Carving a Ball-and-Claw Foot

Tracing the techniques of a Williamsburg cabinetmaker

by Mack Headley, Jr.
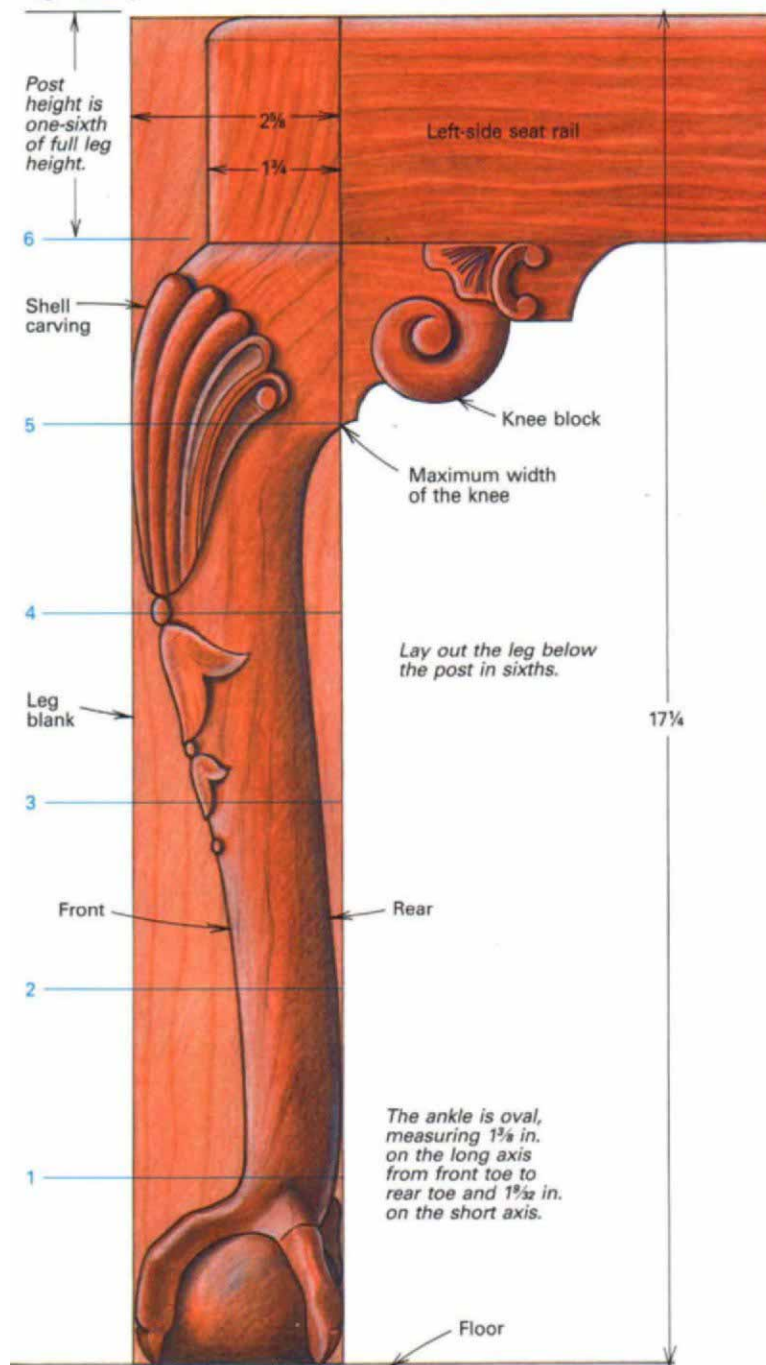
R ecently I "studied under" Peter Scott, a cabinetmaker who worked in Williamsburg, Va., from the early 1720s to the mid-1770s. Although he's been gone for more than two centuries, he left a *legacy* of furniture that provides a fairly comprehensive training program for contemporary woodworkers. Scott himself was probably educated in Scotland before arriving in Virginia, where he built furniture for the state's most demanding customers. During his time, furniture design emphasized strength and bold sculpture with broad reflective surfaces, which created a sense of weight. As pan of my study of regional styles of cabriole legs, I carved a reproduction of one of his chair's legs, using the simple tools and methods common during that time.

I'll tell you how I made a pattern and sawed the leg from a blank and how I carved Scott's version of a ball-and-claw foot. I'll demonstrate the gouges I used to duplicate the sculpture below the shell carving at the knee. For more on this, see "Cabriole Knees" *(FWW #72).* Although this foot is a reproduction of a Williamsburg design of the 1740s, you'll find that my tool techniques and procedures for executing this foot will be helpful when carving other feet.

1 I couldn't rip one of Scott's chair legs in half to trace the sawn section and make a pattern. Instead, I projected imaginary lines past the leg onto a blank in much the same way you would shine a beam of light past the leg and trace its shadow. I held a straightedge parallel to the floor and across both front chair legs so that it met my carving blank at a right angle. I aligned the front of the 2⅝x2⅝x17¼ Honduras mahogany blank parallel with the right front leg of the chair. Then I held the straightedge against the widest points on the front of the two legs (at the knees and feet) and I marked those points on the blank. Next, I marked the blank for the widest points on the back of the legs (at the ankles and where the curves at the back of the knees intersect the edge). Holding the straightedge across the inside curves (the front of the ankle, top of the foot and back of the knee), I marked the blank where the end of the straightedge touched each of these places. I also marked the blank at a number of places along the curves, and carefully outlined the foot in the same manner. Finally, I drew a fair line connecting the marks on the blank, and then I traced this profile and cut out a paper pattern. Since the lines of the original leg and foot are the same when viewed from the front and outside, one pattern can be used for both sides.

I found that Scott probably based the leg's proportions on classical rules of Greek architecture, which cabinetmakers in the 1740s found particularly appealing. He apparently laid out the leg according to this "rule of sixths" by first making the post one-sixth of

Fig. 1: Proportions of a Peter Scott cabriole leg

Post height is one-sixth of full leg height.

2⅜

1¾

Left-side seat rail

Shell carving

Knee block

Maximum width of the knee

Lay out the leg below the post in sixths.

17¼

Leg blank

Front

Rear

The ankle is oval, measuring 1⅜ in. on the long axis from front toe to rear toe and 1⁹⁄₃₂ in. on the short axis.

Floor

the leg's full length and then dividing the leg below the post by six and proportioning its shape on this scale, as shown in figure 1 on the previous page.

The claws on well-carved feet should reach over and grasp the ball in an animated fashion, as shown in figure 2 below. On the Scott feet, the tips of each claw terminate in the corners of the blank. The side toes on some feet follow the corners of the blank and point straight clown, which creates an awkward, boxy appearance. However, this doesn't happen on the Scott feet because the upper knuckles angle forward, giving the side toes' claws the appearance of raking backward. Although the foot and ball are shaped from the same blank, you should try to think of them as two separate elements of this sculpture.
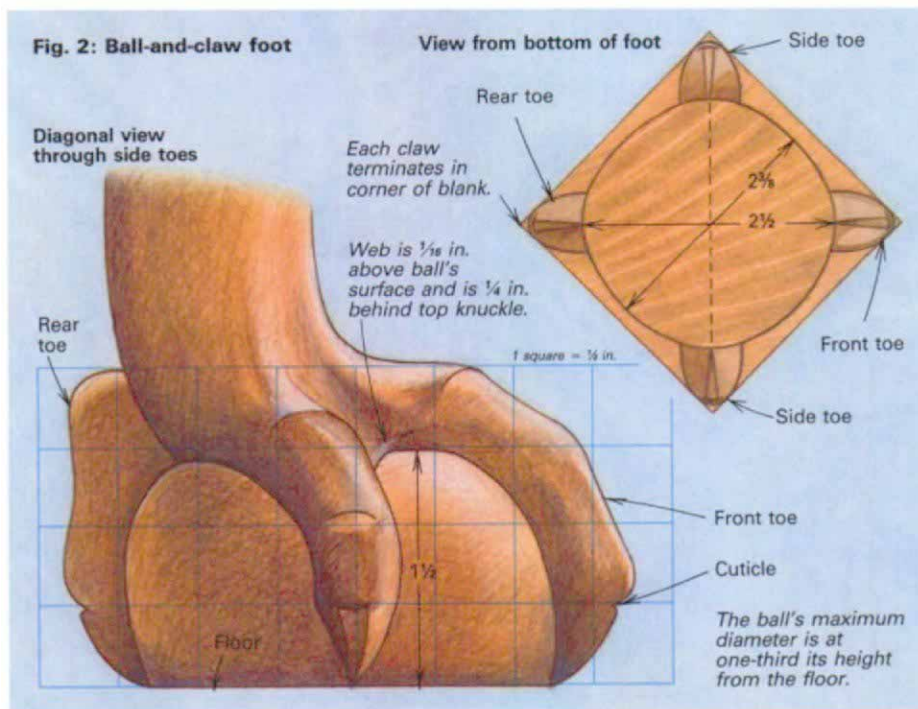
Consistently, the balls on the Scott feet aren't round; they're larger in diameter under the toes than between them, and therefore they give the foot a broader stance. Draw the bottom of the ball with two compass arcs so there is $2\frac{3}{8}$ in. in diameter between the claws and $2\frac{1}{2}$ in. in diameter under the claws. Then fair the two diameters together halfway between the claws.

Above: Following an original discarded example, the author ripped from the knee to the ankle with a handsaw, and then he finished by cutting across the ankle with a bowsaw. Below: Headley uses a gouge to cut the shape inside the knee.

Transfer points from the original leg to the blank following a straightedge held parallel to the floor and against the leg. Mark the blank where the end of the straightedge touches.

Fig. 2: Ball-and-claw foot

Diagonal view through side toes

View from bottom of foot

Side toe

Rear toe

Each claw terminates in corner of blank.

Web is $\frac{1}{16}$ in. above ball's surface and is $\frac{1}{4}$ in. behind top knuckle.

$2\frac{3}{8}$

$2\frac{1}{2}$

Front toe

Rear toe

1 square = $\frac{1}{2}$ in.

Side toe

Front toe

Cuticle

$1\frac{1}{2}$

Floor

The ball's maximum diameter is at one-third its height from the floor.

2 To understand how Scott roughed out his legs, I referred to an unfinished table leg excavated from the stream silt at Anthony Hay's cabinet shop in Williamsburg. This example, discarded in the early stages of production, had apparently been roughed out with a handsaw. Following this, I made two straight cuts along the length of the leg with a handsaw and then cut across the adjacent tops of the foot and intersected the handsaw cuts at the ankle with a bowsaw. I roughed out the rest of the leg with a drawknife, paring chisels and gouges, and finished it with a spokeshave. You can bandsaw the entire shape to the pattern line quickly and accurately. But by working with hand tools, 1 became accustomed to the blank's grain, and so I was able to correct my cuts before I reached the pattern line.

3 To duplicate the shapes of the original, I matched the width and sweep of gouges to the original sculpted ankle, toes and ball, and then I used those tools to carve the reproduction. For instance, I carved the inside curve where the front toe sweeps up to the ankle with a ½-in.-wide #5 gouge. After establishing the front-toe height, I lowered the tops of the side toes ⅛ in. below it and began carving the top of the knuckles. A 1¼-in.-wide #3 gouge matches the arc from knuckle to knuckle. Unless I specify which toe, use the same tools and techniques to carve all of them, but carve the back toe last.

Since the surface of the ball at its greatest diameter projects beyond the toes (as shown in figure 2), I only removed wood next to the toes and left the full width of the blank in between. So if you bandsaw the leg from the blank, don't saw directly on the line across the lower joint of the toes and risk removing wood that's needed for the fullness of the ball.

Next I defined the forward rake of the side toes' upper knuckles by scalloping wood from behind the upper knuckles with a ½-in.-wide #3 gouge. Then I delineated the side toes' ⁹⁄₁₆-in. width with a pencil as I guided it against their freshly carved outside shape. Following in this manner, I then delineated the ⁹⁄₁₆-in. width of the front toe, which descends straight down the ball to the blank's corner. Before shaping the ball, I cut just shy of these lines with a straight parting tool, defining the toes' width and their height above the ball. But cutting this way also left wood to carve later when I made the final cut down along the side of the toes with a 1¼-in.-wide #3 gouge.

*Matching the sweep and width of a ½-in.-wide #5 gouge to the original leg **(above)**, Headley cuts the transition from the toe to the ankle accurately **(below, left)**. The outside of the side toe has been scalloped to angle it toward the center toe, forcing the claw to rake back. After marking their width, the toes are roughed out with a parting tool **(below, right).***

4 On Scott's original, the ball's maximum diameter is at one-third its height from the floor. I carved its surface below that point taking downward strokes with a 1¼-in.-wide #5 gouge, and carved its narrower surface near the web taking upward strokes with a ½-in.-wide #3 gouge. And I pared across the transitional grain at the ball's greatest diameter with the 1¼-in.-wide #5 gouge. Working along both sides of the front toe first, I faired the ball's surface where it passes under the toe, but carved its final diameter after roughing out the surfaces on both sides. Then I cut down along the sides of the toe with the 1¼-in.-wide #3 gouge, leaving a distinct transition between the toe and the ball. Carve the ball's final surface in front of the side toes after you've roughed out its back surfaces.
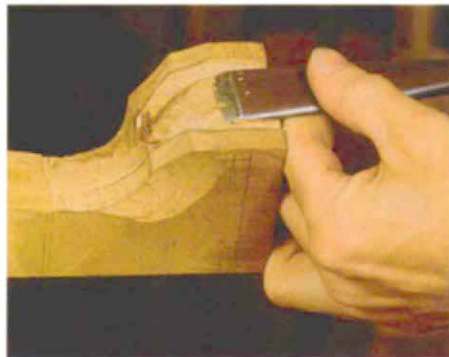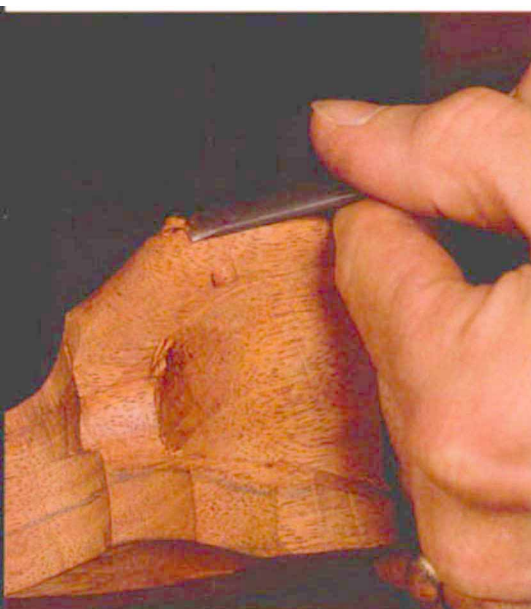

***Above:** Headley shapes the lower surface of the ball with a 1¼-in.-wide #5 gouge, powering the cut with his right hand and guiding it with his left. **Right:** The author carves across transitional grain at the ball's greatest diameter. The leg is held at a comfortable height and angle in an auxiliary clamp secured in the bench vise.*

5 You are now ready to carve the webs connecting the toes. The height of the ball at the edge of the webs between the front and side toes is 1½ in. And the webs' edges are ¼ in. behind the top knuckles when viewed from above, or are ¾ in. from the outside of the ball. Holding a try-square handle against the bottom of the leg with the blade against the ball, measure from the blade to the web.

Working one web at a time, I cut the edge of the first one with a ½-in.-wide #5 gouge, holding the tool parallel to the leg's long axis and cutting toward its bottom. Then I carved the concavity of the web with the same tool, using its full arc to take a deep cut beginning where the web meets the top of the ball. This gouge cut should begin parallel with the floor and sweep up quickly, terminating where the top knuckle of each side toe meets the ankle. The height of the web above the ball on this outstretched foot is ¹⁄₁₆ in. (as shown in figure 2 on p. 84). When looking down at the foot, the web should be distinct and there should be a broad reflective surface on the top of the ball.

Above: The edge of the web is cut with a ½-in. wide #5 gouge. Below: The concave web is cut with a ½-in.-wide #5 gouge.

Below: The edge of the web is ¾ in. from the outside of the ball, measured with the blade of a small try square. Headley works on one web at a time, cutting the edge of the first web with a ½-in.-wide #5 gouge. He then carves the concavity of the web with the same gouge.

The top of the toe is triangular and is rounded over with a ½-in.-wide #6 gouge. A slight concave arc joins each knuckle.
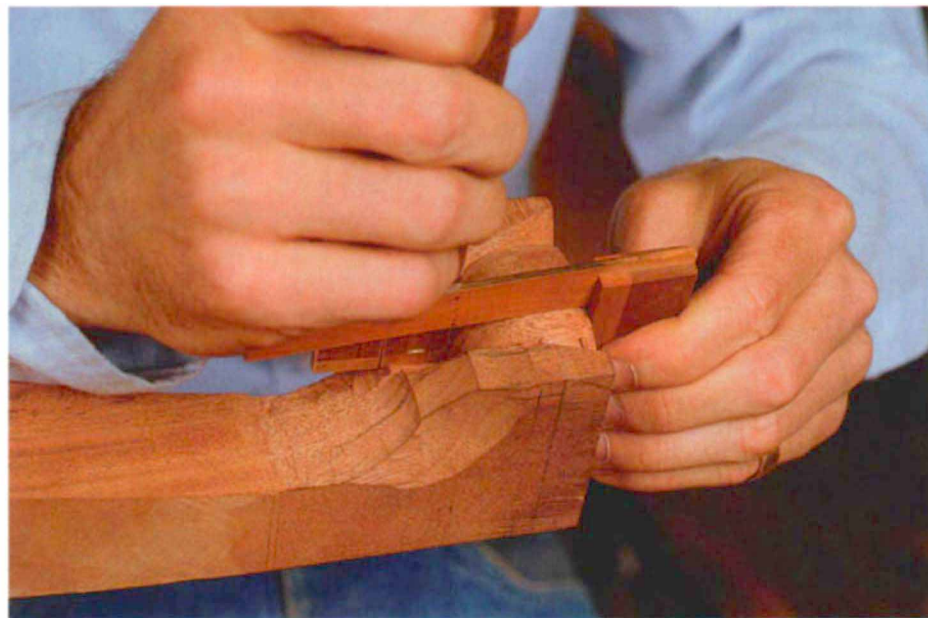
6 Beginning, with the front toe (and then following with the side toes), I shaped its claw first by roughing it out with the parting tool. Each claw is the full width of its toe at the cuticle (below the lowest knuckle) and each tapers to a ¹⁄₁₆-in.-wide point. The claw is rounded so that the profile of its top is a convex arc from the knuckle to the floor. The top of the claw is then finished so that a flat facet diminishes from ⅛ in. wide at the knuckle to ¹⁄₃₂ in. wide at the floor.

I first sculpted the sides of the toes with a ½-in.-wide #3 gouge, giving them a somewhat triangular cross section. Initially 1 cut their tops almost flat, using a ¼-in.-wide #6 gouge, but I left a slight concave arc between knuckles. The junction of the toes' flesh, below the lowest knuckle, and the claw is a ¹⁄₁₆-in.-wide V-shaped cuticle, which I cut with a ½-in.-wide #3 gouge.

There should be a quick transition from the top of the front and side toes to the vertical ankle. This makes the leg appear to sit back on the ball and it gives the leg a sense of weight. I began carving the top of the toe with a ½-in.-wide #5 gouge, and I finished the sweep up to the ankle with a knife because the gouge alone couldn't negotiate the sharp angle.

The back toe of Scott's foot is a unique design element and it should be carved last. It's vertical at the point where it suddenly emerges from the ankle and descends to the ball. And it appears to be a separate component. On most feet from other regions, the web between the back and side toes is a flowing arc, as it is here between the front and side toes. On the Scott foot, however, the junction of the ball, rear toe and ankle forms an obtuse angle. When looking at this profile, the rear toe is a convex-concave-convex curve, carved with a ½-in.-wide #5 gouge.

Above: Headley uses a knife to finish-carve the quick sweep of the top of the toe to the ankle. The ankle's curve gives the leg a sense of weight. *Below:* The shape of the rear toe and claw lends a distinctive character to the Scott ball-and-claw foot. The original leg is on the left.

Drawing its teeth perpendicular to the stroke, a mill file leaves the leg ready to be scraped and polished.

7 The ankle is oval, and its longest axis runs on the diagonal between the front and rear toes. When rounding the leg, you should initially retain the full dimension of the leg blank from below the shell carving on the knee to the foot. I prefer shaping the leg with a spokeshave and chisel. This way, I can learn about the wood's grain and apply the information when cutting the background in the shell carving. Although you could use a rasp if the grain is difficult, it tears up the surface. With practice, the cuts of sharp-edge tools should merge cleanly at grain transitions on curves, but some clean up will still be necessary.

To follow 18th-century methods, I use abrasives sparingly. Instead, I smooth surfaces with mill files and cabinet scrapers, the marks of which I've seen in unobtrusive places on old pieces. A half-round mill file does a good job and leaves few marks if you draw its teeth perpendicular to your stroke. A light pass with a very sharp cabinet scraper removes me file marks. Since the scraper follows the hard and soft variations in the grain, I alternated the cutting direction with each pass to avoid amplifying irregularities. Finally, I polished the leg with a fine abrasive for an even, reflective surface. At home I'd use worn 240-grit sandpaper; at Colonial Williamsburg it's more appropriate to use shark skin or shave grass (Dutch reeds). ☐

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