



Sweet details define the furniture of Greene and Greene. Learning to produce them is key to making furniture that compares to the originals. The author's sideboard (above) and writing

desk (below) are fresh designs, but their superbly made and marshalled details give them the ring of the real thing. Both are made of sustained-yield mahogany and Ebon-X, an ebony substitute.



Building in the Language of Greene and Greene

Their furniture's deftness is in the details

by Thomas Hugh Stangeland

I made a roomful of furniture recently in the style of Charles and Henry Greene, brothers who designed houses and furniture in California in the first decades of this century. One of the most difficult aspects of making this furniture was finding ways to produce the details, the little touches that define the Greenes' work and make it so appealing to the hand and eye. The square black pegs, which are left slightly proud of the mahogany surface; the exposed splines also proud and gently radiused back to the surrounding wood; the rounded double-L brackets—these and other signatures of the Greenes' furniture are all deceptively tricky to make well. Once mastered, though, they provide the basic vocab-

ulary for building furniture in the language of Greene and Greene.

The dining chair in the top photo on p. 68, one of a set of eight I built, is a straight reproduction of a chair designed by the Greenes in 1908. Working from photographs, I followed their example as closely as I could. The only concession the client and I made to cost was to leave out a subtle carving detail at the base of the legs. I took a more interpretive approach when I made the sideboard in the top photo and the writing table in the inset photo. For each of these, I used a Greene and Greene piece as a starting point but redesigned the original to satisfy the client's needs, the demands of function and my own sense of proportion. (For an account of



Reproducing details—Square black pegs left proud convey the Greenes' message of hand craftsmanship in the author's reproduction chair (above).

To substitute for ebony, the author used Ebon-X (chemically altered walnut) for black details (right).

how the sideboard evolved from its Greene and Greene forefather to my final version, see the story on p. 71)

Springs of inspiration

The Greenes' system of detailing did not develop all at once. It grew gradually as they were exposed to a variety of influences and ideas. Like many craftsmen of their day, Greene and Greene were deeply influenced by the Arts-and-Crafts movement. Arising in 19th-century England in reaction to the mechanization and shoddy goods of the industrial revolution, the movement was a call for honest hand craftsmanship. The Greenes were particularly influenced by Gustav Stickley and other proponents of Arts and Crafts who emphasized openly expressed joinery and function before frippery—features also evident in all the Greenes' work.

What sets the Greenes' work apart is the blending of an Oriental aesthetic with Arts and Crafts. In Japanese temple architecture and Chinese furniture, the Greenes saw ways to soften a composition of straight lines and solids by rounding edges and introducing

gentle curves. There's an Eastern overtone as well in the balanced but slightly asymmetrical patterns of the Greenes' detailing.

Doing the details

It's in the material—The impact of the details in the Greenes' furniture is partly a function of the materials they used. Combining ebony and mahogany gives the furniture warmth as well as a strong visual contrast. I wanted to achieve the same effects but without using endangered woods. I considered using maple with walnut accents, but I finally chose sustained-yield mahogany and Ebon-X, an ebony substitute made of chemically altered walnut. The chemical treatment gives the Ebon-X a rich black color but also gives it working properties that aren't that far from ebony's.

Square pegs—Glinting, square ebony pegs are a hallmark of Greene and Greene furniture. The pegs rise above the mahogany, and each little edge is gently radiused back to the surrounding

wood, providing a reflective surface and a tactile message of hand craftsmanship. The pegs emphasize the joints in the furniture and many are caps for counterbored screws. But as I laid out the mortises for them on the crest rails of the chairs, I realized that some of the pegs are purely decorative. I followed the Greenes' example in making the pegs in a variety of sizes, from $\frac{3}{16}$ to $\frac{1}{2}$ in. sq. As far as I could tell, the variation in size was a matter of aesthetics, I found, too, that

their placement was not exactly symmetrical. Rather than being lined up in rows, the pegs were arranged in subsets slightly offset from each other to add visual interest (see the bottom photo).

I made 'A-in.-deep mortises for the dozens of pegs with my hollow-chisel mortiser. It makes the job quick; the little tearout is not noticeable after I drive in the slightly oversized pegs. You could also use a drill and chisels or chop the mortises by hand.

To make the pegs, I ripped 8- or 10-in.-long sticks of Ebon-X, so they were exactly square in section and fractionally larger than the corresponding mortises. I squared up both ends of each stick on the disc sander with the stick held against the miter gauge. I sanded out the disc scratches with 150-paper on my hand-held orbital sander. These sanded ends would eventually be the exposed surface of the pegs: achieving a totally smooth surface was essential.

It would be murder to make die tiny radiused edges with the pegs already in their mortises, so I did my shaping ahead of time. I rounded down slightly on each edge at the end of the stick with an orbital sander, keeping the roundovers equal. To get the gleam of



polished ebony, I took the sticks to my grinder and burnished the ends with red rouge on a cotton buff wheel.

When I was satisfied with the finish, I bandsawed about $\frac{3}{8}$ in. off each end of all the sticks and repeated the process until I had a good supply of pegs. The bandsawn face would be hidden in the mortise, so I didn't have to clean it up. But I did chamfer the four bottom edges, so they wouldn't hang up or cause tearout when I drove the peg into the mortise. I did the chamfering on my stationary belt sander, holding the little pegs by hand (leave your fingernails a little long for this chore). Or you could do the chamfering against a stationary piece of sandpaper on a flat surface. I put a little glue in the mortise and drove the pegs with a rubber mallet.

Curved brackets—Those little double-L brackets below the seat of the chair and the cases of the sideboard and writing table are derived from Chinese furniture. In addition to tying parts together visually and adding a curve, they provide some resistance to racking forces (see the top photo). While they may look innocent, they're quite a challenge to make.

I made the brackets in bunches. I made a Masonite template for each size L and traced it over and over on a board machined to the correct width and thickness. Because the wide end of the L would be face glued, I put it on the edge of the board to give it a long grain surface. I cut the brackets out on the bandsaw and then sanded their outside curves on my stationary disc sander and their inside curves with a sanding drum chucked into my drill press. To be sure I had flat, square glue surfaces, I touched them up using the miter gauge with my stationary disc sander.

All the curved edges on the fronts of the brackets are rounded over, and I did the work with a router inverted in a vise. If you make a small push block with a foam or rubber bottom surface, you'll be able to get your hands away from the action while keeping good pressure on the little workpiece. Because the grain changed direction as I routed around the bend, I found it was important to go fairly quickly and maintain even pressure.

I doweled pairs of L's together and then doweled and face-glued them to the furniture, as shown in figure 1. To drill the dowel holes in the L's, I clamped them in my drill-press vise with stop blocks set up to keep them oriented properly as I tightened the vise.

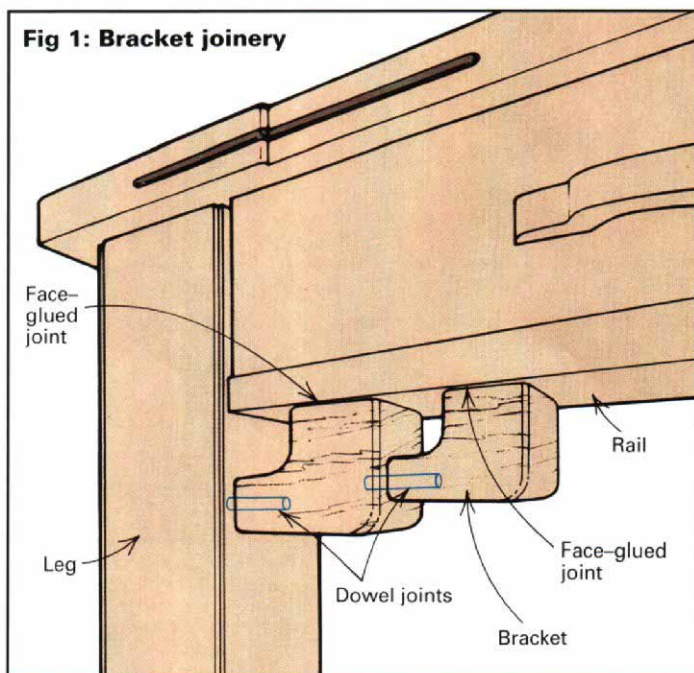
Gluing up the brackets was a two-stage operation. First I joined the two L's. I laid them on the tablesaw (any reliably flat surface will do) and pushed the dowel joint together by hand. I found if I held them for 30 or 40 seconds, I could leave them and they'd stay tight. When they were dry, I gave them a quick hit on the belt



Chinese brackets for strength and a sinuous line—Drawn from Chinese furniture, curved brackets (above) tie Greene and Greene pieces together visually as well as structurally.



Bracket alignment is tricky—At left, the author locates a dowel hole on his table by sliding the bracket along a guide board clamped to the apron and marking with a dowel center.



sander to make sure the glue surfaces were flat and square.

The second stage was gluing the brackets in place. To locate the dowel hole in the leg, I put a dowel center in the bracket and slid the bracket along a guide board to mark the spot (see the photo at left above). After I'd drilled the dowel hole, I clamped the bracket in place using one small quick-release clamp to pull the dowel joint tight and another to keep pressure on the face joint.

Exposed splines—The arms on the chairs I made are joined to the front legs with large splines shaped in a shallow S. Like the square pegs, the splines are left proud of the surrounding wood and gently radiused back to meet it. The sinuous black line of the Ebon-X in the mahogany arm emphasizes the joint and underscores its



Pulls can make or break a piece of furniture: Experiment to find the right one by mocking up a range of pulls (right).

Exposed splines masked movement of solid panels in the Greene's work. But the plywood top (above) won't move. So the spline (below) is glued to both the panel and breadboard end.



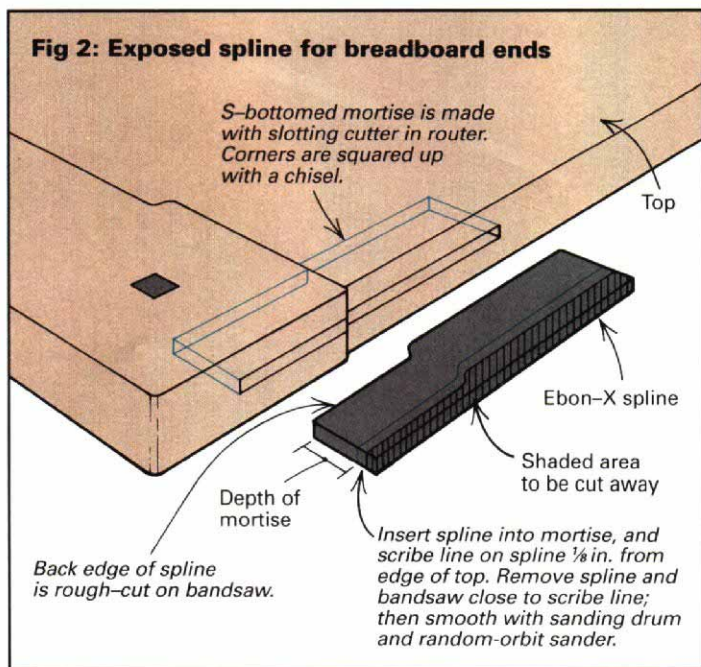
board ends are decorative in my piece because I used a veneered plywood panel and didn't have to accommodate seasonal movement. The ends are solid mahogany, biscuited and glued to the panel. At the front, I inserted false loose splines of Ebon-X. Because the breadboard ends extend beyond the panel, the splines had to follow in a shallow S-shape, as shown in figure 2 below.

I routed mortises for the splines with a slot-cutter fitted with a bearing wheel. After chiseling out the ends of the mortises, I cut Ebon-X splines to length and rough-cut their back edges to the shallow S-shape on the bandsaw. Like the square pegs, the false splines stand proud of the surface, so I put them in temporarily and scribed a line following the contour on the edge but spaced away $\frac{1}{8}$ in. Then I removed the splines, and bandsawed to the line. I gently radiused the edges that would be exposed, sanded and burnished them and glued them in place.

Pulls—If a door or a drawer front could be compared to clothing on a person, then knobs and pulls would be like neckties, pins and earrings—finishing touches that are key to the overall impact of a piece. I used the same type of pull on the table drawers as I made for the sideboard. I tried a number of different sizes before settling on the right one for each piece, as shown in the bottom photo. The pulls are a variation on the Asian "cloud lift," an abstract representation of clouds found throughout the Greenes' work. I bandsawed the pulls and filed and sanded to finished shape; then I radiused the edges with a router. I had to scale them down considerably from the ones used on the sideboard. For the sideboard, I decorated them with square pegs, but on the smaller pulls for the writing desk, I found they looked cramped so I left them off.

A fitting finish—I wanted the pieces I made to have an immediate presence, a feeling of having been around for a long time: In a sense, they had been. To achieve it, I treated the wood with potassium dichromate, an oxidizing agent borrowed from photographic processing. It comes in powder form and is mixed with water and sponged on. Before applying it, I wet-sanded every surface to raise the grain and knock it back down. While applying the potassium dichromate, I kept an air hose handy to disperse the puddles that formed in the inside corners. If they are left to stand and soak in, the color will be uneven. I then sprayed three coats of catalyzed lacquer, sanding between coats with 320-grit paper.

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double curve. Here the spline is structural, but where a similar element appears in the breadboard ends of the sideboard and writing table, it is purely decorative.

I made the loose splines for the chair by temporarily screwing a rough-cut dummy spline in the joint and flush-trimming it to the shape of the arm with a router. I removed it and used it as a template with a straight router bit and an oversized bearing wheel to turn out Ebon-X splines $\frac{1}{8}$ in. proud of the arm. As with the pegs, I did the sanding, radiusing and burnishing on the exposed edges of the splines before screwing and gluing them in place.

Breadboard on the sideboard—I made the tops of my sideboard and desk breadboard style, as the Greenes did. The bread-

A new Greene and Greene sideboard

With my reproduction Greene and Greene chairs around his dining table, my client asked if I would make a sideboard to go with them. I quickly agreed but soon found it to be an entirely different undertaking. Reproducing the chairs had been a matter of mechanics: I had to figure out how to do what the Greenses had done. But making something in their style to fit a specific site would be a matter of interpretation.

My starting point for the commission was a sideboard the Greenses' made in 1909. But I would have had to contort the original to make it fit the site. The three drawings at right show the development of my sideboard: the Greene's original (top), a drawing midway in the adaptation (center) and the final version (bottom).

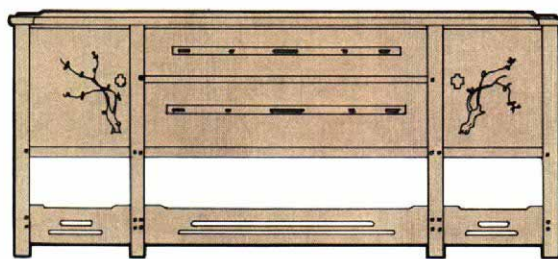
Site specifics: The client intended the sideboard to be a visual anchor at the end of the room, so it had to be visible above the backs of the dining chairs. And it had to fill a long alcove. These requirements brought the sideboard's overall dimensions to 7 ft. long and 42 in. high—quite a bit longer and higher than a typical sideboard. I would have to do all I could to keep the piece from looking abnormally high.

Reapportionment: The Greenses' sideboard has doors at each end and a bank of wide drawers in between. I decided to change this arrangement for several reasons. First, because the sideboard had to be so long, drawers located in the center would wind up being far larger from side to side than they were from front to back: a recipe for drawers that bind. I also thought wide, central drawers would emphasize the length of the piece. And my client, who entertains on a large scale, was concerned that the cabinets in the original were on the small side. I solved all these problems by moving the doors together into the middle, so they would open on one large cabinet and by splitting the drawers into two banks, one on either side of the doors, as shown in the center drawing.

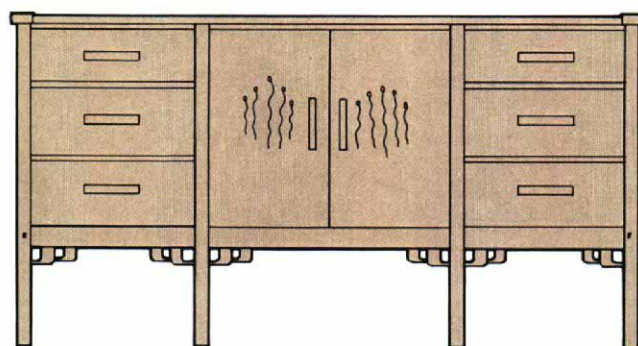
To help mask the height of the sideboard, I resorted to unusual proportioning on the drawers. Where a normal silverware drawer is 3 in. high, I made these 6 in. It would have been possible to stay closer to normal sizes if I had added a fourth drawer, but having more drawers in a stack emphasizes the vertical lines. I also preferred the appearance of three drawers. Call it mystic balance if you will, but an odd number of drawers always looks better to me.

How many legs? The Greenses' sideboard has eight legs joined by wide stretchers. I

Evolution of a sideboard

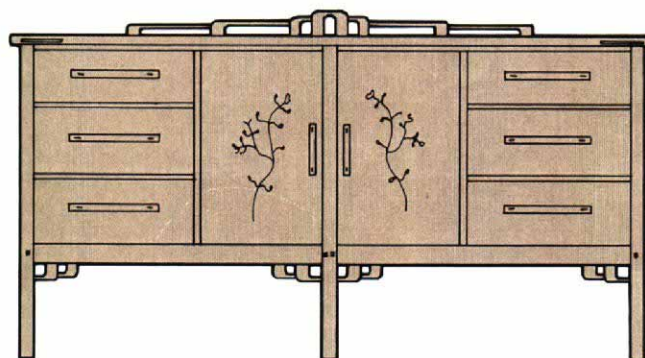


Sketch for Thorsen House sideboard, Greene and Greene, 1909



Early sketch for the author's sideboard

Doors have been moved to the middle to make the cabinet more spacious. The wide stretchers have been removed in favor of brackets.



Final version of the sideboard

Two legs have been eliminated, giving the piece a more horizontal appearance. Bracket form has been adapted to make an open plate rail. Drawer handles have been elongated. The stylized tulip inlay of the earlier version, drawn from the chair splats, has been replaced with a more naturalistic composition.

decided to omit the stretchers and adopted the bracket detail from the chair to add decoration and a bit more strength below the case. But the number of legs didn't seem right. I did a sketch of a sideboard with four legs, but I thought such a long sideboard would appear ill-supported on four legs even if it could have been made soundly. I drew a version with eight legs (see the center drawing). But that tended to emphasize the height of the piece and made for a clutter of brackets. So I drew a version with six legs; that immediately looked right to me.

Plate rail—With the placement of the legs, doors and drawers determined, I turned to the plate rail. The Greenses' sideboard has a

low, solid plate rail. I wanted something that would lighten the sideboard and relate to the brackets, so I designed a low, open plate rail by adapting the bracket shape, stretching it out horizontally. I also took the opportunity to make a visual link to the legs. By creating a little vertical center point in the plate rail, I carried through the line of the middle leg.

I used my bracket-making techniques to produce the parts of the plate rail. I doweled the parts together as before, but because the assembled rail was somewhat delicate, I screwed it to the sideboard's top from below rather than gluing it. This way, I could transport it separately and then attach it on site.

—T.S.