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Ornamental Plaster Restoration

Making an impression with traditional techniques and materials, plus a few new twists

The author designed this new 6-ft. medallion for the parlor of a 19th-century Charleston house by analyzing the design of the house's original medallions. Ornaments from the cornice reappear in the outer circular band of the medallion; the center cluster matches those found in the extant medallions.

by David Flaharty

In May of 1987, I received a packet of photographs from restoration architect James H. Small of Charleston, South Carolina. Small's photos were of badly damaged but still beautiful plasterwork from a large Regency-style house built in Charleston between 1822 and 1825 by Governor Thomas Bennett. The practice of architecture ran in Bennett's family: his father was a noted builder-architect after the American Revolution, and his son Washington Jefferson Bennett was an architect as well. The Bennett House boasted finely detailed interior millwork, a dramatic circular staircase and robust ornamental plasterwork as sophisticated as any in Charleston.

But the passage of time challenges even the most well-crafted work to withstand the intrusion of the elements, changes of ownership and adaptive reuse. The present owners of the Bennett House, trustees of Charleston's Roper Hospital, wished to return the house to its former grandeur. To do so a major restoration was essential, particularly of the plasterwork.

Collecting evidence—I was hired to replicate two plaster medallions: one to replace a badly damaged 5-ft. medallion in the stair hall (top photo facing page), and the other to recreate a medallion that had once existed in the parlor but was now gone, a flat plaster ceiling in its place (photo above). I flew to Charleston to gather ornamental samples, sections and dimensions that would allow me to build the two medallions with historical accuracy. As is my standard practice, before beginning any on-site work I obtained from the owner a written release from liability in the event that further damage should result from unforeseen structural failure as I gathered samples and dimensions from the existing medallions.

It is worth noting that prior to the introduction of metal lath, the standard ceiling consisted of a three-coat plaster applied to wooden lath nailed roughly ⅜ in. apart. Ceilings of this design are remarkably sturdy but they can be jeopardized over time by a number of deleterious factors, such as inadequate keying, rusting lath nails, structural settling, water damage from leaky roofs or plumbing, nearby blasting, heavy vehicular traffic and even repeated sonic booms.

Three-coat plaster on wooden lath is very heavy and it is even weightier at the center of ornamented parlors, such as those in the

Bennett House with its elaborate medallions. The wooden lath is usually continuous over a ceiling, so the failure of a part of the ceiling is likely to affect a broader area. The results of such a ceiling failure can be disastrous when the debris descends upon an irreplaceable crystal chandelier, costly china, inlaid Empire dining table and handwoven oriental carpets—not to mention the family at dinner.

Fortunately only half the stair-hall ceiling had failed. Because the damage to the medallion had occurred during the restoration of the house, much of the debris was still on site, not in the dumpster. I spread out the fragments, photographed them and determined that the twisting acanthus leaves, canopy surround, circular fretwork and a segment of the plain-run fret border had survived the fall to the floor in a condition suitable for my work (bottom photo).

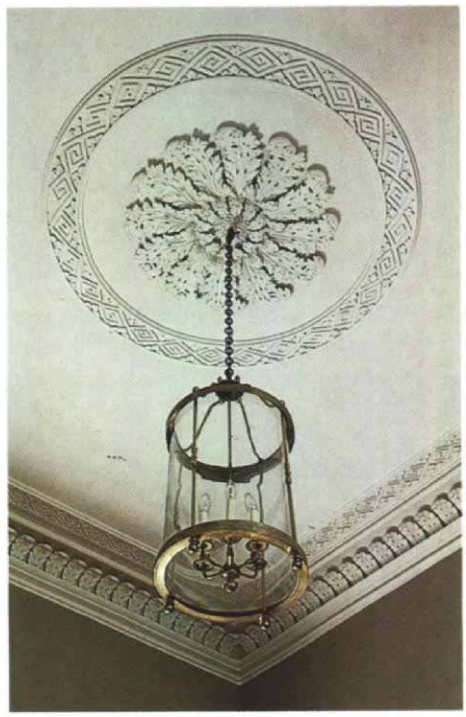
The parlor medallion, however, was missing altogether. The medallions in other rooms were all the same size (6-ft. dia.) and had identical center clusters, but each had a different border enrichment that duplicated the ornaments found in the cornices in that particular room. I obtained samples of the center cluster ornaments from an intact medallion in another room. To do this, I used the flattest chisel I had, and gently chiseled and hammered at the joint between ornament and ceiling. A wooden-handled hammer resonates so that I can tell when the bond is broken. You often have to sacrifice one ornament to get its whole neighbor, so I make enough castings later to replace any that break during this process.

I use several methods to obtain the profile of a plain-run molding—the continuous molding that surrounds individual ornaments. One method is to saw through the molding in place, insert a piece of sheet metal and scribe the profile on the metal. A less satisfactory way is to use a profile gauge. The most precise way is to make a rubber impression of the molding and then trace the profile of a plaster cast made from the rubber impression.

Urethane is the molding rubber of choice today—latex is slow and dimensionally inaccurate, polysulfide distorts under pressure and silicone is needlessly expensive. The urethanes I use come from G. P. Roeser, Inc., P. O. Box 248, Lahaska, Pa. 18931. The barrier coat, or parting agent, that I use for urethane molding is simply a neutral liquid soap film that I lather on to the plain-run molding (which remains in place), allow to dry and burnish (polish) with a dry brush. I then brush on layers of a trowelable urethane, achieving a ¼-in. thickness, smooth the surface of the urethane with a brush and soap, and allow it to cure overnight. The urethane alone is flexible, so to stiffen the mold, I apply a plaster shell to the urethane, press on plaster-soaked burlap as reinforcement and finish up with more plaster. The shell can be as thick as necessary for strength—from ½ in. to 1 in.

After the plaster hardens, I peel the plaster shell and the urethane off the original molding. The shell makes a solid support for the urethane during casting. After making a plaster cast in the urethane mold, I remove it from the mold and then place the molding profile directly on a strip of 22-ga. sheet metal and trace its profile with a scriber. I'll make a template from the sheet metal later. I used all three methods to record measurements on site, taking photos to document the process, then crated the sample ornaments and other information and shipped it to my studio in Pennsylvania.

Stripping the paint—At the studio, I unpacked the crates and reassembled the carefully tagged ornaments on a large marble bench (a polished, pink Tennessee slab, 3 ft. by 6 ft., formerly a toilet partition). I've a larger marble table, too. Both are perfect for paint-stripping and casting because they have straight edges, don't absorb water and are dead flat.



This new 5-ft. medallion in the stair hall (top photo) replaces one that was damaged beyond repair. The fragments from the damaged original, however, were in good enough shape (bottom photo) to use as models for new casts.

When new work must match existing ornaments, I reproduce samples without disturbing the paint buildup on the originals. When new work (particularly a medallion) will stand alone, however, it is more pleasing to strip the samples before they are molded.

Fortunately, these casts had been painted many times since the 1820s and the thick paint was easy to peel. To loosen the paint, I brushed or soaked the pieces with water to loosen the kalsomine, a whitewash made of glue, white pigment and water that was very likely the type of paint first used on the molding. When the kalsomine paint layer was softened, it allowed the subsequent, more modern oil and latex layers to yield to scaling with small picks. More fragile pieces were moistened with water from a plant mister, particularly where the paint had loosened from the plaster. I seldom use methylene-chloride strippers because the gummy residue is difficult to remove, may be chemically antagonistic to subsequent molding materials and because some plasters will not withstand its harsh treatment.

Careful, patient craftspeople are usually able to remove built-up paint with little or no damage to the original cast surface. Any nicks or cracks are pointed up with plaster washed in with water following paint removal. Removing paint is tedious, but it is nevertheless very exciting to me; as the original detail becomes visible, the skill of the modeler is revealed.

Rubber molds—The sharp 19th-century detail finally exposed, I began preparing to make rubber flood molds of the ornaments. The first steps were to glue the original cast ornaments, called models, to the marble bench, fence the casts with wood (sheet metal works, too) and seal around the bottom of the fence with clay (top photo, next page). I lathered the models with the soap, allowed it to dry and burnished it, then flooded the mold with 30-durometer (a measure of hardness) urethane, which cures overnight. The urethane rubber for flood molds is a two-part system that gels in 25 minutes after mixing. The next morning, I stripped off the soft rubber with little regard for the original plaster ornaments. In the Bennett House project, unlike some others I've worked on, specifications did not require reinstallation of period material. The original ornaments went into my dumpster.

Casting ornaments—To cast the ornaments, I use casting plaster because its starch component results in a hard surface, making the ornaments resistant to damage by electrical and painting contractors. Molding plaster is almost as fine-grained and works well, too. I moisten the urethane mold before pouring the plaster (middle photo, next page). Just before the plaster sets, I scratch back the sur-

face, which is visible. This was also done in the period to make a better bond between ornament, adhesive and ceiling. I undercut the scratches to make keys.

I had determined from photographs of the existing medallions the number of reproduction castings required for the job. Ornaments that appeared in great quantity were gang-molded to produce several casts at a time for efficiency. I produced all the required ornaments in one day's working time, using a little over 100 lb. of plaster.

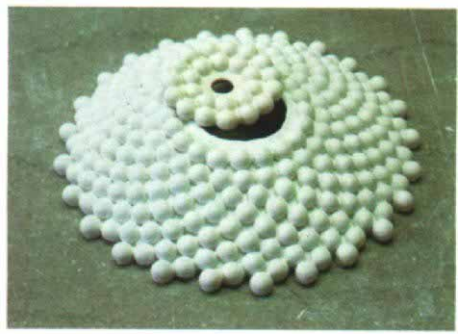
Fashioning a template—In addition to the cast ornaments needed for both medallions, the Bennett House project called for plain-run moldings to be made at the job site. For this process, I used the sheet metal that I had scribed on the site to make one template for each of the plain-run profiles (drawing facing page). The templates would be attached at the center of the medallion and when turned, would form plaster into the desired shape. First, I cut the two 22-ga. galvanized sheet-metal blades to the approximate profile of the molding using tin snips, then carefully filed the exact profile using half-round, rat-tail, flat bastards and carbide rotary files chucked-up in my drill press. I nailed the blade for each medallion to a wooden stock that I had sawn to a slightly smaller profile than the blade. A slipper and brace help to stiffen the stock and catch the plaster as the template is run. Metal nibs would keep the edge of the slipper from wearing too quickly, and a pivot point at the other end would allow it to rotate around a screw set into the electrical box at the center of the medallion.

I traced the location of the plain-run molding in pencil onto my wide bench and placed the cast-plaster leaves on the penciled pattern, so that at the job site I could be sure of an accurate fit. When all the casts were dry, I loosely packed them in cardboard boxes padded with foam peanuts and set them aside for the eventual drive to Charleston. Shipping the materials requires sturdy crating, insurance and an eye to lead time.

Accommodating a light fixture—In the 1820s, before gas and electrical service, light fixtures were simply hung from hooks attached to a ceiling joist and lit by candles or whale-oil fonts. Plaster canopies of the period were often "seeded" like the centers of a flower. The plasterer would carve or model ½-in. to ¾-in. dia. balls and attach them individually around the hook. Seeded canopies were specified for the medallions here, but the small

To make a flood mold, two-part urethane rubber is poured between wood fences clamped together and dammed with clay. The plaster models were first lathered with liquid soap (a parting agent). These pieces are for the parlor medallion.

Flaharty spoons casting plaster into the two-part urethane mold of the stair-hall medallion. He's already poured a gang mold and single mold for parlor ornaments.



To provide access to the electrical box, Flaharty cast a two-part beaded canopy for the stair-hall medallion. The removable center piece is cast with Hydrocal, a gypsum cement of exceptional hardness.

beads would restrict or prevent access to the electrical box, both for chandelier installation and for later alterations to service. In addition, limited electrical access puts the owner at a disadvantage if he files claim against a fire-insurance carrier.

To solve this problem, I cast a seeded decorative canopy in two parts, using a model from a previous job (photo above). A larger surround of seeds cast in plaster is permanently affixed to the ceiling. In the center is a small removable canopy cast of Hydrocal, an especially durable plaster from U. S. G. Corp. (110 S. Wacker Dr., Chicago, 11. 60606). As with a standard metal canopy, this seeded version has a 1-in. shouldered hole through which the electrician threads wire and nipple for hanging the chandelier. I often cast an extra canopy center to leave for the electrician, but canopies of this design have often survived falls from the scaffold, and they provide a period detail with no compromise to modern convenience.

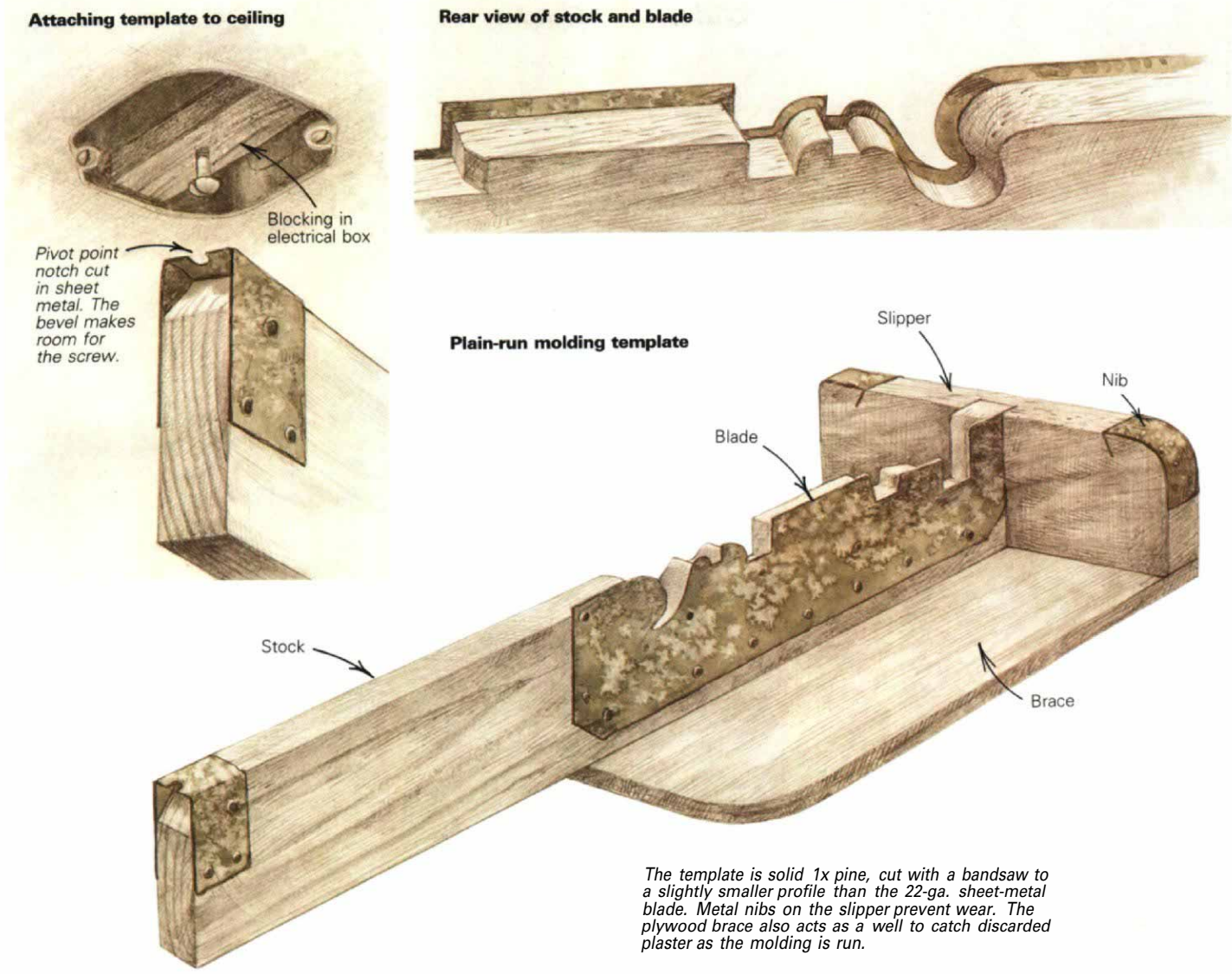
Plain-run moldings—As I continued work in my studio, I kept in close touch with the architect and the plastering, electrical and general contractors. Coordination with them was essential. By the time I arrived in Charleston, the plastering contractor had relathed and plastered the hole in the stair-hall ceiling, and the electrician had installed chandelier hanging apparatus and wired a 4-in. electrical box flush with the finished ceiling line. The general contractor, Tuk & Pherigo, Inc., from Mt. Pleasant, South Carolina, provided the scaffolding.

Scaffolding used for restoring plaster ceilings can be of many different types so long as it's sturdy, adjustable and spacious enough to hold two people, a mortarboard and stand and other equipment and materials. Locking wheels are often desirable, especially when you have to move frequently. I've used trestles, steel and aluminum pipe—even wooden scaffolds over the years—and all are satisfactory. I'm six feet tall so I need scaffolding to be 6 ft. 6 in. from the ceiling and then hope that the other mechanic isn't a midget or a giant.

For the plain-run moldings I had the assistance of a local plasterer, Richard Taylor. I force-fit a piece of 1x blocking into the electrical box and drove a screw into the dead center of the box. Then I slowly pivoted the template around the ceiling, marking with pencil on the ceiling where the molding was to be run. We scratched the existing plaster and painted it with a polyvinyl acetate (PVA) bonding agent to provide adhesion and to reduce the ability of the dry ceiling to absorb water from the new mix.

Gauging up, or mixing the plaster, was next. I use a mortarboard with a plastic laminate top (which makes the board nonabsorbent and easy to clean) and a collapsible steel stand. After troweling finish lime putty (also available from U. S. G.) in a ring on the mortarboard, I poured water into the ring, plus a small amount of powdered retarder to slow the set, then added enough molding plaster to equal the amount of lime. I had previously slaked, or soaked with water, the finish lime putty, but because I used autoclave lime, I could have whipped it up on the job and used it immediately (autoclave finish lime, which re-

Photos this page: David Flaharty

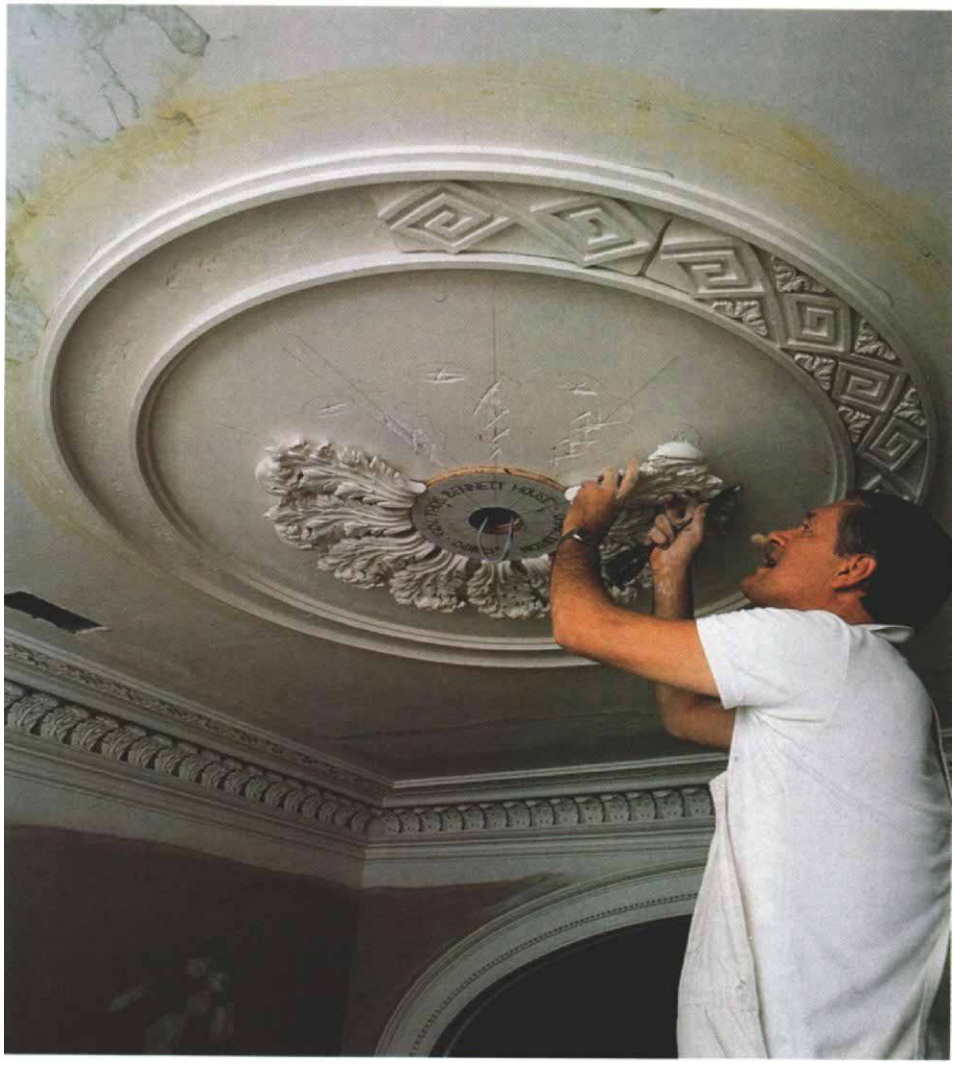


The template is solid 1x pine, cut with a bandsaw to a slightly smaller profile than the 22-ga. sheet-metal blade. Metal nibs on the slipper prevent wear. The plywood brace also acts as a well to catch discarded plaster as the molding is run.

Flaharty uses a template to run the plain molding of the stair-hall medallion. A well catches falling plaster as the template is pivoted on a screw at the center of the medallion.

Assistant Richard Taylor trowels on a mixture of lime putty and plaster ahead of the template. It takes many passes with the template and some stuffing—swabbing plaster on rubber-gloved fingers—to eliminate voids.

Drawings: Charles Schmidt



A plywood stop allows precise placement of the acanthus-leaf cluster. Before attaching the ornaments, Flaharty marked guidelines with a shop-made protractor, then scratched along the lines to give the plaster adhesive a better grip. The ornament is then painted with a bonding agent and the ceiling is misted with water. These steps prevent the adhesive from setting too quickly.

quires no time to hydrate). When the plaster had fully soaked up the water—about a minute or two—the batch was thoroughly mixed, and Taylor applied it to the prepared surface with a hawk and trowel (right photo, previous page).

I reattached the template to the pivot point and spun the template around and through the plaster mix until the molding began to take shape (left photo, previous page). This process was repeated until the circle was perfected, using tools, brushes and hands to feed the plaster ahead of the revolving blade. (Rubber gloves are recommended for applying the plaster to prevent lime from burning the skin.) Every few passes, I removed the template to clean off dried plaster particles.

The operation is usually completed by one mechanic, but on this job we had the luxury of one man mixing and applying while the other ran and cleaned the template. It took us about 20 or 30 passes in about half an hour to make a sharp molding. We followed the same procedures for the stair-hall medallion and the parlor medallion with the exception that the existing paint on the parlor ceiling had to be scraped off before scratching and bonding.

The cast enrichments—The ceilings were then ready for installation of the cast ornaments, or enrichments, as plasterers call them. I drew a line through the center of the circle and squared it to the chimney breast. In my shop in Pennsylvania I had cut a protractor from Masonite in a circle large enough to fit just inside the plain-run molding, and marked it with radiating lines where the major ornaments should be placed (photo above). At the side, I held the protractor against the ceiling, centered on the electrical box. The protractor is useful because it lets me do the tenth-grade plane geometry in the shop, so at the job I only have to plot and connect the points. After drawing the location lines for the individual ornaments, I scratched x's up and down the lines to assure a good bond between ceiling and adhesive.

I had also premeasured the space between the center of the medallion to the first group of ornaments, a cluster of acanthus foliage, and had made a circular plywood stop that took up that space. I screwed this stop to the center of the electrical box and removed it after all the ornaments were in place. The stop and radiating lines drawn with the protrator guaranteed quick and perfect placement of the ornaments.

When the Bennett House and others of its period were built, plaster ornaments were adhered with molding plaster. Cast ornaments were first soaked in water so they would absorb no moisture from the adhesive when it was applied to their scratched backs. The ceiling was then moistened and the ornaments pressed into place. They were held only for a matter of seconds until the ceiling plaster drew water from the adhesive, turning it to a very rich mix. Excess adhesive was quickly removed with a wet brush, leaving a clean, as-cast installation.

Because the resulting bond is so strong, I follow the same procedure today, but instead of soaking the cast ornaments with water, I coat the backs with PVA bonding agent, which inhibits suction, decreases the weight (compared with soaking) and allows the painting contractor to start work sooner.

Finishing it off—With all ornaments installed, the final step was pointing between the fretwork pieces and other continuous ornaments to continue the flow of the design. I applied pure molding plaster to the gaps with small spatulas and washed the ornaments with water, using ¾-in. artist's brushes.

The final finish was applied by a local painting contractor. A three-coat application of oil-base paint was used, starting with an alkali-resistant primer containing a high percentage of medium and a low percentage of pigment. Latex emulsion systems may be used (with an acrylic plaster primer, plus two finish coats), especially when the owner has planned a party and the plaster has yet to fully dry. Latex allows the ornament to breathe. Ceiling medallions may be glazed, polychromed and gilded; in the Bennett House a flat to semi-gloss off-white paint was used, replicating the period finish.

If Governor Bennett were alive today, he would be at pains to distinguish the new medallions from those his ornamental plasterers produced from his drawings over 150 years ago. Molds made from hide glue that his craftsmen used have given way to rubber molds with fingerprint detail capability; modern paints, properly applied, last much longer than his kalsomine; and Edison helped make evening entertaining as simple as flicking a switch. His ornamental work placed Bennett among the ablest of early American architects and his house among the finest of home building. □

David Flaharty is a sculptor and ornamental plasterer living in Green Lane, Pennsylvania. Photos by Peter Sanders except where noted.