details.



BREADBOARD ENDS WITH EBONY ACCENTS



Arts and Crafts style is noteworthy for taking joinery—the product of the craftsman’s hand—and elevating it to the level of artistic decoration. The basis of this table design is four decorative joints: through-tenons, gridwork, half-lap joints, and breadboard ends. These design elements will work beautifully together in tables of almost any size.

Although the project detailed here is a coffee table, the techniques are the same for all of the tables illustrated on p. 89. I usually build the base first. Start by milling

the leg stock to the required square dimensions, and then cut it to length.

Cut mortises before tenons

A rule of thumb is to cut mortises before cutting and fitting tenons. Lay out the mortises in the legs. The aprons are joined to the upper portion of each leg with stopped mortises, which intersect inside the leg. Keep in mind that the leg and apron junction is not flush; the apron is set back from the outside face of the leg, so lay out the mortises accordingly. I recommend

a $\frac{3}{4}$ -in. shoulder at the top of each mortise to keep the end grain from splitting, but only a $\frac{1}{4}$ -in. shoulder is necessary at the bottom. Make the tenon $\frac{3}{8}$ in. thick. All of these apron mortises can be done with the same machine setup, whether you are using a mortising machine or a plunge router.

The through-tenons at the lower end of each leg are thicker because they also function as a decorative detail. Note that the ends of the tenons are both beveled and wedged, in that order. Make each through-tenon about half the thickness of the leg stock and, of course, centered. That means a $\frac{7}{8}$ -in.-thick tenon for the $1\frac{3}{4}$ -in.-thick leg on the coffee table. There is no need for a variety of cutting bits to make large mortises for these through-tenons. I make two cuts with a $\frac{1}{2}$ -in.-dia. bit, referencing off opposite sides of the leg, which guarantees the mortise is centered. When cutting a through-mortise, set the stops to cut a little more than halfway through the leg, and then turn the work-



TIP Detailing the bottom of each leg is easier if done before assembling the legs and stretchers.

the mortise. The tenon will be made to fit snugly into the shorter inside length of the mortise, and the wedges will flare the tenon at the top and bottom to close the gap and leave a neat-looking joint.

A final, optional design detail is the small coves I add to the bottom of each leg. They can be cut most easily on a router table, with a bearing-guided $\frac{1}{4}$ -in.-radius cove bit, but you also can use a laminate trimmer and a steady hand.

With the legs complete, make up the apron parts and tenon the ends. The tenons will intersect within the mortises, so cut the ends at a 45° angle.

On the arched stretchers, complete the joinery first

The most labor-intensive pieces in this design are the arched stretchers in the table base. The key is to complete the joinery

piece around and finish cutting from the opposite face.

Because the tenon will receive two wedges when assembled, the mortise must be flared slightly toward its outer, visible face. To flare the mortise, simply add an extra $\frac{1}{16}$ in. when laying out the upper and lower ends of the outer face. Then follow the layout lines when mortising halfway through from each side. Don't worry about the small step created inside each end of

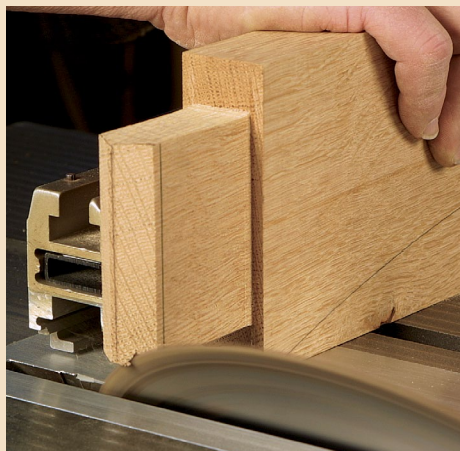


Through-tenons show off precision

The beveled ends of the tenons mirror the bevels on the gridwork stretcher and breadboard ends. The outer portion of the mortise is the most critical: Be sure that its thickness fits the through-tenon exactly and that there is extra width to allow for the wedging action.



Dry-fit the joint and mark for the bevel cuts. Use a sharp pencil. Note that the mortise is slightly wider on the outside of the leg to accommodate the wedging action.



Bevel the tenons on the tablesaw. Undercut the bevels by about $\frac{1}{16}$ in. Trim them to fit with a file and a sanding block.



Prepare the tenons for the wedges. Use the bandsaw to cut a kerf at each end, and drill holes at the bottom of the kerfs to keep the workpiece from splitting.

before doing anything else. When cutting the stock to length, remember that the through-tenons will protrude $\frac{3}{8}$ in. beyond the legs. It is critical that a through-tenon fits snug in the mortise—not so tight that you need to force it in with a mallet, nor so loose that the joint will fall apart from its own weight. When satisfied with the fit, dry-assemble the joint and use a sharp pencil to mark around the tenon where it protrudes through the leg. This line will help you set up the tablesaw for cutting the bevels on the tenon ends. Use a good crosscut blade and don't cut right up to this line; leave $\frac{1}{16}$ in. or so between the cut and the pencil line. Now scrape, file, or sand the exposed end of the tenon. When the base is assembled, the beveled

end should appear to grow right from the surface of the leg.

Before assembling the table base, band-saw two kerfs in each tenon—almost down to the shoulder—to receive the wedges. Locate these kerfs about $\frac{3}{8}$ in. from the ends, and drill holes at the bottoms to keep the piece from splitting.

Notch the arched stretchers for the gridwork—With the through-tenons complete, notch the arched stretchers for the half-lap joints to hold the gridwork. The half laps are not going to be flush; half of the thickness of the gridwork sits atop the arched stretchers. Therefore, the depth of the notches in the arched stretchers as well as those in the underside of the gridwork should be a quarter of the thickness of the

gridwork. Each member of the gridwork is 1 in. wide and spaced 1 in. apart, dimensions which determine the width and spacing of the notches.

I cut the notches in a series of passes with a fine crosscut blade on the tablesaw, using a crosscut sled and working to the layout lines. In keeping with the beveled look used throughout the piece, I also bevel the top edge of the arched stretchers 30° on each side, so it comes to a point.

To make the arch, use a shopmade template of $\frac{1}{4}$ -in.-thick material several inches longer than the stretcher. Lay out, cut, and smooth a curve that is pleasing to your eye. Use the template to lay out the stretchers, and bandsaw them close to the line. Then attach the template to each stretcher with double-sided tape and use a bearing-guided, flush-cutting router bit to smooth the arch.

Assemble the ends of the base

At this point, finish sanding all of the parts made so far and assemble the ends

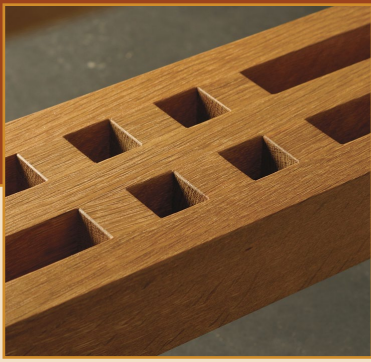


Before assembly, notch the stretchers. Use the tablesaw to notch the arched stretchers for the gridwork. For uniform results, use the same fence and stop setup for the two outside notches.



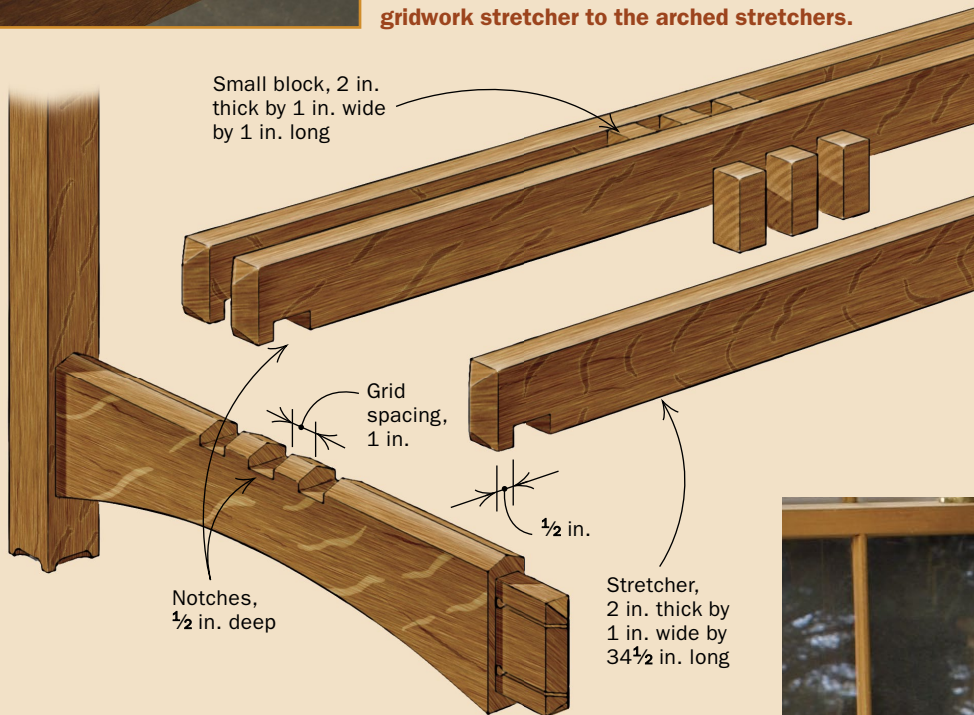
Drive and trim the wedges. During glue-up, drive in the two wedges evenly (top) to ensure proper assembly. After the glue has set, use a chisel to trim the wedges flush with the beveled ends (bottom). Use sandpaper to clean up the surface, including any glue residue.





Gridwork looks harder than it is

The gridwork introduces another geometric element to the angular feel of this design. Like the other end-grain areas of the table, the ends of the gridwork are beveled. Half-lap joints connect the gridwork stretcher to the arched stretchers.



Fit the pieces to the notches. When milling the pieces for the gridwork, test-fit them in the half-lap notches in the arched stretchers.

The gridwork is simply blocks and butt joints. To make the glue-up manageable, start by joining just two of the long grid parts with three small blocks. Place waxed paper under the assembly and press it down as you clamp it. After the glue has begun to set, add the last stick and blocks to the assembly.

of the table base. Before glue-up, make two wedges for each through-tenon. The wedges should be thick enough to fill the $\frac{1}{16}$ -in. gap at each end of the mortise before they bottom out in the sawkerf.

When gluing the through-mortises and -tenons, I have found it best to apply glue on the tenon only. Spread the glue so that it does not get onto the exposed end and also leaves bare the inner third of the cheek, next to the shoulder. As you seat the tenon in the mortise, the glue will spread backward and cover the entire tenon surface, ideally without oozing out at the shoulder. Never apply glue in a through-mortise; it will push out onto the tenon end and the leg, leaving a mess that is hard to clean up and that might interfere with the finish.

Glue-up of this subassembly should be organized and quick. As soon as the two legs, apron, and arched stretcher are in clamps and checked for square—but



before the glue has set—apply a small amount of glue to the ends of the wedges and drive them into the sawkerfs with a small hammer. Do one tenon and then the other, but alternate hammer blows to the wedges of any one tenon so that both wedges go in equally. Saw off most of the excess with a dovetail saw and then pare the surface clean with a chisel.

Build and attach the gridwork

With each end of the table base complete, dry-fit the entire base using the long apron members. Be sure that the tenons in the apron don't hit each other inside the legs.

Now it's time to decide exactly how long to make the gridwork. It should protrude at least 1 in. beyond the arched stretchers; otherwise, the half-lap joints may be weak. Once you have settled on the length, mill three pieces of stock to the required width—1 in.—but leave them about

$\frac{1}{4}$ in. thicker than the final dimension and at least 3 in. longer. Test-fit these pieces in the half-lap notches you cut earlier in the arched stretchers.

From the excess length, cut off enough 1-in.-long blocks to form the grid, leaving a few extra as temporary spacers. Now cut the three long pieces to their exact length and bevel the ends on the tablesaw just as you did the ends of the through-tenons. Be sure to keep these three pieces the same length. Then, on a flat surface, clamp them together, ends square. Find the centerline and use a sharp pencil to lay out the grid.

The gridwork appears complicated but is actually built with simple butt joints between the long and short pieces.

Dry-fit the gridwork to lay out its notches—When the gridwork is assembled and glue is set, send the assembly through the planer on each side, taking light cuts to bring it down to final thickness and to level out any inconsistencies in the grid. Now place the assembly on the base and fit it into the half-lap notches. With a knife, scribe the location of the half laps to be cut into the underside of the gridwork. At this point, the extra 1-in. spacer blocks come into play.

Tape or hold them in place several inches away from each end to keep the parts from flexing while you cut the half-lap notches on the tablesaw (see photo, below).

To finish assembling the table base, first glue and clamp the end assemblies to the remaining apron members, and then attach the gridwork. Rather than trusting glue alone to secure the half-lap joints, I like the additional security of screwing these members together from below.

Make the breadboard ends

With the top panel glued up and surfaced, you are ready to make the breadboard joints. Consider the anatomy of the breadboard ends (see drawing, p. 88) when cutting the top to length, remembering to allow for the two tongues. I make the breadboard tongues $1\frac{1}{4}$ in. long.

Now, scribe the shoulder line for the tongue around all sides. I attach the finished breadboard with screws driven through its edges into the end grain of the tabletop. However, a screw in end grain does not provide the strongest joint without some modification, so before cutting the tongue, I glue wood plugs into the end grain to give the screws some

TIP

A combination square will ensure that the gridwork remains square during glue-up.



Mark the gridwork for its lap joints. After lightly planing the whole assembly, set it in the stretcher notches and scribe its mating half-lap joints.



Notch the gridwork on the tablesaw. Insert filler blocks between the long parts of the grid to keep them from flexing during the process.

Cap off the top with breadboard ends

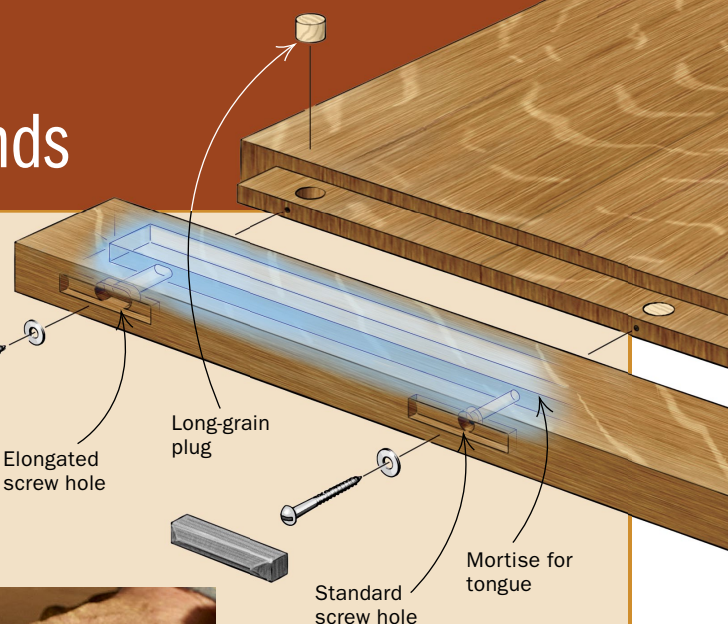
The beveled end grain echoes the overall theme, as do the beveled ebony plugs that hide the screws.



TIP Plugs driven into the ends of the tabletop provide a better grip for the screws than end grain.



Fit the ends over the tabletop tongue. Mortise the breadboards first, then cut and fit the tongues.



Cap the screw holes with ebony plugs. Elongate the two screw holes at the ends of the breadboard to allow the tabletop to shrink and expand.

long grain to bite into. While the plugs are drying, make up the breadboards. In keeping with the overall aesthetics of the piece, I purposely make the breadboards longer than the table width and bevel their end grain to match the ends of the through-tenons in the base. Be sure that the length of the breadboards is sufficient to withstand seasonal wood movement; they should remain a little longer than the width of the tabletop, even when it expands due to humidity.

Center the long mortise in the breadboard and cut it a little deeper than the 1½-in.-long tongue will be. Stop this slot about 1 in. from each end. The center of each breadboard is attached with a screw and glue, while the end screws pass through slotted holes and are used

without glue. On the opposite edge of each breadboard, where the ebony plugs will be located, make ¼-in.-deep slots, ¾ in. wide, squaring the ends with a chisel. Use a drill press to drill clearance holes through the center of these shallow slots. Elongate the outside holes to allow for wood movement.

Now, back to the tongue. Using a router guided by a straightedge to cut the tongue to its ¾ in. thickness. Trim the ends of each tongue to allow for seasonal expansion, and dry-fit the breadboard to be sure of a snug fit.

Next, insert an awl through the screw holes to mark on the tongue's end grain where the screws will enter. If you did everything right, these points will line up with the hardwood plugs in the tongue.

Remove the breadboard, drill pilot holes for the screws, add glue to the center few inches of the joint only, reattach the breadboard, and drive all of the screws.

Finally, make up some ebony (or any other dark wood) plugs to cover the slots and screw heads. After finish-sanding or scraping the top, attach it to the base. If you use white oak for this project, as I have, and you wish to darken it with ammonia fumes, see "Authentic Fumed Finish," on pp. 112-113. I finish all of my work with Tried & True linseed-oil finishes, which have a tone that warms up the cool color of fumed white oak. □

Kevin Rodel designs and builds Arts and Crafts furniture in Brunswick, Maine. To see more of his custom furniture, go to kevinrodel.com.

One design, many tables

My goal as a furniture maker always has been to develop a design vocabulary, which in turn would allow me to create a line of furniture incorporating pieces that



The coffee table and end table work well together. Both share the same design details.

work well together and seem to come from a single maker. This table design is no exception. By changing the dimensions of the stock, you can build similar tables: coffee table, end table/nightstand, sofa/hall table, or dining table. Combining these pieces in a home will unify the decor.

The pieces are similar enough to create a nice theme, but they're different enough to avoid the feeling of boring repetition.

One key difference is the tabletops: A simple inlay is enough for the top of the end table, while the dining table has a tile inlay. Of course, for these designs to work visually, the thicknesses of some elements must be adjusted appropriately.

END TABLE/ NIGHTSTAND

20 in. sq.
by 27 in. tall

Apron,
2½ in. wide

Gridwork,
1¼ in. thick

Leg, 1½ in. sq.

Arched stretcher,
3½ in. wide

Base,
17½ in. sq.

Corner,
¼ in. sq.

Strip,
⅛ in. wide

THE END TABLE GETS A SIMPLE INLAY
Breadboards would be overkill for this small tabletop. The ebony inlay echoes the ebony plugs in the other table.

SOFA/HALL TABLE

20 in. deep by 60 in.
long by 30 in. tall

Breadboard end,
3½ in. wide

Apron,
3 in. wide

Arched stretcher,
4½ in. wide

Gridwork,
1½ in. thick

Leg, 1¾ in. sq.

48 in.

DINING TABLE

42 in. deep by 72 in.
long by 30 in. tall

Apron,
3 in. wide

Breadboard
end, 4 in. wide

Arched stretcher,
5 in. wide

Gridwork,
1½ in. thick

Leg, 2¾ in. sq.

44½ in.

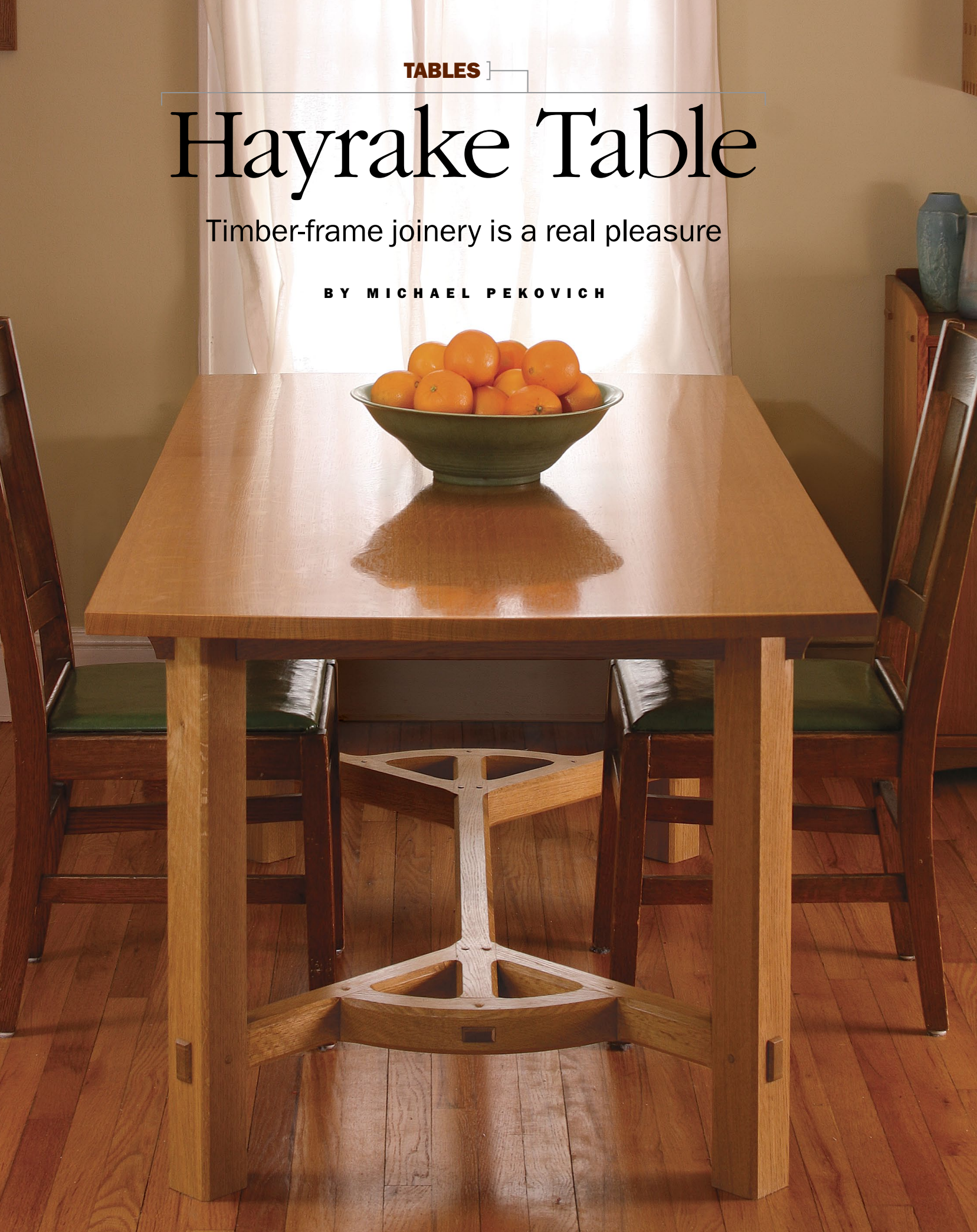
30½ in.

TABLES

Hayrake Table

Timber-frame joinery is a real pleasure

BY MICHAEL PEKOVICH



When it came time to make a new dining table, I knew I wanted it in the Arts and Crafts style, but I was also looking for a twist. For inspiration, I looked to the English countryside, the birthplace of the Arts and Crafts movement. What I found was a hayrake library table by Sidney Barnsley, one of the pioneers of English Arts and Crafts design. The table gets its name from the unique lower stretcher system, which splays out at the ends like a hayrake. I really like the table's massive timber-frame look, with its obvious through-tenons and heavy chamfers, and building it is a refreshing break from typical woodworking projects.

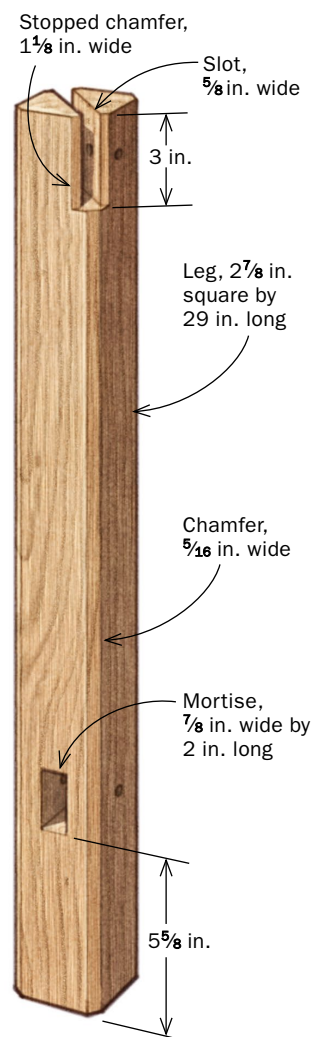
Another distinctive feature of the table, though it may not be apparent at first, is the orientation of the legs. They're at 45° instead of parallel to the edges of the tabletop. This makes the joinery to the hayrake stretcher simple—just a single through-mortise. Things get a little more interesting at the top. Each pair of legs is connected with end aprons that slot into their tops. This requires a slot cut diagonally across the top of the leg as well as a wider stopped chamfer. It looks like a tricky joint, but a bandsaw simplifies the task (see photos, this page).

How to get thick stock

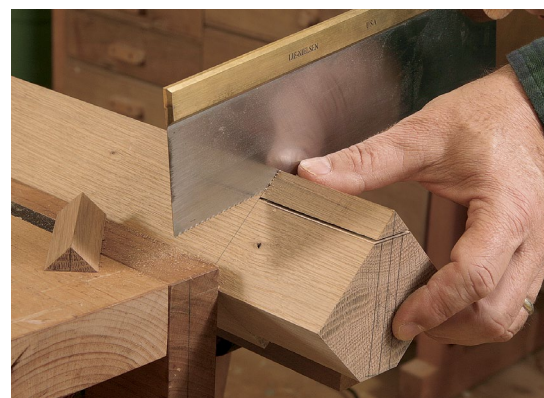
The base of this white-oak table requires 12¼ stock. If you can find it, buy riftsawn stock for straight grain lines on all the faces. If you can't find these massive

Start with the legs

The through-mortise at the bottom is standard, so we'll focus on the diagonal joinery at the top.

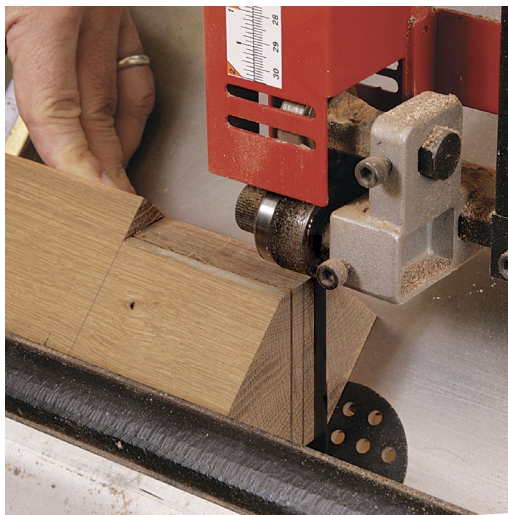


CUT THE STOPPED CHAMFER

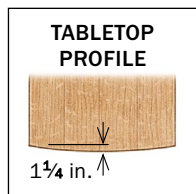


Bandsaw then handsaw. Tilt the bandsaw table to 45° and cut the flats (top). Clamp the leg in a vise and use a handsaw to cut the shoulders. Then clean up the sawn surfaces with a shoulder plane and chisel.

THEN THE SLOT



Saw, drill, chisel. With the bandsaw table still tilted to 45°, cut one side of the slot, rotate the leg, and cut the other side (left). This ensures a perfectly centered slot. Now make a 45° cradle to hold the leg, and drill a hole at the bottom of the saw cuts (center) to remove the waste. Finish up with a chisel (right).



Wedge

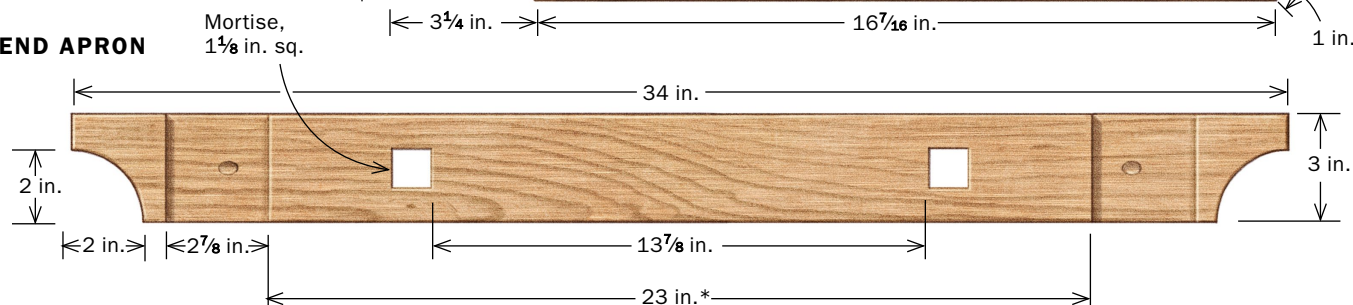
Peg, 3/8 in. dia.

ANATOMY OF A HAYRAKE TABLE

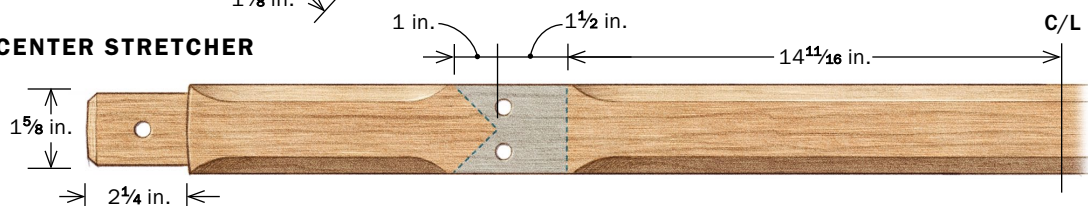
Thick stock, through-tenons, and heavy chamfers add timber-frame charm. Use riftsawn stock for the legs and stretcher to get straight grain lines on all the faces of the parts.

***Note:** On dimensions marked with an asterisk, exact lengths of parts will be determined during the construction process.

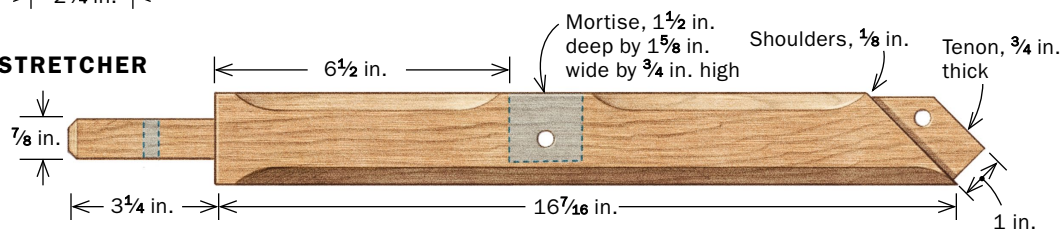
END APRON



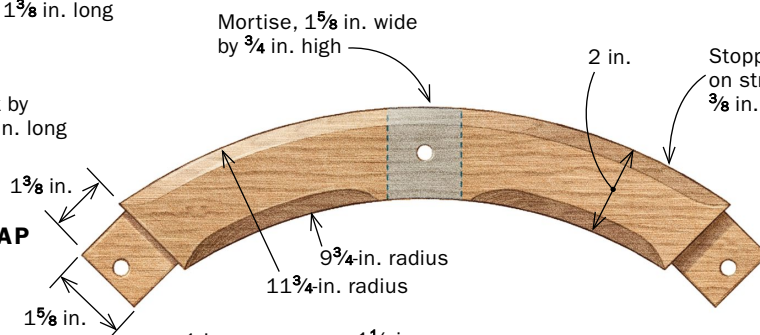
CENTER STRETCHER



Y-STRETCHER



END CAP



Tenon, 1 1/8 in. sq. by 1 3/8 in. long

Y-stretcher, 2 in. wide by 2 1/4 in. high by 20 5/16 in. long*

End cap, 2 in. wide by 2 1/4 in. high

Tenon, 3/4 in. thick by 1 5/8 in. wide by 1 3/8 in. long

Tenon, 7/8 in. thick by 2 in. wide by 3 1/4 in. long

Front and rear aprons, 1 1/8 in. thick by 3 in. wide by 57 1/2 in. long*

Center stretcher, 2 in. wide by 2 1/4 in. high by 51 1/4 in. long*

End aprons, 1 1/8 in. thick by 3 in. wide by 34 in. long

Leg, 2 7/8 in. square by 29 in. long

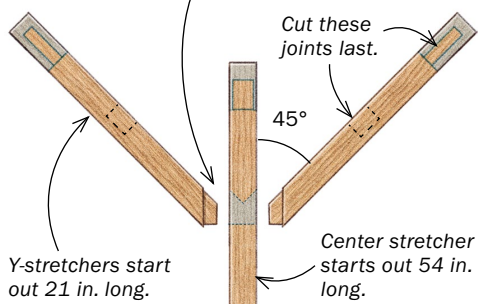
To purchase expanded plans and a complete cutlist for this table and other projects, go to FineWoodworking.com/PlanStore.

Tackle the hayrake stretcher

The stretcher array gives the table its farmhouse flair, but the angled stretchers and curved cap on each end also present the biggest joinery challenge of the project. Breaking down the construction into simple steps is the key to success.

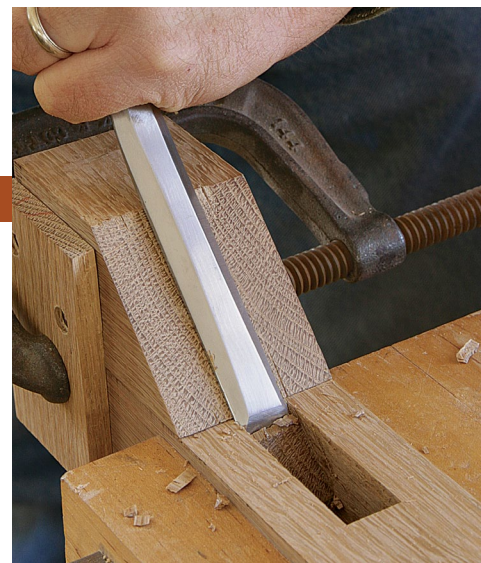
1. JOIN THE Y

Leave the center stretcher and Y-stretchers long until after cutting the joinery that connects them.



MAKE THE ANGLED MORTISES

Start by cutting a through-mortise in the center stretcher. To create the 45° angled shoulders, clamp a 45° block in place (above) to use as a guide. Chop out a bit at a time until the chisel is resting on the block (right).



planks, you can get by with 8/4. Here's how. Reduce the thickness of the hayrake stretcher parts just $\frac{1}{8}$ in., to $1\frac{7}{8}$ in., and glue up the $2\frac{7}{8}$ -in.-thick leg stock from two $1\frac{1}{2}$ -in.-thick layers. Make sure the layers are flatsawn so the glueline will be hidden in the straight grain lines on the edges. Mill all the parts to final width and thickness but leave all the stretcher pieces about 1 in. extralong at this point.

Now you can launch into the stocky joinery, walking in the footsteps of timber-framers past. The legs are the place to start. Cut out the stopped chamfer at the top of the leg, and then create the slot. When the lower mortise on the leg is complete, chamfer the corners on the tablesaw.

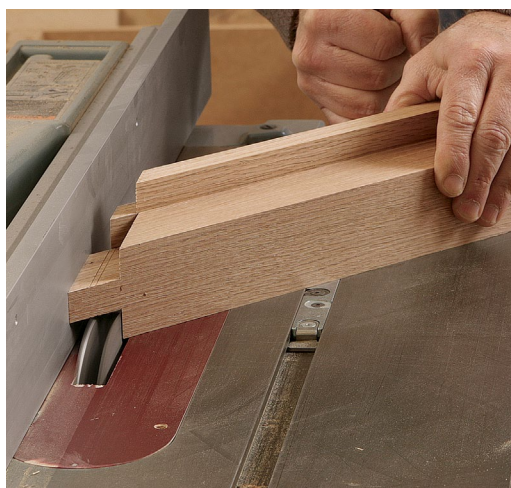
Rake section is easier than it looks

The lower stretcher system is where the fun begins. The curved and angled parts look daunting, but if you tackle the joinery one



NOW THE ANGLED TENONS

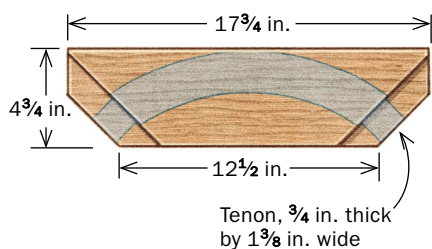
Leave the stretchers long and miter one end using an angle guide on a tablesaw sled (above). Install a dado blade and adjust your miter gauge so the end of the piece is flush with the rip fence, and cut the tenon (right). You'll have to readjust the gauge for the opposite face, but the rip fence can stay put. Last, trim a triangle off the end, to fit the angled mortise (far right). Once the angled end is done, cut the stretcher to length, tenon the opposite end, and finally cut the mortise for the end cap.



Hayrake stretcher *continued*

2. END CAP: CUT THE TENONS BEFORE THE CURVES

The end cap starts as a block with mitered ends. All of the joinery is cut at 45° angles, which the tablesaw and bandsaw handle easily.



More angled shoulders. Start by mitering the ends of the end cap on the tablesaw using the same sled that you used for the Y-stretcher ends. This will ensure an exact angle match between all of the joints. Then cut the tenon cheeks with a dado blade as before (right).



step at a time, it's really not that tough. The curved end cap actually simplifies the joinery. It allows you to cut mortises in the angled Y-stretchers at 90° instead of 45°.

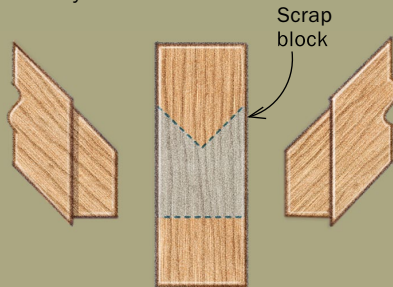
The first task is to join the Y-stretchers to the center stretcher. The ends eventually will be tenoned to fit the end caps, but leave the stretcher long for now, taking all measurements from its midpoint. Start by cutting the through-mortises, noting that one shoulder on each side is cut at 45° to receive the diagonal stretchers. Cut a simple through-mortise, then chop the angled shoulder with a chisel as shown on p. 93.

With the mortises done, tenon the Y-stretchers as shown on p. 93. Finally, use a backsaw to cut the tenon ends and clean them up with a block plane.

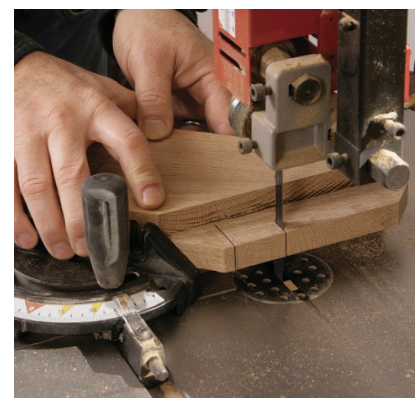
With the angled tenons done, it's quick work to cut the stretchers to length and

SCRAP BLOCK IS THE SECRET

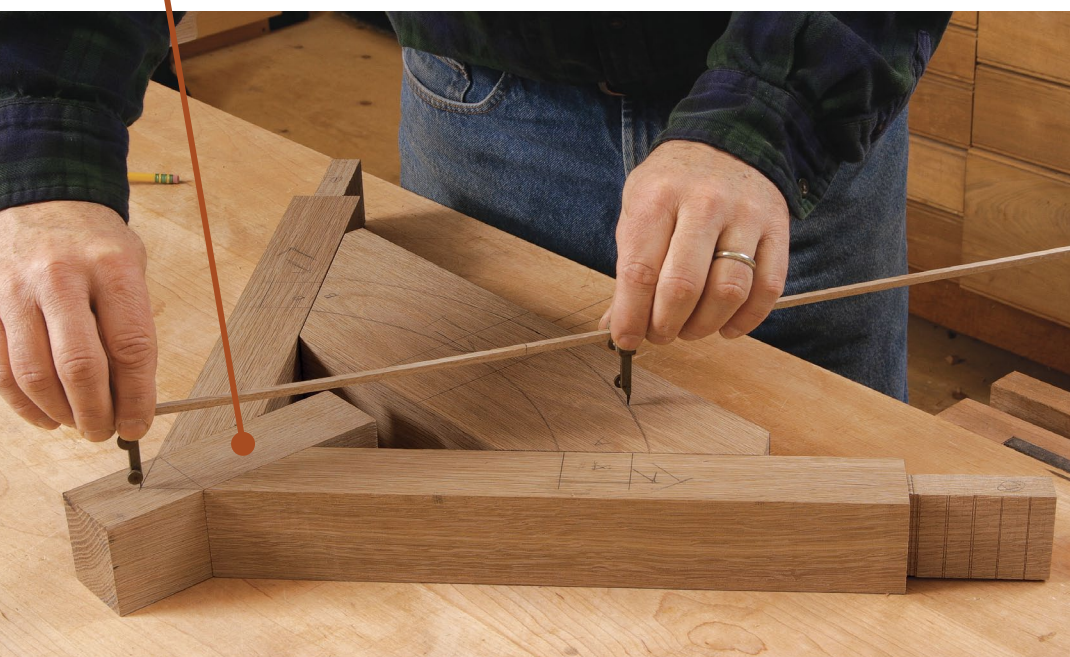
A mortised block allows you to assemble the Y-stretchers and mark the end-cap tenons and curve without the long center stretcher getting in the way.



Lay out the tenons. Dry-fit the Y-stretchers to a mortised scrap block. Then place the end cap over the stretchers, sliding it forward until its shoulders are snug. Use a square to mark the mortise locations on the ends of the tenons.



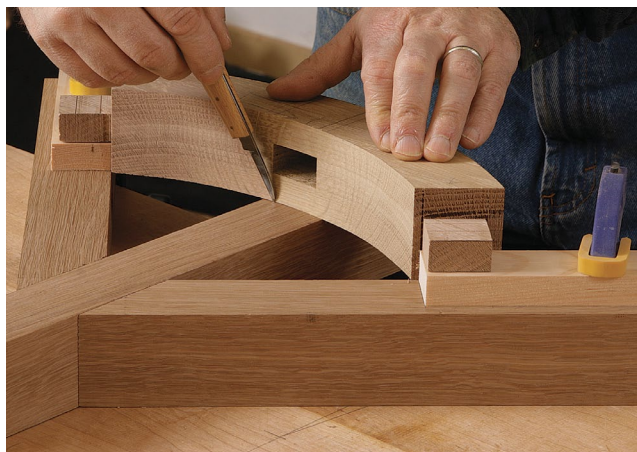
Cut the tenon ends on the bandsaw. Use a miter gauge to guide the workpiece, flipping it backward in its slot.



Now cut the curve. Dry-fit the end cap to the assembly and lay out its curves (left). After sawing out the center of the end cap so you can mortise for the center stretcher tenon, cut the curves on the bandsaw (above).

3. CENTER STRETCHER IS THE FINAL PIECE

With the end cap complete, you can use it to scribe the shoulders on the center rail and cut it to its final length. Leaving the center rail long until now is the key to a gap-free assembly.



Transfer the curve. To scribe the curved tenon shoulders, dry-fit the stretchers and clamp on blocks even with the end-cap mortises (left). This elevates the end cap and lets you align it with the mortises so you can scribe the shoulder accurately on the center rail (right). To mark the bottom, extend the scribe marks down the rail sides, flip the rail and align the end cap to the marks, and scribe.



Cut a square shoulder, then pare to fit. Cut the tenon with a dado blade, stopping short of the curved shoulder. Then use a chisel to pare to the scribe line.

tenon the ends to fit the leg mortises. While you're at it, bandsaw kerfs in the tenons for wedges. The last task is to cut the mortises that the end cap goes into.

How to handle the curved end cap

The final component of the hayrake stretcher is the end cap itself. Its construction is pretty simple because the joinery is cut while the stock is square.

Miter the ends of the end cap on the tablesaw, then tenon the ends. Set the end cap against a miter gauge and adjust the angle until the mitered end is flush with the rip fence, then cut the cheeks with a dado blade. Now locate the tenon ends using a scrap block as shown on the opposite page.

Next, you'll mortise for the center stretcher and cut the end cap to shape. Lay out the curves as shown, but bandsaw out some of the waste on the inside face to make mortising easier. Cut the curved profile on the bandsaw and clean up with a block plane and spokeshave. A spindle sander or sanding drum mounted in a drill press also works well for the inside face. With the end cap shaped, tenon the center stretcher and cut it to length (see photos above).

Drawbore pins replace clamps

It would be difficult to get clamps on this odd-shaped stretcher assembly for gluing. So, I created a self-clamping joint using drawbore pegs. It looks like a simple pegged joint, but the holes in the parts



All together now. All of the pieces come together at once, bit by bit. When fine-tuning the fit, keep in mind that the top face of the stretcher is most critical. Feel free to flip it to put the best side up.

are slightly offset so that when the peg is driven in, it pulls the joint together tightly. I also added wedges in most of the through-tenons. They add extra strength, and also close any visible gaps. I don't angle the mortises, but just kerf the tenons, drive in thin wedges, and trim them flush.

Smart methods for thick chamfers

The last task before assembly is to chamfer the parts. These chamfers were originally made by hand with a drawknife.

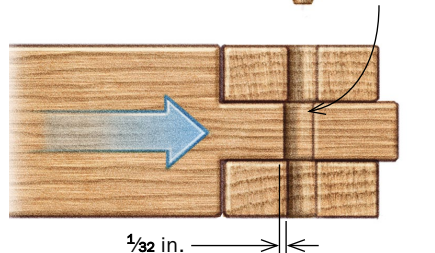
I wanted to keep the handmade look, but I sped things up a bit by using a router for most of the work. The trick is to rout the chamfer, stop short of the end lines, and then use a chisel to finish it. This way, the chamfer flows smoothly from part to part.

I find it easiest to dry-fit the parts and rout the chamfers as a unit. I use a light touch and rout in the climb-cut direction to avoid tearout. As long as you don't take too heavy a pass, the router won't get away from you. Stay well away from intersections.

Offset pins take the place of clamps

The angled and curved parts of the hayrake stretcher are nearly impossible to clamp for glue-up. Instead, drawbore pegs driven into intentionally misaligned holes pull the joints together tightly. It's a time-tested method for both assembling and reinforcing joinery.

By offsetting the tenon peg holes slightly toward the shoulder, the mortised joint will be drawn tight as the peg is driven in.



Drill through the mortised parts. Insert a scrap into the mortise to prevent blowout inside.



1

Mark and drill the tenon. With the holes drilled, dry-fit the parts again and insert the drill bit into each peg hole, giving it a twist to mark the center point (1). Disassemble the parts and mark a new center point $\frac{1}{32}$ in. toward the shoulder of the tenon from the drill-bit mark (2). Insert a piece of scrap below the tenon to prevent blowout when drilling (3).



VIDEO WORKSHOP

Watch Pekovich build this table from start to finish in a members-only Video workshop series.



2



3

After routing the top and bottom faces of the stretcher assembly, mark the joint intersections and disassemble the parts. Use a chisel to complete the chamfer. Small irregularities are a good thing, but avoid chiseling deeper than the routed chamfer.

Get ready for glue-up

I make my own pegs, ripping stock to $\frac{3}{8}$ in. square and then pounding it through a dowel plate (lie-nielsen.com). I cut the pegs long and taper the leading end with a pencil sharpener so that it can clear the offset holes. I lightly chamfer the top of the pegs because they are left slightly proud of the surface. To ensure a consistent peg height, I drill a shallow hole in the end grain of a scrap block and position it over the peg when driving it in.

Assembly begins by gluing up the hayrake stretcher (see photos, opposite). When both ends are assembled, flip the stretcher over and trim the bottoms of the pegs flush. With the stretcher glued up, dry-fit the legs and measure for the upper stretcher frame. Because of all the odd angles, it's better to take dimensions from the workpiece rather than a set of plans. Start

Assemble from the stretcher up



Glue up the hayrake stretcher. Wipe a thin coat of shellac on the end grain of the through-tenons to prevent glue from soaking in. Let it dry, then glue and assemble the parts one end at a time. Start the pegs in the hole and gradually drive them in until the joints are fully seated. Then drive them all the way home.



Assemble the rest of the base. Start by gluing the legs to the hayrake stretcher, but don't drive in the wedges just yet. Before you do that, it's important to install the upper aprons to help square up the entire assembly. Then drive wedges into the through-tenons in the legs, and peg the upper frame joints.

by measuring between the legs to locate the bridle joints on the end aprons. Cut the bridle on the tablesaw with a dado blade. Then cut the corbel profiles on the ends and mortise for the front and rear aprons. Fit the end aprons in place and measure between them to determine the shoulder-to-shoulder length of the long aprons.

Tenon the long aprons, then rout slots for the wooden buttons that secure the top. Finally, glue up the apron frame and drive wedges into its through-tenons. Assemble the rest of the base as shown.

Keep the color light

English Arts and Crafts furniture tends to be lighter in color than Stickley-style furniture. So, even though I fumed the white oak with ammonia, I didn't fume it as long as I normally do, just a couple of hours. I also used the weaker janitorial-strength ammonia instead of the industrial-strength. The result was a nice golden tone. I warmed it up further by wiping on a thin coat of garnet shellac before finishing with Waterlox, a tung-oil-based wiping varnish. □

Michael Pekovich is a furniture maker, instructor, and Fine Woodworking's executive art director.



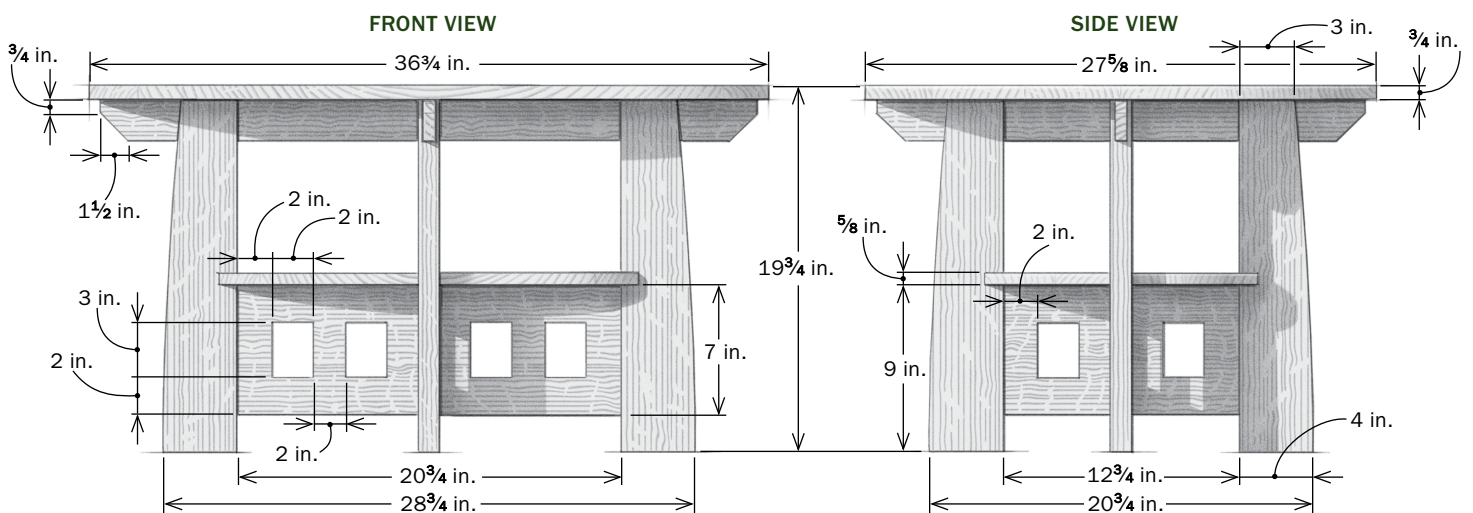
The top is attached with buttons. The tabletop won't be attached to the base until after finishing, but Pekovich pre-drills for the buttons now.

Limbert-Style Table

BY
GREGORY
PAOLINI



Learn to cut perfect ellipses and tight bridle joints



There are many well-known designers of Arts and Crafts furniture, like the Stickleys and the Greenes. But a lesser-known designer, Charles Limbert, has always held a special appeal for me. I'm especially fond of his oval library table. That's why I jumped at the chance to design and make a scaled-down version, to be used as a coffee table.

I've preserved the elliptical top and shelf, the gently curved legs, the decorative piercings in the stretchers, and Limbert's choice of wood—quartersawn white oak. I kept the overall proportions as well, so the parts come together just as harmoniously as they do in the original table.

A variety of joints are used. Bridle joints hold the legs and aprons together, and a half-lap joint is used where the stretchers and aprons intersect. The legs and shelf are notched where they meet, and slip tenons join the stretchers to the legs. Some of those joints can be tricky, but I'll show you some techniques to help you get flawless results. I'll also show you

STRENGTH AND BEAUTY

An elliptical top, arched legs, and decorative piercings add grace and beauty. Slip tenons and bridle joints ensure decades of service.

Top, $\frac{3}{4}$ in. thick by $27\frac{5}{8}$ in. wide by $36\frac{3}{4}$ in. long

Apron, $\frac{5}{8}$ in. thick by $2\frac{1}{4}$ in. wide by $35\frac{1}{2}$ in. long

Slot, $\frac{5}{8}$ in. wide by $1\frac{1}{8}$ in. tall

Apron, $\frac{5}{8}$ in. thick by $2\frac{1}{4}$ in. wide by $26\frac{3}{8}$ in. long

Notch, $1\frac{1}{8}$ in. wide by $\frac{1}{2}$ in. deep

Slot, $\frac{5}{8}$ in. wide by $2\frac{1}{4}$ in. tall

Shelf, $\frac{5}{8}$ in. thick by $14\frac{3}{4}$ in. wide by $22\frac{3}{4}$ in. long

Shallow dado, $\frac{1}{16}$ in. deep

Slot, $\frac{5}{8}$ in. wide by $3\frac{1}{2}$ in. tall

Stretcher, $\frac{5}{8}$ in. thick by 7 in. wide by $12\frac{3}{4}$ in. long

Slot, $\frac{1}{2}$ in. wide by $3\frac{1}{2}$ in. tall

Slip tenon, $\frac{1}{4}$ in. thick by 3 in. wide by $1\frac{1}{2}$ in. long

Slip tenon, $\frac{1}{4}$ in. thick by $1\frac{3}{4}$ in. wide by $1\frac{1}{2}$ in. long

Leg, $1\frac{1}{8}$ in. thick by 4 in. wide by 19 in. tall

Stretcher, $\frac{5}{8}$ in. thick by 7 in. wide by $20\frac{3}{4}$ in. long



To purchase expanded plans and a complete cutlist for this table and other projects, go to FineWoodworking.com/PlanStore.

TOP AND SHELF

HOW TO MAKE A PERFECT ELLIPSE

Both the top and shelf are elliptical. You can use a simple nail-and-string technique to make patterns for these. Each pattern does double duty. First, it lays out a line to follow at the bandsaw. And after the shape has been roughed out, the pattern serves as a template for a bushing-guided router.

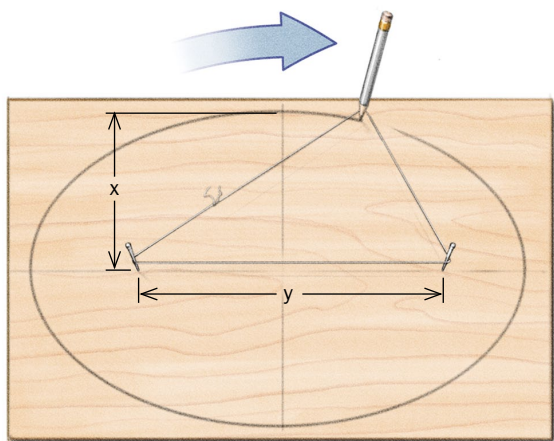
Nails and string. Driven into the focal points, nails guide the string loop, which in turn guides the pencil along the perimeter of an ellipse.



KEY DIMENSIONS

Here's how to lay out the nails and size the string for each ellipse:

Top: $x = 13\frac{13}{16}$, $y = 24\frac{1}{4}$ Shelf: $x = 7\frac{3}{8}$, $y = 17\frac{5}{16}$



Simple, accurate ellipses. Size the string so the pencil reaches the x dimension (see diagram at left). Then keep the string taut as you trace an ellipse.



Cut the pattern at the bandsaw. Cut just outside the line, so there is less waste to remove when smoothing the curves.

how to draw an accurate ellipse to take the mystery out of the top and shelf.

Pattern-rout the top and shelf

Begin by gluing up panels for the top and shelf and milling all of the parts. Then make full-size patterns for them. You'll need to draw two ellipses, which is easy to do with string, a pencil, and two small nails. To begin, draw the ellipse's axes on a piece of plywood 1 in. longer and wider than the ellipse and mark its length and width. Next, locate the foci, drive a nail into both foci, and tie a loop of string around them. When you stretch out the loop, it should just reach the side of the ellipse (see drawing, above left). Put a pencil inside the loop and draw, keeping the string taut.

With both ellipses drawn, cut them out at the bandsaw. Use 100-grit (CAMD) sandpaper, glued to a thin strip of wood, to remove the sawmarks and fair the curves. Then trace the patterns on the panels for the top and shelf. Before cutting out the top and shelf, cut the notches in the shelf that join it to the legs. This is far easier to do now, when the sides and ends are square, than after cutting



Notch the shelf before cutting the ellipse. Because its width is critical, cut each side of the notch first and then remove the middle. Use stop blocks on your crosscut sled to ensure that notches on opposite sides will line up.

the shelf into an ellipse. Lay out the notches by placing the legs on the shelf and transferring their thickness onto it. Then cut them at the tablesaw, using a crosscut sled. The width of the notches is critical, so cut the notch sides first and then nibble away the inside. Cut the notches a bit tight and fit them with a chisel later.

After all four notches have been cut, head to the bandsaw and cut out the elliptical top and shelf. The top is heavy and unwieldy, so cut away the bulk of each corner first. Then make a second pass close to the line. I use a flush-trimming bit to rout the top and shelf flush to their patterns (right).

Join legs and aprons

With the top and shelf done, you can get started on the joinery. The stretchers are joined to the legs with slip tenons. Because the stretchers are 7 in. wide and could expand as much as $\frac{1}{16}$ in., break the mortise into two. The tenon will fit tight in the upper mortise but loose in the lower one, forcing the stretcher's movement downward and away from the shelf. I make the slip tenons by milling some white oak to the correct thickness and width, rounding over the edges at the router table, and then crosscutting the tenons to length. Now cut a notch in each leg. Paired with the notches in the shelf, they form a strong joint that

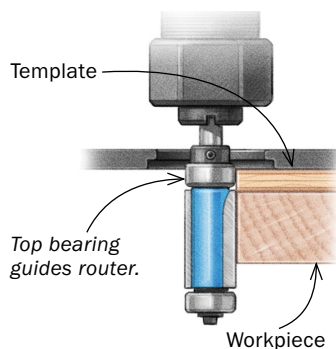


Cut the top and shelf at the bandsaw. Use the patterns to trace the shapes. When bandsawing, leave about $\frac{1}{8}$ in. of waste for the next step: routing the edges flush to your template.

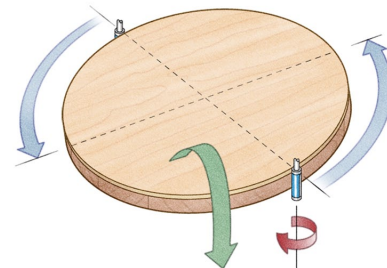


Always rout downhill. If you try to rout the whole circle in one pass, you'll tear out the grain in some areas. So you'll need to flip the workpiece. Use a double-bearing, flush-trimming bit so there's no need to change bits or re-attach the template on the other side. Just adjust the bit height to use the other bearing.

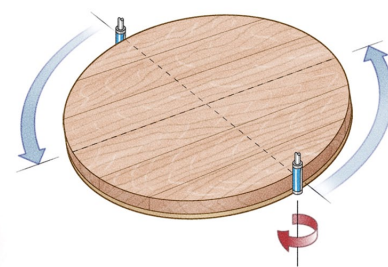
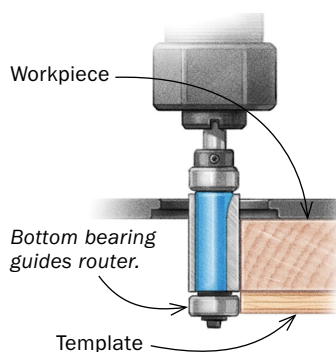
1. ROUT WITH TEMPLATE UP



Rout downhill to eliminate tearout. To avoid climb cuts, which can be dangerous, you'll only be able to trim two of the ellipse's quarters.



2. FLIP THE WORKPIECE



With template and workpiece flipped, the two remaining quarters can now be trimmed cleanly.

holds the shelf in place and prevents the base from twisting or racking. Cut them just as you did the notches in the shelf. While you're at the tablesaw, go ahead and cut the slot for the bridle joint into the top of each leg. I use a tenoning jig, starting at the center of the slot and working outward. As you get close to the sides of the slot, use the apron to test the fit.

A half-lap joint is used to connect the aprons where they intersect. For this joint, I cut a slot halfway through each apron. Unlike

BASE

A LESSON IN BRIDLE JOINTS AND SLIP TENONS

Other than the mortises and slip tenons holding the stretchers to the legs, every joint in this table is some type of bridle joint or half-lap joint. A router makes quick work of the mortises, and a tablesaw, equipped with a standard combination blade, is the right tool for the bridle joints and half-laps.



TIP

FENCE AND GUIDE BLOCK KEEP THE MORTISE ON LINE



No wiggle room. It will be straight and parallel to the sides because the fence and guide block prevent the router from wandering.

Router mortises in the legs. Use a spiral bit that matches the mortise's width, and use a fence on both sides of the router: Set up the router's edge guide and then clamp on a simple shopmade fence. The mating mortises in the stretchers are done the same way.

the notches in the legs and shelf, which were cut from the sides in, cut this joint from the center out. That will keep the joint centered on the aprons.

To complete the legs, cut the curve on the outside edge. I made a pattern out of 1/4-in.-thick plywood and traced it on the legs. Save the offcuts to use as cauls during glue-up.

Slot and rout the stretchers

As with the aprons, a half-lap joint is used where the stretchers intersect. However, cut a shallow dado on both sides of the shorter stretcher to conceal the joint and reinforce it against racking.

LEGS

Bridle joints must be centered.

Using a tenoning jig for the slot, cut in the middle of the leg first. Then flip the leg side to side to make the subsequent cuts. As you work out to the sides of the joint, it remains centered on the leg.

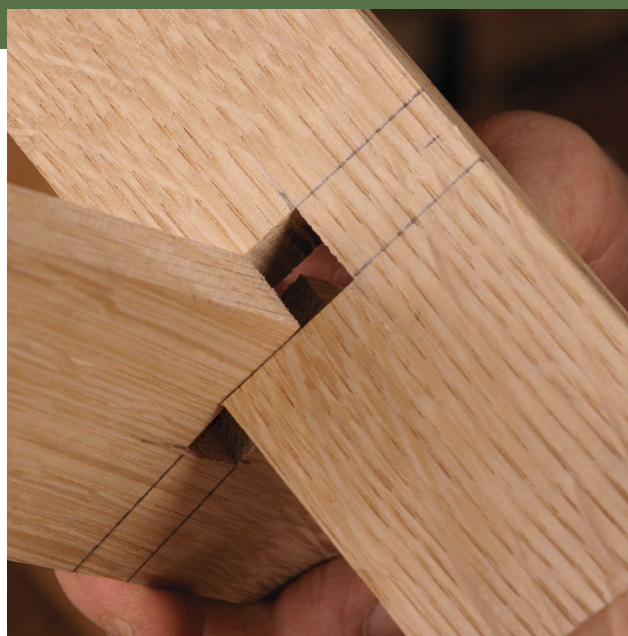


Cut the curve last. After tracing the shape onto the leg, cut away the waste on the bandsaw, and then clean up the saw marks with a handplane or sander.

APRONS



Slot the aprons and test the fit. After marking the joint, cut each side first and then nibble away the waste one pass at a time (above). Cut the slots a bit tight at first, and then sneak up on a tight joint, checking the fit (right) after each trimming cut.



After cutting the dados, raise the blade and cut a slot on the bottom edge of the stretcher. You won't be able to get the full depth with a 10-in. sawblade, so cut as deep as you can and finish up the slot with a handsaw and chisel. With the short stretcher done, cut the slot in the longer stretcher.

Now it's time to rout mortises in the ends of the stretchers to accept the slip tenons that join them to the legs. Do this the same way you routed the mortises in the legs, with a router and spiral bit.

After routing the mortises, use a template, plunge router, guide bushing, and spiral bit to rout the decorative piercings in the stretchers. Make the template from a piece of plywood and lay out the piercing on it, taking the bushing's offset into account. Head to the router table and cut out the opening. Attach a fence

to the bottom side, lay out the location of the piercings on the stretchers, and you're ready to rout the openings.

Hog out most of the waste with a Forstner bit at the drill press. With most of the waste removed, clamp the template to the stretcher and the stretcher to the bench. Make a clockwise pass around the opening, increase the bit's depth, and make a second pass. Make a third pass to complete the piercing.

Dry-fit, stain, and glue up

This little table is kind of like a puzzle, in that there are pieces that interlock and must be assembled in a particular order for the table to come together. Dry-fitting the table will help you not only learn and get comfortable with that puzzle, but also find any joints that need to be tweaked.

STRETCHERS



Cut the dado with a standard-kerf blade. That way you can sneak up on the final width, testing how well the long stretcher fits into it as you go.



Start the slot at the tablesaw. With the blade as high as possible, cut the sides to line up with the dado, and nibble away the waste in between.



Go deeper with a handsaw. Follow the sides of the slot with the saw and then remove the rest of the waste with a chisel.

APRONS

USE A ROUTER TEMPLATE FOR CLEAN CUTOUTS

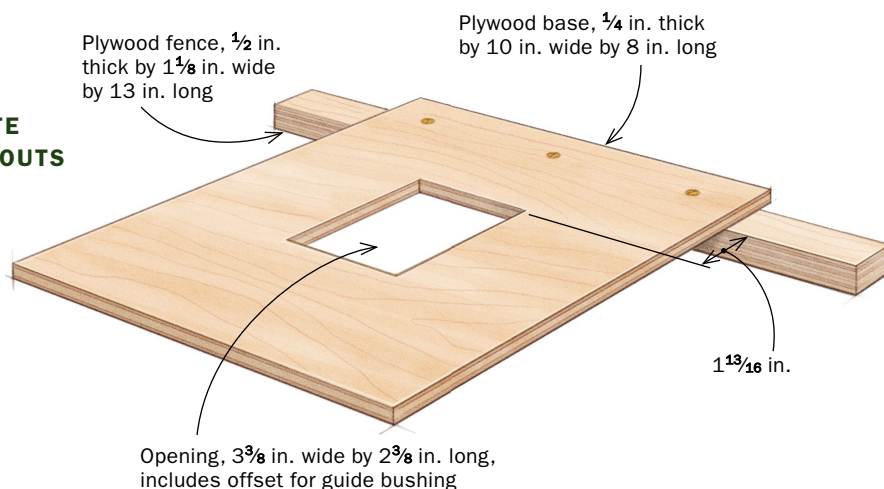
There are six rectangular piercings. Use a router and template to make them all the same. A spiral bit is best because its shearing action will cut the end grain areas smoothly.

Make the template at the router table.

Paolini routs one side of the opening at a time, lowering the template onto a $\frac{1}{4}$ -in.-dia. spiral bit. He stops the last cut about $\frac{1}{2}$ in. before the end and finishes it with a handsaw and sandpaper.



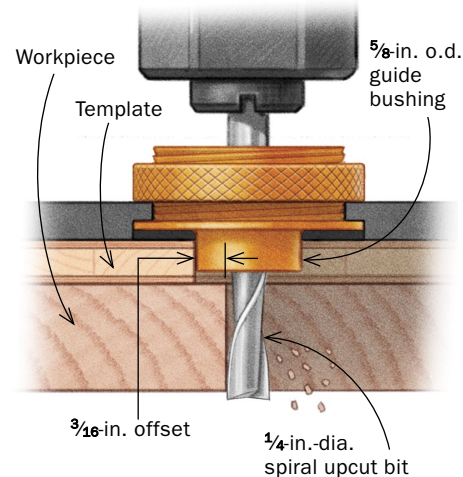
TEMPLATE FOR CUTOUTS



Clamp the template in place. Remove most of the waste in the cutout using a Forstner bit. Then clamp the template to the stretcher. Place scrap beneath the stretcher to protect your bench.



Trim flush in three passes. Set the bit depth to $\frac{1}{4}$ in. for the first pass, $\frac{1}{2}$ in. for the second, and $\frac{5}{8}$ in. on the last one.



Begin by putting the stretchers together and adding one leg. Fit the shelf into that leg and add the opposite leg. Then add the last two legs. Now add the aprons and put the top in place. Before you take the table apart, use a pencil to mark the joint where the aprons intersect and where they pass through the legs. The marks will remind you not to sand those areas, which would cause the joints to become loose. Also, as you take off the legs, number the inside of the notches—I use a felt-tipped marker—and number the corresponding legs to match. Numbering the aprons on the top edge also is a good idea.

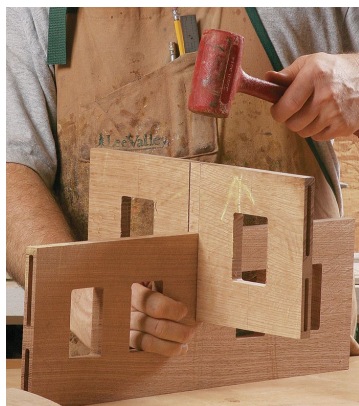
After disassembling the table, break the edges with a block plane and then use a random-orbit sander to sand all of the parts up to P180-grit. Do not sand the areas you marked earlier: the half-lap joint where the aprons intersect and the area where the aprons pass through the bridge joint in the legs. Next, wipe all of the parts with a damp rag to raise the grain, then use a sanding block and P220-grit paper to remove the raised grain.

I finish the table before the glue-up. The advantage of finishing first is that any glue squeeze-out will not soak into the grain and become a prob-

ASSEMBLY

A DRY RUN SORTS OUT SURPRISES

The table's base is a three-dimensional puzzle, and you don't want to be figuring it out with glue on the joints. So do a dry run to get comfortable with the steps.



Start with the stretchers. As the core of the table, these should fit snugly and squarely.



Fit the slip tenons. The top should be a close fit, but leave the bottom tenon a bit narrow to allow for wood movement.



The shelf is next. Lock it in place with opposing legs, then add the last two. If you assemble the legs first, you won't be able to get the shelf in place.

lem when you try to finish over it. And squeeze-out doesn't stick to the finish, so it just peels away without fuss. To stain the table, I used the same finishing recipe that I used on my bow-arm Morris chair (see p. 56). Tape off any area where glue will be applied, like the bridle and half-lap joints on the aprons, and use caution when staining around them and the slots.

Now you're ready for the glue. You can do it in stages or, if you're feeling lucky, all at once. Repeat the assembly order from the dry-fitting and use the leg cutoffs as cauls for the clamps. After the glue is dry, peel away any squeeze-out. Then rub out the finish with 0000 steel wool and paste wax, and buff the wax with a shoe-shine cloth or brush. Finally, attach the top with four screws, driving through the aprons and into the top. Slot the holes on the short apron to allow for wood movement. □

Gregory Paolini makes Arts and Crafts style furniture in Waynesville, N.C.



Aprons are the last piece to the puzzle. They hold the legs in place and make the base rigid.





Finishing Touches

108 Safe and Simple Arts and Crafts Finish

112 Authentic Fumed Finish

114 Leaded Glass



Safe and Simple Arts and Crafts Finish

Pigment stains
and dyes reproduce
a fumed finish
without the ammonia

BY JEFF JEWITT

The Arts and Crafts furniture that became the rage in this country in the early 20th century was a reaction against the ornate and excessive style of Victorian designs. Several companies, such as Roycroft, Limbert, and Stickley, all produced this style of furniture. Gustav Stickley is considered by many as the leader and originator of this style of furniture in America, and he had a particular fondness for quartersawn white oak. He worked tirelessly to perfect the finishing process, even after his company folded, and he clearly favored results that emphasize the subtle character of the oak with a low-luster, “in-the-wood” type of finish.

Stickley and others used a method of coloring oak in which the wood was exposed to ammonia fumes in an airtight chamber. The method effectively colored the hard, glassy surface of the ray-fleck patterns as well as the rest of the wood, establishing an even tone throughout the furniture. Fuming isn't that hard to do, but there are drawbacks, not the least of which is that ammonia is a dangerous chemical.



STEP ONE A DYE STAIN MIMICS FUMING



Prep work before the color goes on. When using a water-based dye stain, it's best to raise the grain with a coat of clean, distilled water. After that dries, lightly sand the raised grain on all of the wood that will be stained.

Ammonia produces color by reacting with tannic acid in the wood. The color can vary widely in boards from different trees, and the lighter sapwood (often difficult to spot on white oak) will not react to the ammonia. Also, the strength of the ammonia, the length of exposure, and the amount of tannic acid in the wood are all variables that make the process difficult to control.

Ammonia produces a cool brown tone—color that is devoid of orange or red. Stickley and other manufacturers sometimes corrected this initial fumed color by using warmer tones of dyes or pigment stains. Reading about those finishing practices, it occurred to me to try another approach—to eliminate the fuming process altogether. And I have found that I can finish white oak to look as though it were fumed. I get great results using only water-based dye stain, store-bought oil-based pigment stain, and a clear topcoat such as lacquer or shellac. I prefer this method to fuming because it's less toxic and dangerous, and it gives me more control over the final color.

When finishing quartersawn oak, proper selection of wood for grain, texture, and color is of the utmost importance. After lightly planing the rough stock, choose boards to make up panels very carefully. To get a better read on the grain patterns, you can wet the wood with distilled water. (Regular tap water can contain dissolved



A light dye stains it all—even the ray flecks. This washcoat of a light brown dye brings the color of different woods closer together, imparting an even tone to all. Work fast when applying dye stain. Flood it on and wipe it off quickly. Small pieces get dunked into the dye and wiped immediately.



STEP TWO A PIGMENT STAIN POPS THE RAYS



A darker pigment stain adds color by filling the pores. Oil-based pigment stains contain particles that lodge in the open grain and stay behind as color after the excess stain has been wiped clean. Jewitt uses oil-soaked rags and brushes to apply this stain and wipes it clean in two stages.



iron salts that react with the tannin to produce gray stains that will discolor the final finish.) After gluing up panels, sand them all to 100- or 120-grit and then do the shaping and joinery. After dry-fitting, sand all of the parts up to 180-grit and raise the grain with distilled water. When the wood has dried, hand-sand the raised grain with 180-grit paper and remove all of the dust from the pores with a brush, a vacuum, or a blast of compressed air.

With most Arts and Crafts or Mission furniture, you can do most of the coloring and initial sealing before the final assembly. It's a great technique if you have mostly flat components like those on the dictionary stand shown on these pages. The keyed through-tenons on this piece hold this project together, so it was a cinch to prefinish. On pieces that you must glue together, mask off all of the glue surfaces and plug open mortises with scraps of wood.

Quartersawn white oak doesn't blotch, and the open grain and glassy ray fleck provide either subtle or rich contrasts, depending on the type of colorant used. Dye stains add color to the ray flecks; pigment stains don't. Water-soluble dyes are a terrific way to imitate the effect of fuming. You can usually nail the exact color you want by starting with some basic brown colors on scraps and tweaking them with primary dye colors. This initial dye can range anywhere from a light tan to a dark reddish brown. The only way to tell if the color is right is to experiment on scraps and carry the finish all the way to the end.

To reach the color you want, use a systematic approach for mixing the dyes. Start with the manufacturer's suggested mix of dye to solvent (such as 1 oz. dye to 1 qt. water), what I call the master mix, and apply the dye to a piece of scrap. The color of the wood when it's wet is pretty much the color it will be after a clear finish has been applied. If the dye is the right shade but too dark, take one part of the master mix and add one more part of water. Then try that on a piece and see if you're closer. If it's still too dark, continue to dilute it.

When the approximate shade and intensity are right, use master stock solutions of primary colors (made from the manufacturer's suggested ratios) to tweak the dye color to what you want. If the color is almost there but not red enough, put 1 oz. of the master mix in a new container and then add ¼ oz. of red at a time until the color is right. If the color is too red, do the same with green. Orange, yellow, and black can be used in the same way, but I usually get what I'm after by tweaking brown with either red or green. When tweaking colors, keep a record for each sample.

When you have the color you want, mix the amount of stain you'll need for the job. Figure a quantity of 1 qt. of dye for every 100 sq. ft. of material. This amount works for stain applied by hand, but figure more for the additional waste if you intend to spray it on. You can apply dye stain by just about any method—sponge, rag, brush, or spray. Whichever you use, apply the dye liberally to the entire surface you're working on and blot up the excess quickly. When it's dry, lightly scuff the surface with a gray synthetic abrasive pad to bring down any raised grain. Don't use sandpaper because it will cut through the dyed surface and remove the color.

You can stop adding color at this dyed stage if all you want is a subtle surface color and less pronounced grain, and move straight to a clear topcoat finish. But I prefer to take it another step for the added effects you can get with a pigment stain.

An oil-based pigment stain applied over a dye stain is a good way to highlight the grain and "pop" the ray fleck because the pigments fill in the crevices of the open grain without adding color to the harder, smooth surface of the ray flecks. Dark pigment stains applied over lighter dye stains



How you apply it doesn't matter, but what it looks like does matter. Whether sprayed, brushed, or padded on with a rag, you can make an Arts and Crafts finish work by using almost any clear film finish, as long as you steer away from glossy sheens. A dead flat, or at most a satin sheen, will work best.

are particularly effective when using this technique. Choose a pigment stain that contains Gilsonite, the trademarked name for asphaltum, which is essentially tar. You can find Gilsonite in many wood-tone stains such as McCloskey's stock maple and walnut colors and Watco's dark and light walnut colors.

After the stain has dried, add a topcoat to it, which will darken the color slightly and add some depth to the piece. To check whether the stain is dry enough for a topcoat, wipe the stained surface with a clean white cloth. If any stain comes off, wait

longer. When no more stain comes off, you can safely apply just about any topcoat—lacquer, shellac, or varnish—with the exception of water-based finishes.

Most Arts and Crafts or Mission furniture looks better with a fairly thin topcoat, and a satin or matte sheen is preferable to gloss. Rub out any glossy sheen with 0000 steel wool. When the finish is dry, the piece can be waxed, but use a dark-colored wax over a dark stain. □

Jeff Jewitt writes frequently about finishing topics for Fine Woodworking.

Vary the look with different stains

Different stain combinations will significantly alter the look of a piece of furniture.

These samples were prepared with three colors of dye stain (TransTint). The first two were then colored with a coat of dark walnut stain (Minwax); the third was colored with a coat of jet-black mahogany pigment stain (Bartley).



DYE STAIN
Light oak
STAIN
Dark walnut



DYE STAIN
Reddish brown
STAIN
Dark walnut



DYE STAIN
Dark Mission brown
PIGMENT STAIN
Jet mahogany

Authentic Fumed Finish

Safe, straightforward method with consistent results

BY KELLY J. DUNTON

Having been faithful to Gustav Stickley's design ideas and materials when building the side table shown above, it seemed only right to use his finishing method. The technique that Stickley employed was to expose oak pieces to ammonia fumes. This gave the furniture its distinctive brown appearance and highlighted the rays of quartersawn oak.

This method has several advantages over dyeing or staining. With open-pored woods, pigment stains will collect in the pores, exaggerating the grain structure; dyes avoid this problem but are not lightfast; and both are labor-intensive to apply. With fuming, time and nature do all the work and the change is permanent.

There are also several disadvantages. Household ammonia won't do the job. You'll have to find industrial-strength ammonium hy-

droxide, which is dangerous stuff (see below). Also, ammonia reacts with tannin in the wood, the amount of which varies from tree to tree. You probably can't create your whole piece from a single tree, but try to make the most visible parts, such as tabletops, out of a single board. Finally, you'll need an enclosure, or tent, big enough to house the piece.

Save your offcuts for fuming samples

To get an idea of how long your project will need to be fumed, do a trial run with scrap pieces. Take the pieces out of the fuming tent at intervals and record the length of time on each piece. You'll see how long it takes to get the desired color, but you'll also see if different parts of the table will darken at different



Not your mom's ammonia

The ammonium hydroxide used for fuming contains around 28% ammonia compared to less than 5% in household ammonia. You should therefore take extra precautions when handling this material, also known as aqua (or aqueous) ammonia.

Avoid eye or skin contact with the ammonia by using goggles or a full-face shield, and protective gloves. A respirator with cartridges designed for ammonia is ideal, but basic charcoal vapor filters will reduce the exposure.

If you don't have a respirator, use a fan and stay upwind of the fumes.

Use a glass or plastic container rather than a metal one to hold the ammonia while fuming. Make sure that you don't use an aluminum pie plate because the ammonia will dissolve it.

After you have finished fuming, dispose of the used ammonia in a large bucket of water, which can then be poured on the ground or on the compost heap. It makes a good fertilizer.

If you can find this type of ammonia locally, you will save yourself a large fee for shipping and handling this hazardous material. This type of ammonia is used in the manufacture of large blueprints, so possible sources include office-supply stores. You can purchase it online at hvchemical.com for just under \$17 a gallon, but the shipping will cost you an extra \$39.



How to handle ammonia. Take care not to come in contact with the 28% ammonia solution. Wear heavy-duty gloves and eye protection, and use a glass or plastic container to hold the liquid when fuming.

Fuming white oak

HOW LONG TO FUME?

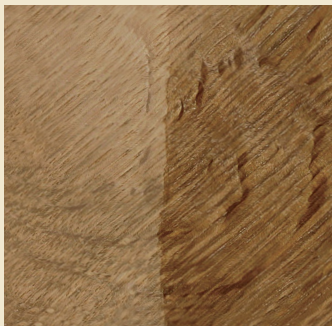
Expose scraps from your project to the ammonia fumes for different lengths of time to judge how long to fume your project. Dunton exposed cutoff corners from the round top for two, five, and seven hours respectively. He gave half of each sample a coat of finish to evaluate the final appearance. Be aware that lumber from different sources may fume at different rates. In this case, Dunton fumed the top longer than the rest of the piece to achieve a uniform tone.



2 HOURS



5 HOURS



7 HOURS



Preparing to fume. Pour about an inch of ammonia into a container (above) and place it under the project. To reduce the risk of inhaling ammonia fumes, use a fan to stay upwind of them. Lower a cardboard box over the table and the ammonia container (left). To reduce fume leakage and to keep the box from blowing over, place a few bricks or stones on top.



Check your progress. After four hours, Dunton removed the box and inspected the color of the table (left). To bring the top to the same color as the base, he fumed the top on its own for another couple of hours (above).

rates. In this case, the scrap from the base got noticeably darker than the scrap from the tabletop, so I knew I'd have to fume the top longer.

Fuming makes white oak brown, but with a greenish cast. Warm up the look by using a finish with an inherent amber cast.

Set up the fuming tent

The wood won't achieve full color on any surface that is in contact with another surface, so the easiest way to achieve an even color is to assemble your project before fuming it. If possible, dry-assemble it so that you can take it apart after it has been fumed and apply a coat of finish before glue-up. I used a large cardboard box for this small table, but for a bigger project you may need to construct a tent from thick plastic and battens to enclose the fumes.

The enclosure won't be totally fume-proof, so try to fume outside. Higher temperatures speed up the process, so make sure samples and your project are fumed at about the same temperature. Don't let children or pets come into contact with the ammonia, and windproof the box with bricks on top or by tying it down.

When my table had fumed long enough to get the base to the color I wanted, I took the base out and left the top in, placing it on a cardboard stand to let the fumes circulate.

After the fuming has ended, let your project shed fumes for 24 hours before you apply a finish. Test the finish that you plan to use on a piece of the scrap fumed earlier. Choices include boiled linseed oil for a darker look, tung oil, or an oil/varnish mix, any of which can be topcoated with shellac. □

Kelly J. Dunton is a deputy art director at Fine Woodworking.

Leaded Glass

Easy approach to a true
Stickley detail

BY MICHAEL PEKOVICH



For the Arts and Crafts display case on p. 32, I made doors with leaded glass. Leaded glass is attractive and true to Stickley furniture, and it's also simple to make and an alternative to glass panels divided by wood mullions. The simple pattern on these doors is a great introduction to the craft, but the techniques apply easily to more intricate designs (see "A technique for tight curves," p. 117).

Choose your glass first

You will need a few special tools and materials to make leaded-glass panels (see box, below). For the panes, I chose a slightly distorted glass ($\frac{3}{16}$ in. thick) that my local glass shop referred to as restoration glass. There are a lot of glass options available online and from stained-glass

SOURCES OF SUPPLY

delphiglass.com

Glass cutter: \$6 and up

Soldering iron: \$20 and up

Solder (60/40): \$13 per lb.

Glasflux: \$8

Horseshoe nails: \$12 per 100

Inland black cement: \$9

Whiting powder: \$6

Lead nipper pliers: \$9

Lead vise: \$13

$\frac{1}{4}$ -in. lead came: \$6 per 6-ft. strip

$\frac{1}{4}$ -in. zinc channel: \$4 per 6-ft. strip

Cutting glass cleanly

Although a steel-wheel glass cutter from a hardware store will work, you'll get better results with a diamond-wheel cutter.

STEEL-WHEEL CUTTER

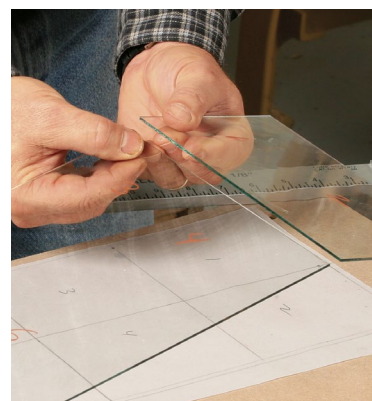
DIAMOND-WHEEL CUTTER



Oil is a must. Without lubricant, the kerf cut into glass will want to close up, leading to a coarse edge. A simple steel-wheel cutter gets dipped (left), while a self-lubricating cutter gets filled (right).



Use a full-size pattern as a guide. A drywall square ensures a straight, square cut. Make one pass only, pressing hard enough with the cutter to hear a slight crackling sound. Offset the cuts $\frac{1}{16}$ in. inside the lines to account for the lead came.



Breaking up isn't hard to do. With a properly lubed cutter, the glass should snap apart cleanly after scoring.

Assembly: Follow the pattern

¼-IN. ZINC
U-CHANNEL

¼-IN. LEAD
CAME

The glass panes are installed between sections of lead came. The entire assembly is framed with zinc channel.

supply stores, but for this display case, stay away from anything too textured or bubbly. Clear plate glass would be better than something that draws too much attention to itself.

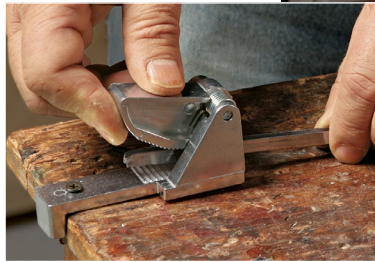
The process of making a leaded-glass panel involves cutting the glass into small pieces and reassembling them between strips of lead called came. Lead came is available in a few profiles, but for this panel I used a simple H-profile. Surrounding the assembly is a U-shaped zinc channel that adds rigidity to the panel. After assembly, the joints are soldered, and cement is forced between the came and the glass pieces. Finally, the came is buffed, which nicely darkens the lead.

Use a template to cut the glass

It's always best to start with a full-size pattern of the glass panel. In this case, it's easy enough to lay the glass on the pattern and use it as a guide to cut the rectangles. For ornate designs, I'd transfer the pattern onto



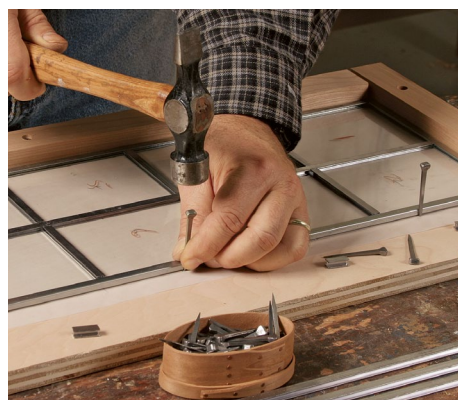
One row at a time. Tack the glass rectangles in place with horseshoe nails, using short pieces of came as a cushion. Horseshoe nails (far right) can be removed and reused.



Clamp and pull. The lead-came strips are flexible when shipped. To straighten them and make them rigid, you need to stretch them. Put one end in a lead vise (above) or other clamp and pull hard on the other end.



Square from the start. To keep the glass panel square, assemble it on a right-angle jig, placing the full-size pattern underneath.



Secure the frame. Once all the panes are in place, install the last two sections of the zinc frame. Use horseshoe nails to prevent the assembly from shifting.



Article Extra

Watch our audio slideshow for a complete overview of Pekovich's technique



Corner first. Slide the first piece of glass into the zinc channel. Snug a short section of came against the glass and use it as a guide to cut the horizontal section of came to length.



Solder the joints

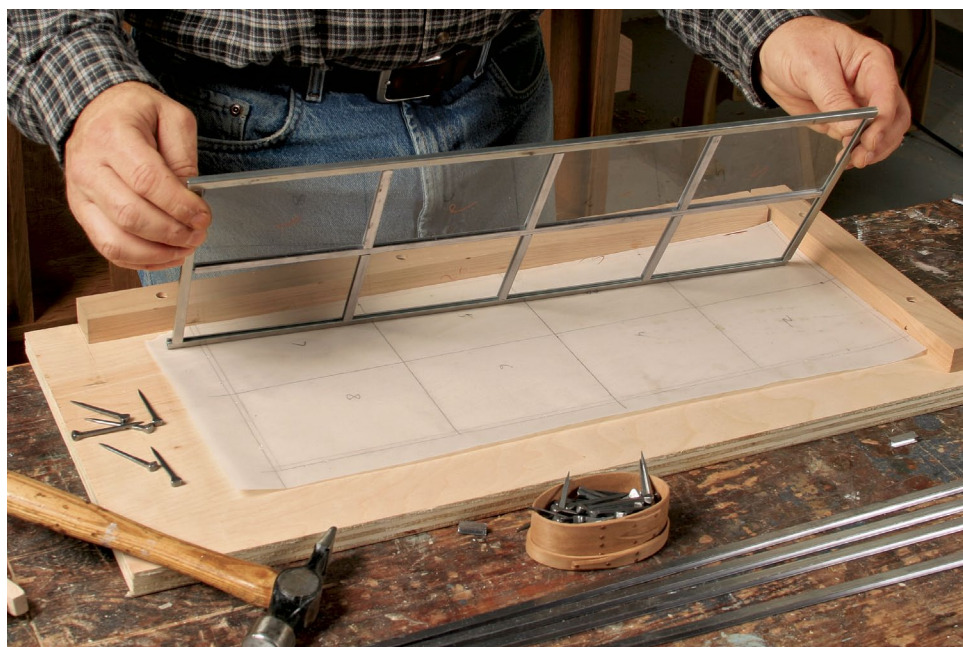
To achieve a smooth solder joint, let the soldering iron heat until the solder melts easily and doesn't stick to the iron.



Flux first. Flux cleans the joint before soldering. It also helps the solder to flow more easily when melted, for a better-looking joint.



Solder on. Melt some solder onto the iron (left), and apply it to the joint (right). Do not leave the iron in contact with the came too long or it will melt the came and create a gap.



Do the second side. Once the joints on one side have been soldered, remove all the nails along the border and carefully flip the panel to solder the other side.

heavy paper and cut the pieces apart to use as individual templates. When cutting the rectangles, offset the cuts $\frac{1}{16}$ in. inside the pattern lines to allow for the $\frac{1}{16}$ -in.-thick rib inside the lead came; otherwise, the panel will end up too large.

As you cut the glass, number each rectangle to correspond with the numbers on the pattern.

Right-angle jig is the key

To keep the panel square during assembly, use a jig with a $\frac{3}{4}$ -in.-thick plywood base and two fences that meet at a right angle. Trim the pattern along two adjoining edges and place it against the fences of the jig. Then cut the zinc border to length and place two pieces against the fences. Put the first piece of glass in the corner, secur-

ing it with a horseshoe nail and a short piece of came.

Cut a piece of came to length, place it along the side of the glass, and install the second rectangle. Continue until the first row of panels is completed. Cut the center strip of came to length and install it and the second row of panels. Once the last two pieces of zinc border are secured, solder the joints on both sides of the panel.

To cement the glass in place, you can use glazing compound, but I prefer the dark look of black cement. Apply the cement liberally, brushing it into all crevices, then use whiting and sawdust to solidify the mix and to clean the glass. Do both sides of the panel.

When the glazing is complete, the panel is ready to be installed in the door. □

Michael Pekovich is a furniture maker, instructor, and Fine Woodworking's executive art director.

Glaze the panel

Use black cement to fill any gaps and make the panel more rigid. Whiting firms up the cement and helps clean the panel.



Apply the cement liberally, then sprinkle on whiting. Use a stiff-bristle brush to work the cement into the gaps between the came and glass (right). Sprinkle the whiting and rub it in (far right). You can use plaster of paris in place of the whiting.



Burnish with sawdust. The final step is to pour sawdust on the panel and brush (far left). This step not only helps clean the glass, but it also darkens the lead and the solder joints. The more you brush, the darker the look. Use a thin stick to remove excess material in the corners (left).

A technique for tight curves

I use a different technique to make intricate designs such as the glass panels on these Greene-and-Greene lanterns. First, make a full-size pattern of the panel and cut individual patterns for each piece of glass.

Instead of assembling the glass pieces using lead came, wrap the edge of each piece with adhesive-backed copper foil. Once all of the foil-wrapped pieces are in place, melt solder onto the copper. This technique requires much more soldering than the lead-came technique, but it's easy to assemble and doesn't need to be glazed. Typically a chemical patina is used to darken the solder lines.



Wrap and fold. Run adhesive-backed copper foil around the edge of the glass and fold it over onto the face.



Flux and solder. Assemble the pattern and brush flux onto all of the copper foil. Then apply solder along every joint line.



STEVEN HODGSON

Northfield, Minn.

This Arts and Crafts desk is a modified reproduction of an original designed by David Robertson Smith and built by Stickley Bros. of Grand Rapids, Mich., for the 1904 Louisiana Purchase Exhibition. The stained glass was fashioned by David Kjerland, a local artist, and the copper hardware was made by Ball and Ball Hardware Reproductions. The piece is finished with dye, stain, and lacquer.

QUARTERSAWN WHITE OAK, 15D X 60W X 60H



JEFF COLLINGWOOD

Ramona, Calif.

Signing up for a Morris-chair class at Palomar College in San Marcos, Calif., Collingwood, an engineer by trade, took it upon himself to build this entire Arts and Crafts ensemble. The chair is a reproduction of an original by William Morris. The chair and ottoman are upholstered in leather, and the stained-glass lampshade was purchased in Mexico. The whole set has a lacquer finish.

MAHOGANY, 38D X 34W X 38H

Photo: Archie Breeden



DON BOLANOS

Friday Harbor, Wash.

Bolanos's love of the Arts and Crafts style, combined with a Gustav Stickley drawing, inspired his design of this wall cabinet for media storage. Constructed with sliding dovetails, the piece is fumed and then finished with five coats of a linseed oil and beeswax mixture. The cabinet holds 40 CDs and 24 DVDs. The windows are leaded glass, and a battery-powered light illuminates the interior.

QUARTERSAWN WHITE OAK, 11D X 42½W X 12¾H



DEBEY ZITO

San Francisco

Zito, a woodworker for more than 20 years, prefers simplicity in her furniture forms. The subtle curves in her cabinet's door rails and bottom apron, as well as the soft taper in the columns, echo that philosophy. The cabinet was a team effort. Nickel-plated handles, which mimic the overall form of the piece, were made by Audel Davis. The pussy-willow details in the upper door panels were carved and gilded by Terry Schmitt. The finish is Tried & True Linseed Oil.

BLACK WALNUT, 23D X 60W X 70H

Photo: David Ramsey



HARVEY J. VON CULIN

Blue Bell, Pa.

Having an interest in Gothic art and the Middle Ages, Von Culin became inspired to build and carve this chest after reading an article on Gothic tracery by Edward R. Hasbrouck. The linenfold side panels are modeled after a design Von Culin saw in Richard Butz's *How to Carve Wood: A Book of Projects and Techniques* (The Taunton Press, 1991). With the incorporation of both the tracery and the linenfolds, the chest is representative of pieces from the late 15th and early 16th centuries. It has a tung-oil finish.

BLACK WALNUT, 14½D X 26W X 17¾H





KEVIN RODEL

Brunswick, Maine

Rodel's inspiration for this side table came from a table designed by Josef Hoffmann in 1903. Rodel made just a few updates to the original: minor tweaking to the dimensions, a fumed finish instead of a blackened finish, and the striking pinwheel top with a ceramic tile center block.

WHITE OAK,
20½D X 20½W X 27H



NEIL KNECHT

Monroe, Conn.

This Greene-and-Greene-inspired piece may look like a freestanding cabinet, but it's actually a built-in. Knecht needed the depth to store stereo components, so he recessed the back of the case 8 in. into the wall. He reconfigured a closet on the other side of the wall to allow extra room for the built-in and access to the electronics. The cabinet is finished with an oil-based stain, garnet shellac, and wax.

MAHOGANY, 21D X 28W X 44H

Photo: Susan Knecht



NANCY HILLER

Bloomington, Ind.

Hiller found a photo of the piece that inspired this hall stand in a book of English interiors. She was "struck by the bold bevels of the crown and the interplay of vertical and horizontal elements throughout the piece." Her updated version doesn't have the original umbrella stands on each side. Instead, Hiller capped the umbrella pockets with limestone to increase the table surface.

CURLY WHITE OAK, 37½D X 15W X 81½H

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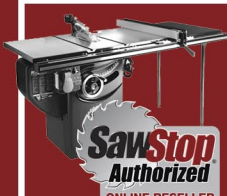
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STEVEN KESSLER

West Caldwell, N.J.

To make this desk, Kessler modified plans for a Roycroft lady's writing desk. He finished it with Jeff Jewitt's Arts and Crafts finishing technique (p. 108). Each silver panel took more than 100 hours to complete. Kessler employed the metalworking techniques of chasing and repoussé to repeatedly hammer the heated metal into shape.

QUARTERSAWN WHITE OAK,
20D X 36W X 45H

Photo: Tom Verniero



STEVE YOUNGLOVE

Brimfield, Ill.

This wine cabinet is the result of Younglove's fondness for Arts and Crafts furniture and his need for a place to store the wines he and his wife buy on their trips to Kelleys Island in Lake Erie, Ohio. The cabinet is stained, glazed, and finished with three coats of hand-rubbed satin polyurethane.

QUARTERSAWN WHITE OAK, 18D X 42W X 35H

Photo: Bob Preece



RICH CHAPPLE

West Vancouver, B.C., Canada

Chapple, who has been building Craftsman-style furniture for six years, stumbled upon this uncommon piece while flipping through *Making Authentic Craftsman Furniture* (Dover, 1986). It required 228 pieces of wood and took approximately 260 hours to build. It is finished with aniline dyes, pigment stains, shellac, and wax.

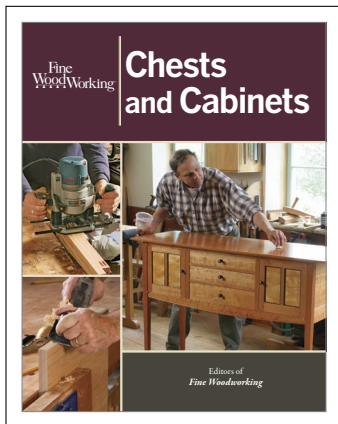
QUARTERSAWN WHITE OAK, POPLAR, AND MAHOGANY,
25D X 44½W X 56H

Photo: Glen Erikson Photography



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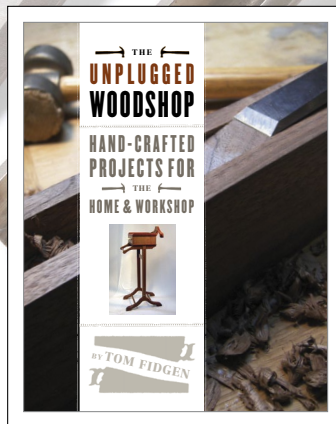


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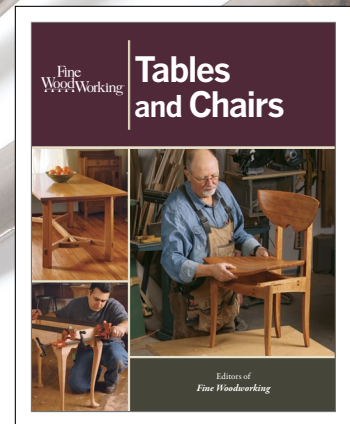


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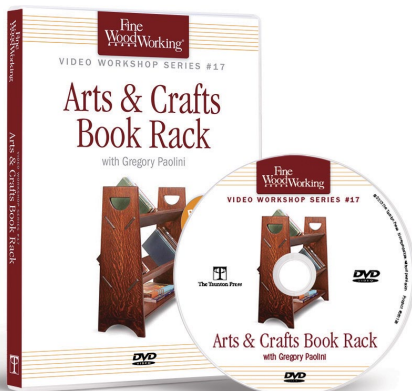


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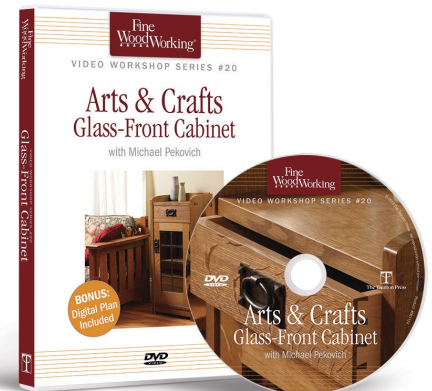
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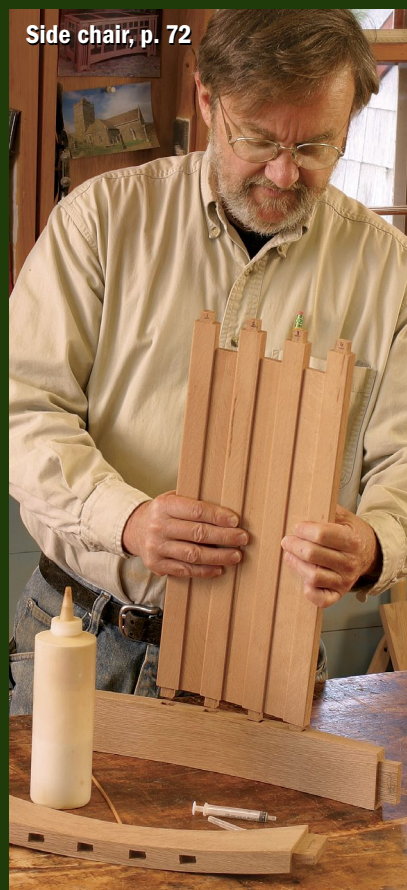
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