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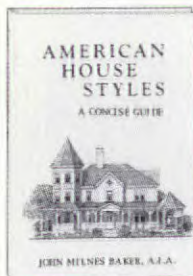
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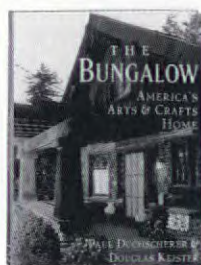
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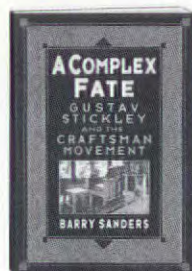
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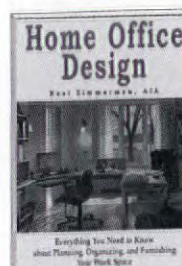
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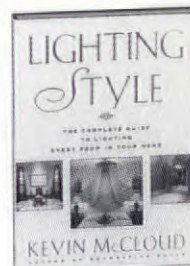
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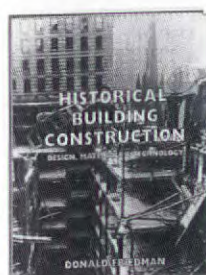
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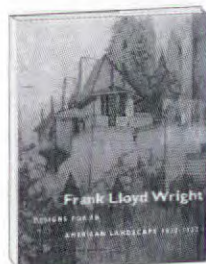
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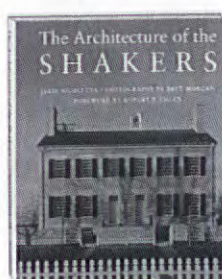
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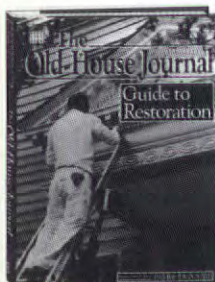
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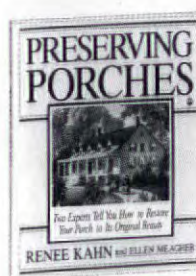
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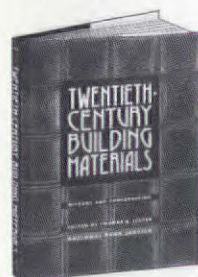
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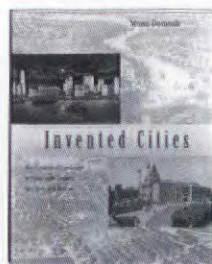
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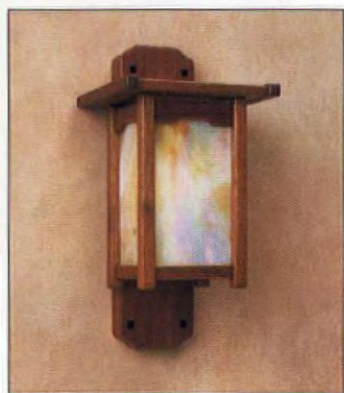
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6 1/2" - 20 tooth



5 1/2" - 24 tooth



5 1/2" - 16 tooth



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5 3/8" - 20 tooth



5 1/2" - 16 tooth

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Please Fence Me In

THIS ISSUE INCLUDES SOME GREAT INFORMATION on working with wood, from rethinking log buildings to repairing a Prairie School masterpiece with engineered lumber. Nonetheless, I'm most attracted to the articles that make up the special theme on metals, perhaps because they each have a point of reference for me.

Exterior ironwork from the past comprises a world of surprising beauty and variety, especially when compared with the strictly functional, all-steel versions of our own era. Iron was a plastic medium in the hands of 19th century craftsmen, and they used it to adorn and protect houses of all economic strata—and literally at all levels. Fences or railings, when raised to the second storey, became balustrades for the balconies and verandas so closely associated with southern cities such as Savannah and Mobile. Cresting, as we learn, is just fencing at the top of the house, marking where the owner's property meets the sky rather than the street.

I know of no better example than OHJ's old neighborhood: Park Slope in Brooklyn, New York, one of the largest uninterrupted Victorian communities in the world. There, street after street of row houses are limned by stocky cast iron fences. Some are slowly self-

destructing after a century of neglect, but many stand beautifully preserved or lovingly restored. Exterior ironwork represents a tremendous investment in materials and time—the metal fence and gate market was over \$180 million in 1995 alone—and it is well worth the effort to retain.

Indoors, every old house makes use of metal in both mechanical and decorative ways. One of the most impressive is the embossed-metal ceiling, a classic gaslight-era

material that finishes off countless interiors across the continent. Surprisingly, there's next-to-nothing written on the restoration of "tin" ceilings. The little practical information that does find its way into print—primarily on new installation for neo-traditional uses, such as restaurants—is almost as thin as the material itself. It's also not that useful if you want to save an old, existing ceiling. To solve the mysteries of dealing with paint and rust overhead, we drew on the advice of some local tin ceiling stewards and our own collective experience restoring the coffered beauty in OHJ's office.

Refinishing old-house hardware is subject we've wanted to brush up on since answering an Ask OHJ letter almost two years ago. A reader in Nebraska was perplexed about the piebald "zebra" finish on his bungalow light fixture. So were we until we talked to some experts. Turns out the surface was antique copper, a metallic effect that was highly popular early in this century.

Researching the article even sent me on a bit of a nickel-plating binge. My latest love is the 1897 General Electric fan you see blowing away on page 56, a \$3 find at a flea market that worked fine after a little electrical surgery. The surface, however, was another story. Gangrenous corrosion had eaten the blades, cage, and fittings down to their brass base. It looked like The Fan from the Black Lagoon. So, I found a company that plated and polished the parts to a factory-fresh shine. Here's hoping these articles are as useful a reference for you.



Yellin used monel, a nickel alloy, for the pedestrian gate at Yale Graduate School.



The genius of Samuel Yellin brought unmatched design and metalworking skills to wrought iron.

Golden Roel

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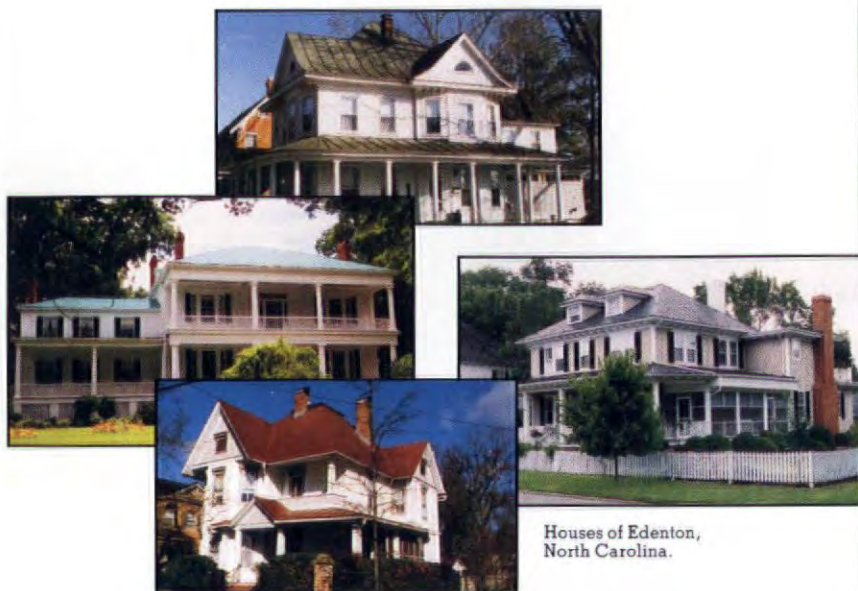
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M A I L B O X

HORSING AROUND

REGARDING YOUR LIST OF COLORFUL trade jargon ["Writing on the Walls," March/April 1997], "horse" has an interesting origin. As you explained, a horse is the wood backing for a metal template used to run plaster mouldings. It's my understanding that the word comes from early plaster shops, where templates for large cornices were attached to stocks and slippers and pulled by mules.

A phrase that mystifies me is "punch list." It refers to the work to be corrected or completed on a project, but does anyone know the phrase's origin?

— DAVID FLAHARTY
Green Lane, Penn.

ROAD WORK

IN HIS EXCELLENT ARTICLE "A PERIOD Approach to Walks and Drives" [March/April 1997], author Michael Weishan makes a slight mistake. John McAdam (1756–1836) developed a road construction process that involved carefully graded stones: large stones on the bottom, small stones on top. The bed was coated with rock dust, but not with bituminous binder. The "macadam" road was ideal for horse-drawn vehicles, which compacted them into hard surfaces. Only after McAdam's time were tar and asphalt added.

— MARVIN H. ALLISON JR.
Acushnet, Mass.

You're right. McAdam's original road surfacing process included no bitumen. In 1815 London, McAdam began using compacted and interlocked layers of stone and stone dust to create hard-surface roads. Later in the 19th century, road builders coated the surface with coal tar or asphalt to weathertproof the rock. This new process was called tarmacadam (tarmac). In modern road engineering, macadam has taken on another meaning. It refers to a road surface made with a crushed rock base that's coated with asphalt, cement, or hot tar mixed with aggregate. —THE EDITORS

TWO-ACRE TUDOR

MEADOW BROOK HALL, ["The Other Proper Style," March/April 1997], is in Rochester, Michigan. It's location was incorrectly identified.

— ALICE SPANDE
Clarkston, Mich.



Meadow Brook Hall was built as a private residence in 1929 at a cost of \$4 million. The 100-room, 88,000-square-foot mansion is now a part of Oakland University.

OLD-HOUSE LIVING

THANK YOU FOR "SALVAGE LABORS" [March/April 1997]. Articles like this are the best part about subscribing. After seeing what Richard and Sharon Schmidt did to save that old carriage house, I know I'm [continued on page 12]

UN-MASKED MAN

I HAVE NEVER LIKED USING MASKING tape to paint lines and have used straightedges for years, but never knew it was a 19th-century method ["Victorian Lining and Striping," March/April 1997].

Your advice to use a dowel to guide the paint brush without touching the paint has improved my speed and accuracy.

— JOSH PARKER
Ft. Collins, Colo.



The original painting in the dining room of the White Farm Bed & Breakfast in Brockport, New York, includes Victorian lining discovered under many layers of old paint. Restoration by Christine Muratore Deats.

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MAILBOX

[continued from page 10]

not alone. My salvage labors include rebuilding the 19th-century outbuilding—which includes a blacksmithy—behind our house.

—SARAH MASTERS
Roseburg, Oregon

ADDITION AND SUBTRACTION

WHEN IT COMES TO ADDING ON TO a historic property, many preservationists, like Mr. Norris ["Bucking the Standard," Jan./Feb. 1997], feel it's best if additions "blend seamlessly with the original." To see the problem with this thinking, you have to look beyond pure aesthetics and recognize the importance of historic structures as tangible records of the values, technologies, and lifestyles of their time. The Secretary of the Interior's Standards for Rehabilitation correctly

suggest that the addition will best respect the original house by carefully embracing its features, while maintaining a distinct character that accurately portrays a physical record of its own time.

—ANDREW CARPENTIER, R.A.
Chair, Oakland Landmarks
Preservation Advisory Board
Oakland, Calif.

MEDALLION MAKEOVER

SINCE I WROTE ABOUT REPAIRING my ceiling medallion ["Ceiled with a Kiss," March/April 1997], I have completed the restoration of the rest of my house. I was even lucky enough to locate an 1850s four-arm gasolier, which now hangs from the medallion.

For anyone who may be in the Galena, Illinois, area June 14 to 15, my home will be on a local house

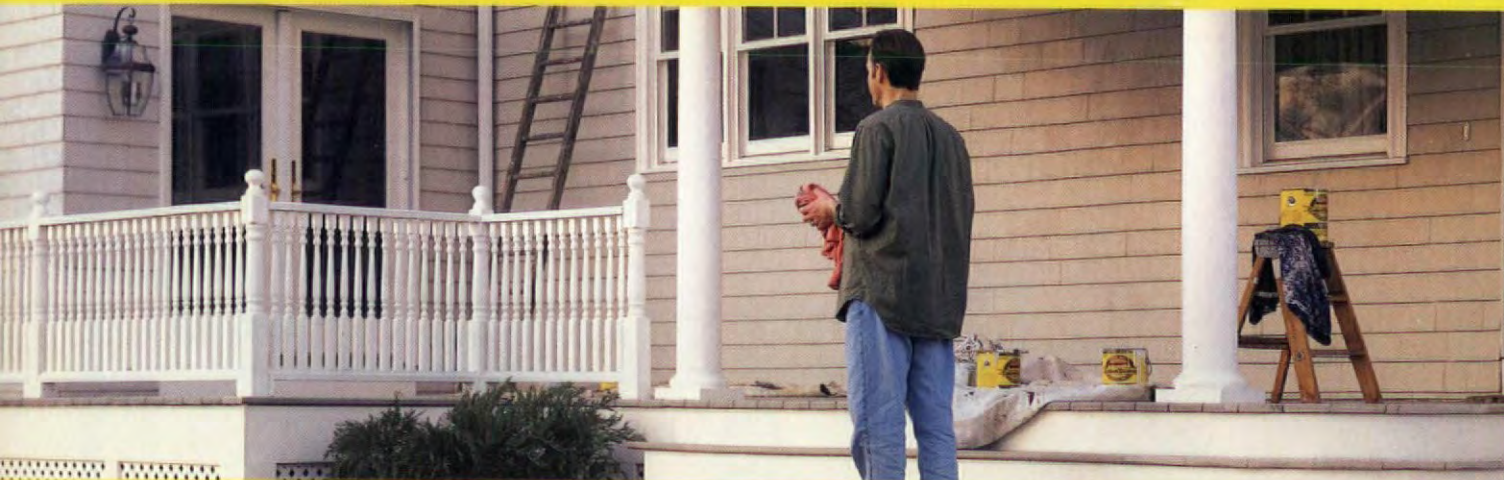


The shades on the gasolier are from the turn of the century. Husfloen is looking for a more appropriate set.

tour sponsored by the Galena/Jo Daviess County Historical Society and Museum (815-777-9129).

—KYLE HUSFLOEN
Galena, Ill.

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ACCIDENTAL PLANS

WE FOUND A DUSTY BOX AMIDST trash left in the attic eaves by previous owners. Inside were signed architect's plans ["Dream Come True," March/April 1997], bills for materials, and some family correspondence. The drawings indicate that a dormer is not original, or at least originally planned. They also show a built-in dining room cabinet where the door to the kitchen now stands. This fall we'll be moving the door to its original location and rebuilding the cabinet. The dormer stays.

— KITTY JAMISON
Columbus, Ohio

SASH SENSATION

I READ WITH GREAT INTEREST Gordon Bock's article, "New Century Sash" [Jan./Feb. 1997]. As you can



Wintertime in Ontario looks better through picturesque divided lights.

see from the photo, we have decorative upper sash in our house, built in 1925 in a gold-mining town eight hours north of Toronto. The house needs repair and enlargement, and we are anxious to preserve its character. Articles like yours help to teach us about its features.

— CAROLYN F. FRANKE
Timmons, Ont.

MASSEY AND MAXWELL TO TEACH COURSE

OLD-HOUSE JOURNAL CONTRIBUTING Editor James C. Massey will teach a two-week course on the restoration and preservation of historic houses at Drew University this summer. Through slide lectures and site visits, students will learn to recognize house styles and to understand prudent restoration methods. Shirley Maxwell, Massey's wife, business partner, and fellow OHJ contributing editor, will be a guest lecturer. Running from June 2 through 12, the class will meet Mon.-Thurs. from 9 a.m. to noon. For further information, contact Meghan Culbertson, Continuing Education, Drew University, 120 Madison Ave., Madison, NJ 07940, (201) 408-3185.

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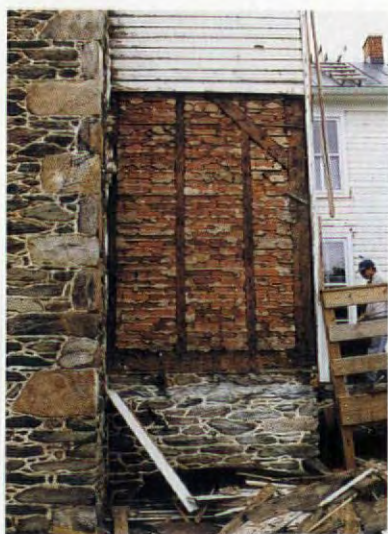
WATTLE YOU HAVE

When we removed three layers of siding from our 150-year-old farmhouse, we found a brick filler between the studs in the first storey. It appears to have been installed from the interior. What can you tell me about this type of construction?

—Sandra Simmers
Purcellville, Va.

YOU HAVE A WALL FULL OF BRICK nogging, a masonry filler used as a firebreak and insulating material in houses built before 1860. Nogging typically was a mixture of rough-hewn wood slats or brick, bound in place with mud, straw, twigs, or grass. A close relative of wattle-and-daub construction, it was used to fill the wall spaces between vertical framing posts in timber frame and stone houses.

In the Middle Atlantic states, nogging was a common feature of



The brick nogging "insulation" in this northern Virginia farmhouse represents a building technique that dates to Elizabethan times.

the exterior walls of wood-frame houses built before the Revolutionary War, and in the interior walls of stone houses into the early 19th century. Nogging may have been a carryover from half-timbering, the English construction practice of covering the exterior of a building before filling in the frame. Although early American colonists began closing in house frames almost as soon as they went up, infilling apparently persisted long after the original purpose had been forgotten.

SLATE SPLASH

Our slate roof is nearing the end of its 60-year life. When we replace it, I'd like to use some of the old slate to tile a kitchen backsplash. Will this idea work?

—L. Bellerio
Red Bank, N.J.

THERE'S PLENTY OF HISTORICAL precedent for slate around sinks — although recycling old roofing slate for the purpose is a novel idea. Slabs

[continued on page 16]

LAMP WITH A MISSION

We were excited to see a table lamp identical to the one we own in the background of a photo of Patricia Poore, published last year. We've been trying to identify the lamp for years. Can you offer any help?

—Jeff Dziura
Western Springs, Ill.

ELECTRIC TABLE LAMPS FIRST appeared after 1900, displacing earlier electrified versions of oil and gas lamps. Freed from the need for bulbous oil fonts and chimneys, many took an angular, Gothic form in keeping with the Arts & Crafts aesthetic just hitting its peak.

Sears, Roebuck & Co. sold a metal Mission lamp similar to yours (and that of OHJ Editor-in-Chief Patricia Poore) between 1905 and 1910. The shade and base are made of green cathedral art glass, essential for softening the harsh glare of early (unfrosted) electric light. When the lamp is lit, the glass turns warm



The art-glass and ebony-finish metal base of this ca. 1910 Mission lamp may originally have been illuminated.

yellow. Undoubtedly this is a mass-market lamp, probably made by a small manufacturer — but exactly who that was, we can't say. We'd enjoy hearing from anyone who can shed more light on this lamp.

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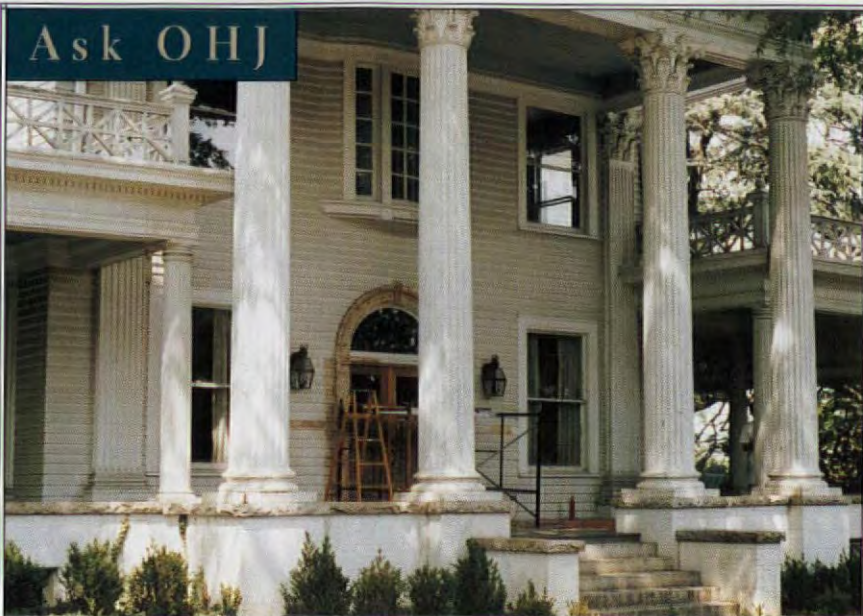


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of soapstone and slate were common backsplashes for dry sinks before the advent of indoor plumbing. In the first two decades of the 20th century, you could order a slate laundry sink from a catalog, says Jeffrey S. Levine, an architectural conservator with John Milner Associates.

Most residential roof slate is standard grade, which has a uniform appearance and a width of about $\frac{3}{16}$ ". You or your tilsetter should easily be able to cut the slate to size with a wet diamond-blade saw. The slate tiles can be set in place using the same mortaring techniques you would use for any heavy tile.

Use only sound slate that shows few signs of flaking or delamination. Since the stones will be weathered and dirty, clean them with soap and water. Once the backsplash is in place, protect the slate in its new habitat with a coat of boiled linseed oil.

STAVE-ING OFF PROBLEMS

The columns on my ca. 1911 Neoclassical Revival house are relatively soft and some of the wood is split. How do I relaminate them?

—Kevin Hennings
Monroe, N.C.

In humid North Carolina, wood columns are especially vulnerable to moisture damage.

BEFORE YOU CAN REPAIR THE splits, you need to determine what kind of column you have, says restoration consultant and OHJ Contributing Editor John Leeke. If the gaps are irregular and tend to spiral, the column may be hollow-bored from the center of a tree trunk, or a solid blank cut from the heart of a tree. If the splits are straight and parallel, the column is stave-built—pieced together out of long shafts joined by any one of a half-dozen techniques.

Given the age and design of your columns, it's most probable that they're stave-built. You can repair splits with the column in place if the loose, open joint is less than $\frac{1}{8}$ " wide and can be moved back together by hand.

To make the repair, move the wood back into alignment and apply an epoxy adhesive formulated for wood. Use band clamps to hold the joint together. If the joint doesn't close with hand pressure, don't try to force it closed with the band clamps. If you do, you risk forcing open another joint or splitting the shaft.

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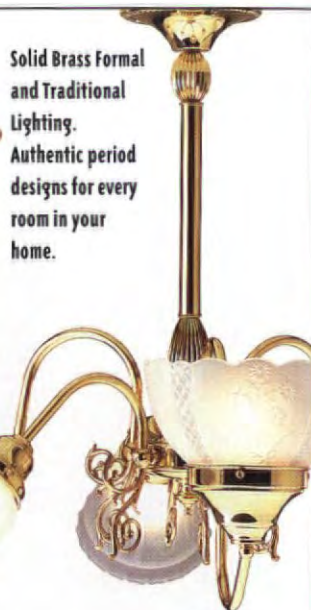
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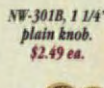
NW-14, Springfield



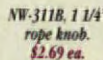
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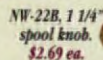
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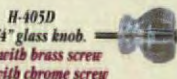
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The cover of 'The Old House Journal' magazine, Volume 1, Number 1. The title is prominently displayed at the top in a large, stylized font. Below the title, the subtitle 'A Magazine for the Old House Enthusiast' is visible. The main image shows a man in a white shirt and pants, seen from the back, painting a wooden structure. The text 'Guide to Restoration' is overlaid on the right side of the cover. The issue is dated 'January 1994' and priced at '\$4.95'.

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in America*

By
The House & Garden Society of America
and
The National Trust for Historic Preservation

Foreword by
James O. Easton, Jr.

Introduction by
John H. Johnson

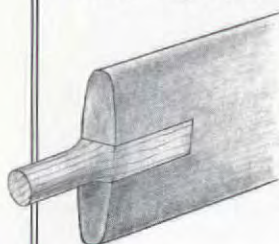
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HISTORIC HOUSE PLANS
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RESTORER'S NOTEBOOK

OPEN AND SHUTTER

I REPLACED BROKEN TENONS ON our adjustable shutter louvers with wood chopsticks. Select chopsticks that are round at one end and square at the other, and stick with bamboo. Remove the damaged louver and cut a mortise for the square end of the chopstick. Next cut the chopstick to length, and put glue on the mating pieces without getting any onto the new tenon.



Place the chopstick segment so the transition between its round and square ends falls at the edge of the louver.

Then jackknife the parts together in place, and clamp to dry. (Tight rubber bands make good clamps.) Apply wood putty as necessary, and sand before painting.

—ALLEN S. JOSLYN
Montclair, N.J.

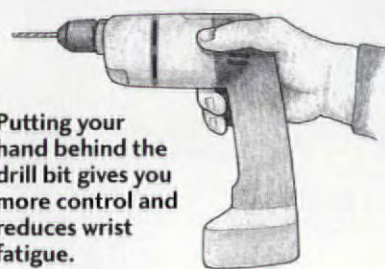
CHASE SCENE

IF YOU HAVE INTERIOR WALLS I opened up for any reason, take the opportunity to provide a chase for future wiring. We cut through the wall plates and flooring with a hole saw and joined lengths of PVC to run from the basement to the attic. Then we cut access holes in the pipe at outlet level on each storey. We'll hide these locations with electric panel covers. The conduit will enable us to run lines between storeys for telephones, cable television, electricity, a security alarm, and whatever else we want. It'll require only limited snaking of wires through the walls.

—JAMES DE FORD
Wilmington, Del.

STRAIGHT SHOOTER

I FAVOR MY PISTOL-GRIP CORDLESS drill over the new T-handled models because it allows me to hold the drill more effectively. Instead of grasping the handle, put your hand



Putting your hand behind the drill bit gives you more control and reduces wrist fatigue.

up higher, behind the motor. This gives you more control and cuts down on sore forearms because your hand is in-line with the bit. Use your ring finger and pinkie to operate the trigger. The technique takes some getting used to, but after 10 years as a union carpenter, I can tell you the reduced wrist fatigue is worth the effort.

—MICHAEL STEELE
Elgin, Ill.

COMFORTABLE COFFEE BREAKS

I 'D LIKE TO SHARE SOME SIMPLE advice that helps when you're doing a major restoration while living in an old house. Get a ratty chair (preferably a recliner) from a thrift shop or a friend's basement, cover it with a washable throw blanket or sheet, and set it up right in the middle of the grit and dust. It'll give you a chance to take breaks without having to decontaminate yourself.

—LAURA WALKER
Washington, Penn.

BIT PARTS

TRY USING OVEN CLEANER TO REMOVE wood pitch from toolshop bits and knives. Simply spray it on, and wipe it away in two minutes.

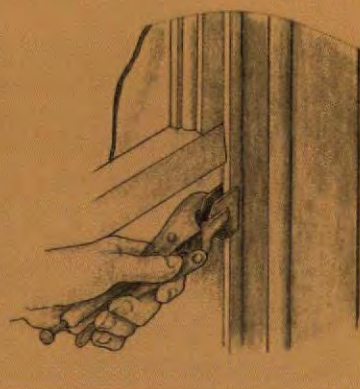
—GREG JOYCE
Red Bluff, Calif.

PARTING WORDS

O VER THE YEARS, I HAVE RE-strung most of the sash weights for our 35 windows. I broke many a parting bead until I stumbled across the perfect tool for removing them intact. First, I use a putty knife or utility knife to break the seal of the paint, caulk, or varnish. Then I grab the bead with one or two locking seamers—basically duck-billed locking pliers sold for metalwork. Locking seamers have wide jaws with no teeth, so they're ideal for grabbing and locking onto the

bead. Once you have a good grip, gently wiggle it free. Start at the bottom and work slowly, especially where the meeting rail covers the bead.

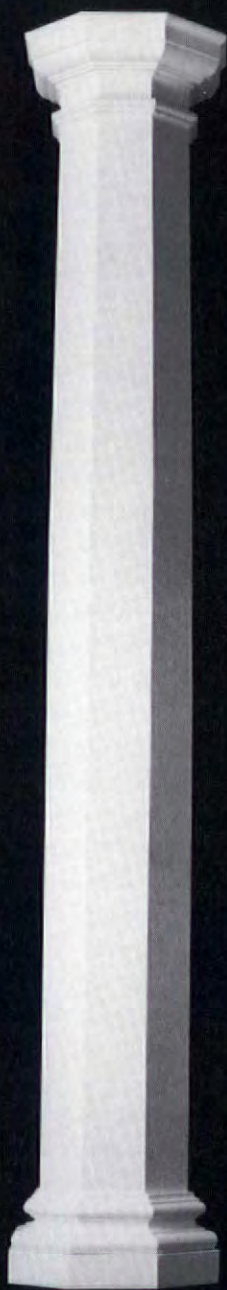
—DAN MILLER
Elgin, Ill.



Use locking seamers to work the parting bead around the meeting rail of the upper sash.

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Sometimes it's a prominent architectural feature—not stylistic flourishes—that defines a house type.

Hipped and Pyramidal Roofs

BY SHIRLEY MAXWELL AND JAMES C. MASSEY

AS WE READ THROUGH A RECENT STACK OF SUBSCRIBER mail, we found ourselves intrigued by a group of unrelated letters that had come with snapshots. Coincidentally, all were from the Midwest. Yet these houses could have been built almost anywhere in the country. What had instead captured our attention was a common trait among the houses. Built over a span of 70 years and in styles from Italianate to Craftsman, the buildings were strikingly linked by their prominent hipped roofs.

That got us thinking.

First, we pondered the definition of a hipped roof. Essentially, we're talking about four roof planes sloping outward—forming the “hips,” or outside corners. When

a building is longer than it is deep, a ridge (or deck) is unavoidable at the apex. At top, there may be a balustraded deck or a cupola. On square or nearly square buildings, the four roof slopes may actually meet at the top to form a pyramid. Think of the trigonometric variations on the roofs of octagonal and

hexagonal buildings, or asymmetrical houses with wings and ells! We imagined a slew of variants: steep hip, low hip, deck-on-hip, hip-on-hip, pyramidal, near-pyramidal with vestigial ridge, hip with dormer, double-hipped, jerk-inhead (a kind of nascent hip).

Second, we wondered when and why the hipped roof became such an enduring feature in American domestic building. The “why” of their popularity seemed at first apparent: Hipped roofs must offer economy and maximize shelter. But the economy argument doesn't al-

ways hold up. True, in building small houses, fewer long timbers would be needed to frame a hipped roof than a gabled roof. And hipped roofs do eliminate the upper portions of walls that would be contained in gable ends. Four very long and heavy pieces of framing, however, must still extend from the roof peak to the wall plate.

Hipped roofs do offer shelter from glaring heat and heavy rains—making this rationale for the form especially applicable to the earliest use of the hipped roof in what is now the United States: the one- or one-and-a-half-storey houses introduced by the French (with West Indian modifications) into the Mississippi Valley and along the Gulf Coast in the late-18th century. Early, steeply pitched “pavilion” (hipped) roofs gave way over time to gentler slopes. Throughout the 18th and 19th centuries and into the 20th, the hipped roof was endemic to Creole, raised, or Gulf cottages. Hipped roofs are occasionally found even on shotgun houses. (We may get an argument on that in New Orleans, where shotguns are gable-fronted. But remember: shotguns were built in Louisville, too, and elsewhere in the South.)

THESE EARLY, FRENCH-DERIVED HOUSES WERE INFORMAL. But what about the early, *formal* use of the hipped roof? Think of 18th-century Georgian and early 19th-century Federal houses. Here again, pitch started out steep in the Georgian era but gradually became lower in the Federal period, as the houses became noticeably wider than they were deep. Deck-on-hip roofs, sometimes with classical balustrades around the decks, are characteristic of this time.

By the middle of the 19th century, houses in the Greek Revival style often had very low hipped roofs with deep friezes at the cornice line. A bit later, many Italianate houses were crowned with low, hipped roofs set above bracketed eaves. After the Civil War and into the early-20th century, houses with Queen Anne or Colonial Revival elements often had a core section with a hipped (or pyramidal) roof. Gable-roofed ells at the front, back, or sides often obscured the shape of the central roof, pro-



The Oquist family moved their ca. 1920 Nebraska farmhouse 37 miles. Its hipped roof is a prominent and defining feature.



A formal hipped roof in the English tradition culminates in a deck in the 1759 example above. The French-derived hipped roof, shown in the Pensacola, Florida, house at right, is an informal type. The Blair house in Williamsburg (below) has a gable roof with clipped ends, or jerkinheads, that form hips.



STEEP HIP ROOF



DECK ON HIP



HIP WITH RIDGE



PYRAMIDAL



JERKINHEAD



Top Picture: Rococo Chandelier by Starr, Fellows, New York C: 1857
Center: Deer's Head sconce by Gibson Gas Fixture Works, Phila., PA C: 1890
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The Prairie-influenced Foursquare (top) with an unusual pyramidal roof is located in River Forest, Illinois. The two New Jersey examples (above) are typical with their hipped dormers in pyramidal roofs.

ducing a cross-gabled effect. (Then there were the towers, oriel, and bays surrounding the hip-roofed sections, too.) Throughout the period, vernacular Victorian-era houses with indefinite style characteristics continued to wear hipped roofs.

IN THE 20TH CENTURY, MANY house styles, both modern and revival, made use of the hipped roof. Think of the ubiquitous American Foursquare in all its style guises; it is a form defined by its cube shape and hipped or pyramidal roof. The hipped roof

lent itself to the formality of the Colonial Revival, the picturesqueness of the Craftsman style, the horizontality of Prairie School architecture, the villa pretensions of the Mediterranean styles—and even to the contemporary lines of Post-War suburban houses.

Hip, hip, hooray: this type is clearly a roof for the ages.

QUESTIONS ABOUT HOUSE STYLE, or about the original appearance, derivation, or details of your house? Send a letter with a clear, color photo or two: Reading the Old House, OHJ, 2 Main St., Gloucester, MA 01930.

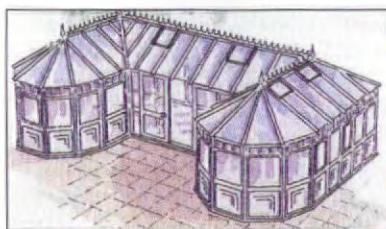


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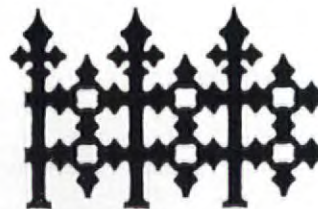
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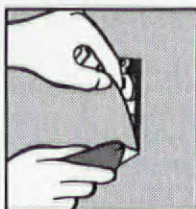
3. Apply fiberglass mat to wet surface.



4. Trim excess mat where wall meets ceiling.



5. Trim mat at baseboard and window.



6. Trim mat at outlets, switches, etc.



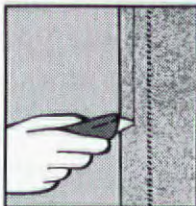
7. Apply second coat of saturant to wet mat.



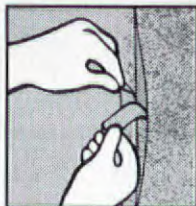
8. Apply 1st coat of saturant to adjacent area.



9. Apply mat to 2nd area, overlapping by 1".



10. Cut down center of overlap (both layers).



11. Remove mat strips on both sides of cut.



12. Apply 2nd coat of saturant (include seam)

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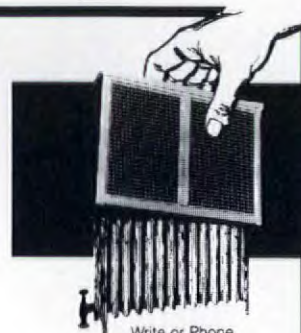
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Cascading over a fence or
banked against a verandah,
old roses re-create the aura of
a landscape rooted in the past.

PHOTOGRAPH BY WALTER CHANDOLA

Old Roses: A Sampler

BY JO ANN GARDNER

OLD ROSES CREATE THE PERFECT SETTING FOR the old house. These often-ancient flowers are the same plants that could have been blooming in any garden prior to the 1910s. Far from being just living heirlooms, old roses are also "hot" in today's horticultural world. Richly fragrant, they bear the deep rose scent we often seek, but fail to find, in modern roses. Unlike showy hybrids of recent vintage, they are relatively carefree, hardy, and willing to grow in a range of soil and climate conditions.

In the sampling that follows, you'll find old roses to suit every garden. Most bloom only once each year but, by selectively choosing types, a home gardener can keep the roses coming from spring to fall. With their attractive foliage and colorful hips (fruits), the landscaping value of old roses extends well beyond their season of bloom. All make fine informal hedges.

Old Garden Roses

CULTIVATED IN EUROPE and Asia Minor since classical times, old garden roses dominated European and American gardens before 1867, when the first hybrid tea roses were introduced. Fragrant and many-petaled, these tough shrub roses typically bloom in early summer.

ALBA (THE WHITE ROSE OF YORK)—The intensely fragrant pink or white flowers of the Alba and its descendants bloom early to midseason on dense, arching bushes that reach 5' to 8' in height.

CENTIFOLIA (CABBAGE ROSE)—Familiar from old Dutch paintings, the round, tightly packed flowers of the Cabbage Rose may have as many as 100 overlapping petals. Centifolia grows to 3' to 5' on canes with

wrinkled foliage. It usually blooms at midseason.

DAMASK—These flowers, ranging from pale pink to red, have been distilled for their fragrance since ancient times. The Damask's arching, thorny canes reach 5', blooming profusely at midsummer.

GALLICA (FRENCH ROSE)—Also known as the Red Rose of Lancaster, the Gallica is the oldest of old roses and blooms at midseason. One variant, the Apothecary's Rose (*Rosa gallica officinalis*), was brought to America by the Pilgrims for medicinal use. Its rich

fragrance, intensified by drying, floats from deep-pink flowers with golden stamens on a low, spreading bush. 'Rosa Mundi' is a spectacular striped variant.

While old garden roses are available from commercial sources, don't overlook some of the best hunting grounds: overgrown gardens and cemeteries. Always ask before digging up an old rose—or better yet, just a piece of it. Choose cuttings early or late in the season.

Wild Roses

WILD ROSES ARE THE FOREBears of the thousands of

roses in cultivation today. Often single flowered (with just five to 12 petals), some of the most appealing are these shrubs and climbers.

THE SWEET BRIAR (EGLANTINE ROSE, *R. eglantaria*)—Associated with cottage gardens, the Sweet Briar bears deep pink flowers at midsummer, followed by scarlet to orange hips. Cherished for its apple-scented foliage, the Sweet Briar can reach 10' to 14'.

RUGOSA—Introduced from Japan in the 1840s, Rugosas are resistant to salt spray and stand up to winds. They often grow to 6' in coastal areas, blooming from



Old roses include climbers like Father Hugo's Rose (left) and 'Dr. W. Van Fleet' (bottom, right), and the intensely fragrant Apothecary's Rose (top).



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midsummer to fall. Tough and beautiful at the same time, Rugosas are identified by their dark green foliage, purplish or white flowers, bright hips, and rose-clove perfume.

'BLANC DOUBLE DE CORBET'—This densely petaled rose (1892) is one of the finest hardy white roses. It blooms from mid-season to frost and reaches 4' to 6'.

Among the hundreds of wild roses and their variants, several stand out because of their yellow flowers—unusual in the world of old roses. The bright, fragrant, densely petaled Persian Yellow (*R. foetida persiana*, 1837) grows to 5' and blooms at mid-season. The spring-blooming Father Hugo's Rose (*R. hugonis*, 1899) reaches 8' and produces yellow blossoms, shown to great effect when the plant is grown as a climbing rose.

Early Modern Climbers

MODERN CLIMBING ROSES ARE technically hybrids, but since they have been grown in American gardens for most of this century, they are considered "old" by garden specialists. They include the following varieties, which can be



No cabbage ever smelled as sweet as Centifolia, the Cabbage Rose.

trained to grow up a trellis, arbor, or building wall.

'DR. W. VAN FLEET'—Bred by an unassuming Department of Agriculture employee in 1910, this climber quickly became a rose classic. Growing on canes to 20', its fragrant, densely petaled flowers are pink, fading to white. A descendant, 'New Dawn' (1930), bears clusters of pink, tea-scented flowers all summer.

'PAUL'S SCARLET CLIMBER'—Spectacular when pegged to a fence, this climber dating to 1916 can reach 15' and blooms at mid-season, pouring forth large, full, scarlet flowers in clusters.

JO ANN GARDNER is the author of *The Heirloom Garden* (Garden Way, 1992). She tends her flower gardens in rural Orangedale, Nova Scotia.

Growing Old Roses

Old roses will survive neglect, but they thrive on care. All types need a site with good air circulation, well-drained soil, and at least six hours of direct sunlight each day. Plant old roses 3' to 5' apart, or with 18" to 24" spacing for a hedge. Climbers should be planted 12" to 15" away from the surface on which they will climb, and 7' apart. Because buds form on old stems, prune after blooming.

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With wrought iron railings at ground level and cast iron balustrades on the upper storeys, residences like this urban row house became showcases of the ironworker's art in the late 19th century.

The Art of Ironwork

Historic Use of Railings, Fences, and Gates—with Techniques for Care

by Henry J. Magaziner, F.A.I.A.

IN RURAL EARLY AMERICA, THE PRIMARY purpose of a fence was to keep livestock—cows, sheep, and pigs—away from the house. As the country urbanized, the fence's function switched to containing pets (predominantly dogs) and defining property lines. In a growing nation that was rapidly industrializing, the material inevitably switched, too. The traditional wooden picket fence soon lost out to ferrous metals—wrought iron, cast iron, and clever combinations of both.

While ironwork of the Colonial and Federal eras is noteworthy because of its hand-crafted beauty and relative rarity, the golden age of American architectural ironwork was actually later, running roughly from 1840 to 1930. If your old house dates from this "century of iron," and you're blessed with an original iron fence (or the evidence of a previous fence), here's what you should know to understand what you have and how to keep it for another century.

TODAY'S FENCES ARE LITTLE MORE THAN utilitarian barriers, but in Victorian times they were considered important features in a site's overall design. According to the prominent Philadelphia architect Samuel Sloan (1815–1884):

None of the appendages to a country seat better repays an expenditure of taste and money than the fencing. Whatever the size of the grounds attached, the enclosure is an important feature in the landscape . . . [The enclosure] may be of stone, brick, iron or wood. The two latter admitting a greater variety of pattern, are more suitable than a wall of either stone or brick.

Nevertheless, of course, Sloan's subject was houses of the well-to-do. In the latter half of the 19th century, nothing finished even a modest town or city home better than a pair of elegant iron railings leading to the front

door. The evolution of such railings, and kindred fences and gates, owed as much to technology as to changes in style.

Wrought Iron

IN URBAN HOMES OF THE COLONIAL AND Federal periods the exquisite iron railings on stone front steps expressed the wealth and good taste of the owners. These railings were all of hand-wrought iron.

Metallurgically, wrought iron is nearly pure iron—that is, it contains less than 1% carbon. It is soft, compared to steel or cast iron, but tough and malleable with a distinct "grain" or layered structure (the result of residual slag). True wrought iron is rarely produced today. The modern substitute is mild steel, an alloy containing up to 2% carbon, which is strong and work-



Above: After 1850, many capable architects also designed fences. This cast iron rail by Frank Furness shows his highly personal style. Below: This 20th-century wrought iron gate swings in Charleston, South Carolina.





The spear motif of this cast iron fence symbolizes its defensive purpose. But symbolism could not stop the corrosion that attacks all outdoor iron not properly maintained with paint.

reservoirs, causing further rusting.

Before there can be any welding, or other restoration, all rust and paint have to be removed from the ironwork. The first step is to chip away any loose paint or rust. Then, dry grit blasting is recommended—unless the member is excessively thin or blasting is prohibited by local regulations. Blasting pressure should be no higher than 80 pounds per square inch, with particles 70–100 mesh in size (see “Gentle Blasting,” July/Aug. 1995).

If blasting is prohibited or impractical, the iron must be wire brushed by hand. Whatever the method, it is important to have the iron cleaned down to bright metal before repairs are made. No type of wet blasting is appropriate; it rusts the iron immediately!

Maintaining Iron

IN RESTORING IRONWORK OF ANY KIND, THE IMPORTANT FIRST STEP IS TO assess the conditions—that is, make a foot-by-foot survey of where deterioration is located, and what kinds and levels of repair or maintenance are indicated. Where the project is large or necessitates contractors, such as welders or blasting firms, it may be cost-effective to hire a preservation architect or conservator to prepare contract documents. Even before this, check with the local building department, the environmental protection agency, and the historical or landmark commission to make sure that the proposed work violates no regulations.

Do some homework on the contractors or craftspeople, too. Examine their previous work to see if their skills, methods, and equipment are appropriate for your project. Major repairs that involve blasting, cutting, fitting, tapping, and finishing of iron are best performed by experienced metalworkers.

Where there's iron, expect to find rust—sometimes lots of rust. Rusting, technically oxidation of the iron, can be due to the presence of water, salt air, sea water, acids, acid rain, and air pollutants. Where the iron has crevices that trap and hold liquids, the rust may be especially bad. Since rusted surfaces are porous, they act as



Unlike oxidation on non-ferrous metals, which provides a protective coating, rust will continue to eat away at iron until the metal is consumed. Most insidious are scale patches and pockets, such as this deterioration on the famous “cornstalk fence,” that trap water.

Rustproofing

ALL EXTERIOR IRONWORK SHOULD BE painted immediately after repairs have been made or replacements added, otherwise it will rust. Whatever paint system is used, the surfaces must be properly prepared. Poorly prepared surfaces will not retain even the best paint. Make sure that the ironwork is clean, free of rust, scale, oil, or grease. Then, never paint on a wet or damp surface. Along the same lines, never paint during fog, mist, or rain, or when the relative humidity is above 80%, or if the temperature is expected to fall below 50 degrees F. within 24 hours. Preferably, don't paint ironwork in direct sunlight either (it dries too quickly for optimum bonding).

A quality metal primer is a critical part of paint protection. Traditionally, red lead—tough, elastic, and impervious to water—was the primer for iron. In our time, however, red lead and zinc chromate (another effective primer) are prohibited, except for some commercial and industrial uses, because they contain heavy metals. Alkyd or acrylic primers have

largely replaced the traditional primers. They dry faster but are not as effective for as long. Alkyd rust-inhibitive primers contain pigments such as iron oxide, zinc oxide, and zinc phosphate.

These primers are suitable for replacement parts and for cleaned, previously painted surfaces. Two or more coats of primer should be used, followed by finish coats of alkyd enamel. Zinc-rich primers containing zinc dust can be used for longer protection, but the surfaces must be in a "bare white" condition. This is usually achieved by sand blasting. Water-based latex house paints will cause immediate rust and should never be used as primers on bare iron.

Cover primer coats with even, not too thick, finish coats that can range from glossy to matte. The best available paint system for cast iron is a two-part epoxy primer, followed by a polyurethane finish coat. However, this paint system is expensive and difficult for homeowners to apply. Another choice is an industrial maintenance coating (for example, Sherwin-Williams DTM Acrylic Primer/Finish).

Hand brushing is still the most effective method for painting iron fences and railings. The action of bristles works the paint onto flat surfaces and corners for a good bond with the metal—especially important for primer coats. Paint rollers and airless sprayers can be used to apply topcoat paint on broad areas if they are followed up with a brush.

If part of the unit is to be set in concrete, then that part of the unit should be treated with a bituminous coating, allowed to cure. For setting in masonry, the buried ends are best rust-proofed, since the molten lead will burn off any paint.

While most ironwork is painted black, that color tends to mask the details and shadows that help define depth. Consider also historic greens (especially for naturalistic fences), stone colors, and picking out occasional realistic ornament, such as fruits or flower petals. Painting ironwork sensitively can enhance it artistically.



able, but not quite as weather-resistant. Wrought iron is easily worked, making it an ideal metal for early blacksmiths who could bend, forge, or draw it into an array of sinewy but expressive shapes.

Before 1840 and the development of large-scale iron production, wrought iron rails, fences, and gates remained the work of local artisans and each example was unique. Ornamental ironwork was not created in a vacuum, though. After the Federal period, when the country entered into the age of architectural symbolism, the railings and fences, like the buildings, often carried Greco-Roman patterns. True wrought iron continued to be produced through the 19th and early 20th centuries, and was brought to new heights of craftsmanship by designers and artists such as Samuel Yellin of Philadelphia.

Cast Iron

THE DISCOVERY AND EXPLOITATION OF HARD coal in eastern Pennsylvania in the 1840s, coupled with new sources of iron, made cast iron available on an unprecedented scale. Cast iron is an alloy high in carbon (up to 3.7%) as well as other minerals and elements. It



This dramatic Philadelphia fence (top) shows the rich design possibilities of cast iron: a naturalistic pattern of free-flowing grape vines in a rinceau motif is in artful contrast to the very geometric Greek key base below. Cast iron was easy to ship, too. The Banning House "cornstalk fence" (above), one of three known examples of this pattern, was moved from New Orleans to Wilmington, California, in 1910.



In this typical composite wire fence with cast-ons (above), the owner perhaps picked the "Gothic Rose" gate design to harmonize with his Carpenter Gothic porch. The hairpin fence (right) became very popular in the late 19th century. Here the gate posts and rosette appear to be the only castings.



is much harder and more brittle than wrought iron, so it is poorly suited to shaping with hammers or rollers. However, cast iron pours readily into molds and stands up relatively well to weather—ideal for ornamental work.

Because it could be molded, cast iron made possible the mass production of objects—first stoves, then machine parts and fencing—at a central factory, spawning a pivotal industry of the Industrial Revolution. Starting in the 1840s, Philadelphia's Robert Wood foundry (and its successor, Wood & Perot) became the national leader in the field of ornamental iron. As Philadelphia was a major port, their castings were easily shipped to distant points. Thanks to a local sales office, Wood, Miltenberger & Co., much of New Orleans' celebrated ironwork came from Wood & Perot. Their 1859 advertisement touted "200 varieties of Gallery Railings" and "50 (patterns) for verandahs."

Many fence and railing castings were basically imitations of ornate stone balusters. Others were tracery. Regardless of the design theme, cast iron fences and railings tended to be somewhat massive, using repetitive design elements. Cast iron was not as thin and muscular as wrought iron, but it was much cheaper. Cast iron fencing and some railings came in regular lengths. They were just bolted or screwed together.

Besides lasting longer than wood, cast iron offered endless design permutations. Patterns were frequently mixed, and the same cast iron elements were often combined in different ways. While some castings were "signed" by the foundries, many were not. Furthermore, it means little if the pieces were pictured in the catalog of a firm. Competing foundries were quick to pirate each others designs and copied them freely.

Cast fences and railings lent themselves readily to reflecting the architectural styles of the buildings they surrounded. For example, it was now possible for the designer of a Gothic Revival house to enclose its front lawn with a cast iron rendition of Gothic tracery. The railing on the house's front entrance steps could also feature Gothic themes.

Picturesque fence designs were developed for needs and whimsies. For example, Philadelphia's Wood and Perot foundry even produced a cast iron cornstalk fence, commissioned by a New Orleans

Cast and Wrought Repairs

AS WITH PAINTING, REPAIRS TO CAST iron should be prefaced with your detailed condition assessment of the piece, preferably after paint and rust have been removed. Select repair contractors based on samples of their work.

Once an iron casting is clean, examination may reveal imperfections—some even dating back to its original manufacture. Discoveries may include air holes, cracks, and cinders, or cold shunts—faults in the metal caused by interrupted pouring or “freezing” of the surface during casting. Some old castings may be excessively brittle.

Others may have impact damage, structural failure, broken joints, damaged connections, missing elements, or loss of anchorage in masonry. Cast iron regularly suffers from ill-advised repairs, too. Concrete poured in the central voids of railings and newel posts only attracts water, which promotes rust and, when it expands as ice, blows the castings apart.

Small, non-structural cracks and

While able to withstand tremendous compression, cast iron is brittle and vulnerable to cracking caused by impact or internal expansion. Since this post is still structurally intact, it may need only caulking to prevent water intrusion and further damage.



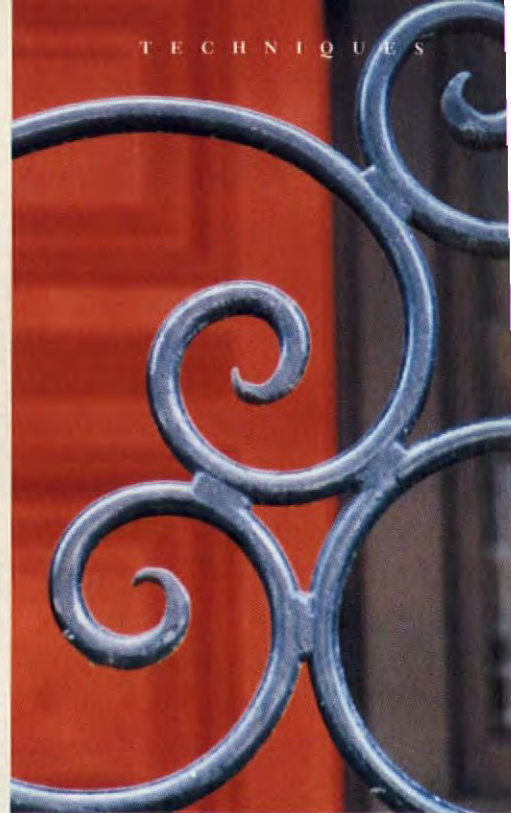
holes can be filled with epoxy steel. Major breaks, however, are not as easy to mend. While cast iron is difficult to weld, it can be mended successfully if the welder is skilled and the welding rod is pure nickel. Of course, fencing is typically not used for load-bearing purposes, but it is important to note here that welding should never be used to repair structural cast iron members. Defective structural members must be replaced. So should any cast iron structural members found to be less than $\frac{3}{8}$ " thick.

If parts of a casting are missing, it is possible to order new replacement iron castings from foundries who specialize in this work. Ideally, a new pattern should be produced for the mold, one that is slightly oversize. This is because once the pattern is removed from the sand mold and molten iron is poured into the void, the metal shrinks approximately $\frac{1}{8}$ " per foot as it cools. Where an exact match in size is not critical, it is possible for the foundry to use an existing piece of ironwork as the pattern. Remember, though, that the eventual casting will be slightly smaller than the original.

Replacement castings can also be made with aluminum, which was not available during the cast iron period. Aluminum will not rust, but it must be isolated from the rest of the ironwork or galvanic corrosion is likely to occur (see page 39). For reassembling old cast iron elements or adding new ones, use only stainless steel pins or bolts.

Wrought Iron Repairs

TO ASSEMBLE THE COMPONENTS OF A wrought iron object, the iron craftsman draws on various mechanical options. If he rivets, his rivet heads are not countersunk but remain exposed, becoming part of the design. If he collars, he combines the parts with strips of iron, bent while hot around the abutting members. When the iron



These oxy-acetylene welds (top) are unmistakably modern. The adjacent metal members are held together by the obvious addition of flux and rod metal between them. Contrast this with hand-forged railings that display true wrought iron welding (above). Here the adjacent wrought iron members were actually beaten into each other while they were yellow hot.

collar strips cool, they shrink and clutch the members in a very tight grip. If the craftsman produces a true hand-hammered weld, he beats together two pieces of metal that have been softened by gradual heating. Such a weld swells slightly at the point of juncture and looks very different from today's welds produced with oxy-acetylene torches or electric arcs. Where metal is missing, the craftsman will typically fashion new parts from mild steel.

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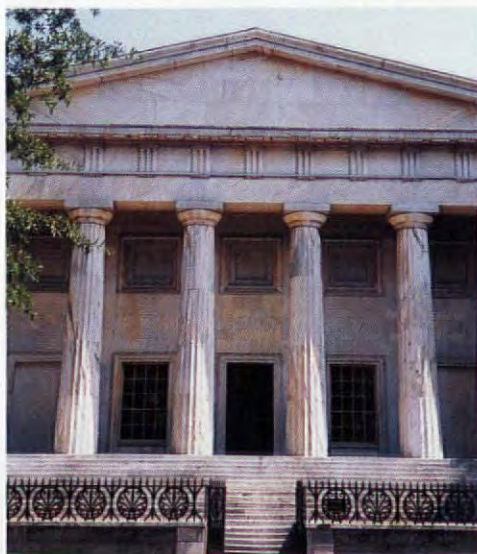
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In keeping with the Greek Revival bank building (right), William Strickland (1788–1854), designed this cast iron fence using the Greek anthemion or honeysuckle motif replete with small spears. As roof cresting (bottom), cast iron fencing was popular on both Gothic Revival and Second Empire-style buildings because it softened the line between building and sky.

physician to keep his wife “from feeling homesick for her native Iowa.” The same fence was later used at the historic Short–Favrot House in the city’s Garden District. As commuter railroads gave rise to early suburbs, better-fixed families seized the opportunity to escape industrial cities and move “back to nature”—hence the fashion for naturalistic fencing.

Wire and Hairpin Fences

BY THE MID-19TH CENTURY, DRAWN WIRE fences and gates became available. In this process, the precursor to modern chain-link fence manufacture, molten wrought iron was drawn from dies to produce wires $\frac{1}{8}$ " to $\frac{1}{2}$ " in diameter. Lengths of wire were then cold-bent around jigs to form diamond and loop patterns, or crimped for decorative effects. The leading manufacturer in this



field was John Wickersham’s New York Railing Company. Beginning in the 1850s, Wickersham combined both wrought iron and cast iron technologies in “composite” fences and railings. The wires were fixed in place by casting solid rosettes, called “cast-ons,” at the points of intersection without the aid of rivets. Wickersham and his competitors also cast the surmounting pickets directly upon the railings (see “Early Wire Fences,” March/April 1992).

Late in the 19th century tastes moved away from elaborate castings and drawn wire fences. Hairpin wrought iron fences became very popular. Thinner and simpler in line than cast iron, they would often be combined with cast gate posts and features. Unfortunately, many fine decorative fences were lost to scrap metal drives during the two world wars.

Appropriate Iron

TODAY’S OLD-HOUSE OWNERS, PERHAPS HEEDING the advice of tastemakers like Samuel Sloan, often wonder which style or kind of fence or railing is appropriate for their property. North America is rich with a variety of architectural styles. While there are numerous exceptions, houses connected with these styles or eras generally had wooden fences: colonial, Federal, gingerbread Victorian, Stick, Shingle, and Colonial Revival.

On the other hand, iron fences and railings often appear with houses showing the influence of these styles: Gothic Revival, Italianate, Second Empire, Richardsonian Romanesque, Arts & Crafts, Beaux Arts Classicism, Georgian Revival, Jacobean Revival, and Spanish Provincial. Town houses almost always had iron step railings at their front doors. Some Southern ante-bellum houses had wooden fences on their grounds and iron railings on their porticoes and balconies.

Whatever their nature, railings, fences, and gates that date from the glory days of iron are worth the effort to retain. Besides being costly—if not nearly impossible—to reproduce, they are examples of our building heritage as much as the houses they enhance.

HENRY J. MAGAZINER is a historical architect based in Philadelphia, Pennsylvania. His book *The Golden Age of Ironwork* is to be published by Skipjack Press.



Footings and Fittings

UNLIKE THEIR WOODEN COUSINS, FREE-standing iron fence posts must be installed in concrete. Earth alone cannot support them. The concrete footing must also be deep enough to extend below the frost line (at least 3' in the snow belt) in order to keep the fence from heaving in the winter.

Iron railings set in exterior masonry (marble, granite, or brownstone, for example) should be set in oversized holes. Traditionally, molten lead is then poured around the sunken stanchions of the railing, embedding them. The craftsman handling molten lead must be sure that the bedding holes are absolutely dry. Otherwise the lead will spatter and may injure the pourer. When the lead solidifies, it is sufficiently soft to accommodate the expansion and contraction of the iron due to temperature change.

Cast iron newel posts, most commonly seen on urban front step railings, were often designed to be anchored with a single threaded rod. The rod runs up through the middle of the newel from a mount in the masonry landing, and the newel can often be restabilized by tightening a nut or finial at the top. First, wire brush the threads, then soak them liberally with penetrating oil (WD-40 or similar product). Afterwards, tighten the hardware cautiously to avoid stripping the threads. Heat from a torch will often loosen up a frozen nut.

Mating Metals

NEVER BED TWO PIECES OF EXTERIOR ironwork—be they wrought or cast iron—directly upon each other. Once they are so joined, there is no way to paint and protect the two touching iron surfaces. Eventually water will find its way between them, rusting the bottom of the top member and the top of the bottom member—both unprotected.



Top: Besides the obvious impact damage, this iron fence leans because the concrete holding its embedded portions did not extend below the frost line. **Left:** Whoever mounted this railing did not rustproof the embedded portion of the iron. Eventually water got in, which expanded the buried iron as it rusted, fracturing the stone. **Right:** The ironworker who produced this railing decades ago bedded two pieces of iron directly on each other. Again, water got between them, the iron rusted, expanded, and the two pieces pried themselves loose.

Rusting iron expands, so the joint will open. In the winter, more water will enter and, if it freezes, expand further. Also, the rust will wick in more water, accelerating the rusting.

Outdoors, where water is ever-present, two dissimilar metals must be insulated from each other or galvanic corrosion will take place. This happens when the dissimilar metals are in intimate contact while an electrolyte—typically water containing salt or hydrogen ions—is present. The corrosion varies, depending on the relative sizes of the metals and their position on the electrochemical series. The more active metal will be attacked and corroded. Thus alu-

minum will be attacked when it is in contact with a less active (noble) metal, such as cast iron. Mild steel, which is close to iron on the galvanic scale, is an appropriate material for patching cast iron.

To prevent electrolytic action in cases where aluminum parts are introduced into an iron fence or railing, insulate the different metals from each other with good spar varnish. Apply several coats to the mating surfaces, then be sure that the varnish does not become damaged while assembling the parts. Cast fiberglass sidesteps the issues of corrosion altogether, and may be practical for reproducing small, decorative elements.



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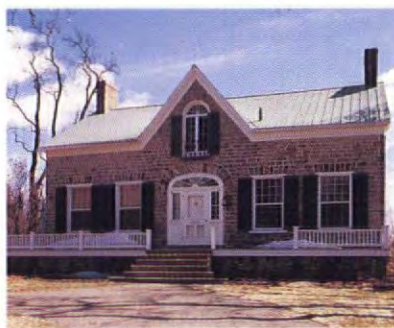


A central cross gable with a Gothic window is the hallmark of the Ontario Cottage, a house with distinct British roots.

ONTARIO COTTAGES

AFTER THE NAPOLEONIC WARS, British officers began settling Ontario's towns, bringing with them a housing tradition that reflected their English roots. The result was the Ontario Cottage, which first appeared in the 1820s and 1830s. The building is probably a regional variant of the Regency cottage—the low-slung, informal house style with one or more porches that the British brought back from the tropics.

In its purest form, the Ontario Cottage is an oblong box, 1½ storeys high, three bays across, with a centered door. This basic plan was often enhanced with a cross gable, typically sheltering a Gothic Revival window, and a full-width verandah. Constructed of local wood, brick, or stone, the Ontario Cottage provided compact, easily built housing



This stone variant from 1824 boasts five bays and a front door in the Adam style, called "Loyalist" in Canada.

for a cold, relatively poor province.

The cottage's signature peak began appearing in the 1830s and 1840s. Practical yet political, the gable allowed Ontarians to light and ventilate their bedrooms, as well as express their strong connection with the

mother country, where the Gothic Revival style was popular. And the gable's carved bargeboard afforded housebuilders a precious chance to decorate with cusps and trefoils.

The Ontario Cottage never caught on in the United States, which was moving away from English architectural influence. While the young nation was infatuated with Greek Revival pillars and pediments, Upper Canada embraced the Regency and Gothic Revival styles that met in the Ontario Cottage. The style, which continues to be built today, has been a favorite ever since.

—KATHERINE ASHENBURG
Toronto, Ontario

Katherine Ashenburg is the author of Going to Town: Architectural Walking Tours in Southern Ontario, 1996, Macfarlane Walter & Ross.

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RE M U D D L I N G

OPINION



Blindsided

SOMEONE ASSOCIATED WITH THIS 19TH CENTURY STONE HOUSE IN EASTERN PENNSYLVANIA CLEARLY HAS A yen for additions. It is possible to successfully add on to an old house, if you respect the existing structure. Many of the changes made here, however, seem to belong to another building.

Let's start with materials. The original house probably looked a lot like the example below—a long, rectangular form, built with irregular rubblestone coursing. The new additions shift the focus to smooth, white vinyl siding, probably over wood-frame construction.

Additions usually work best when they read as secondary. In this instance, the side addition looms larger than the original house. And there's no getting around the new third storey, which rests *on top* of the house. In fiddling with the roof, the builder also altered the roofline—a guarantee of major change, since roofs generally comprise 30% of a building's surface. Put all the alterations together, and there's not much left of the original structure. It's been ignored, one might say. And in this case, ignorance isn't bliss.

Thanks to Steve Rosenberger of Easton, Penn., for spotting these examples along the New Jersey-Pennsylvania border.

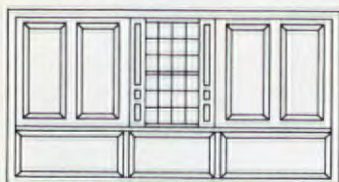


The stone house in Finesville, New Jersey, at right, has probably seen a few alterations of its own. The builder used complementary materials and massing.

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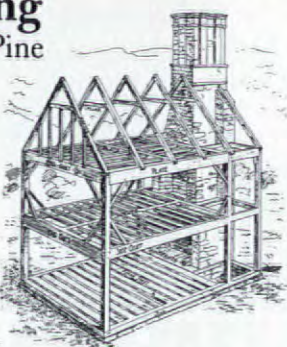
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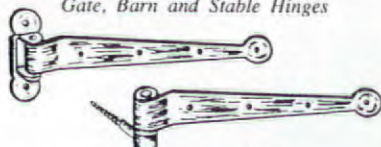
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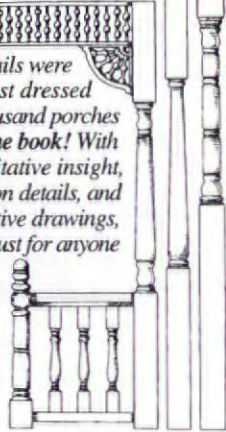
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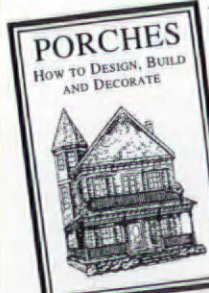
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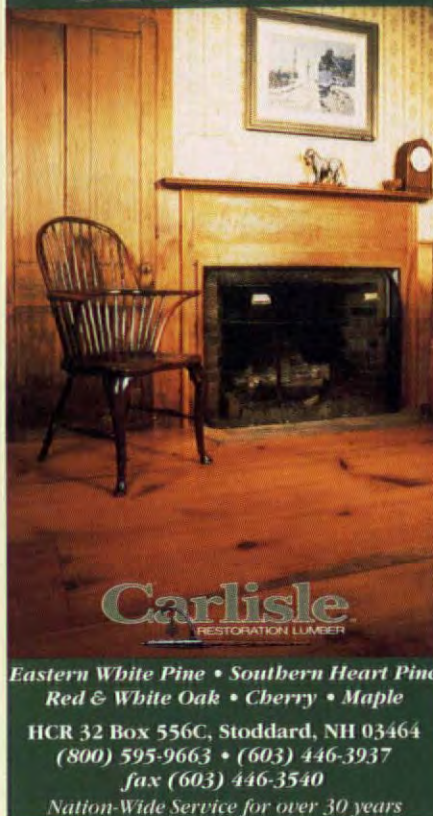
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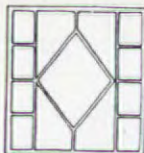
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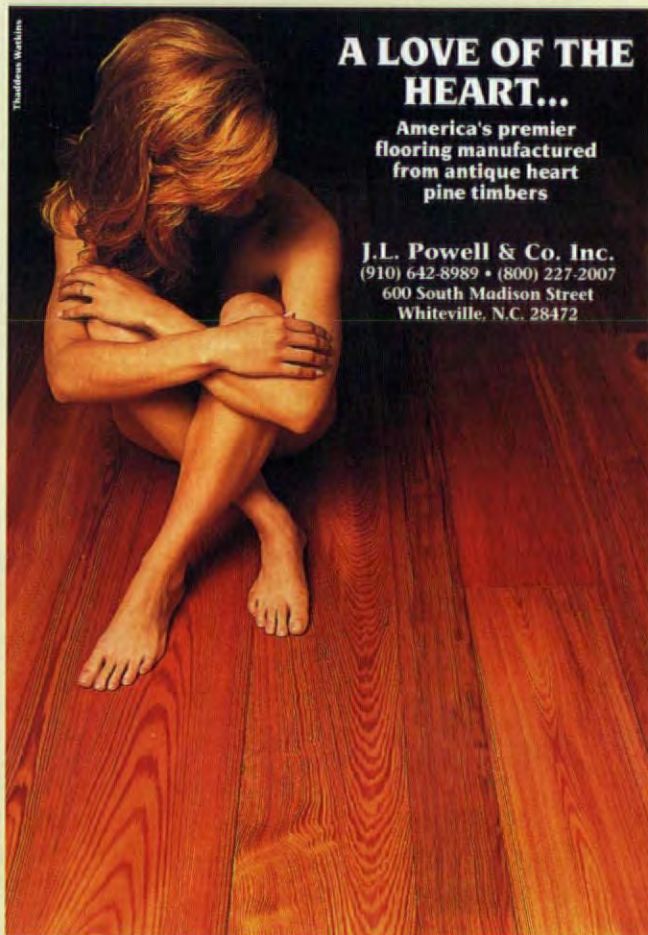
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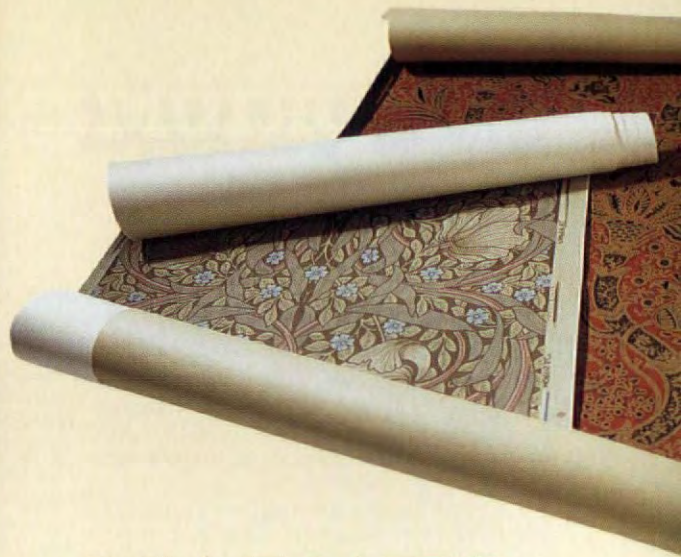
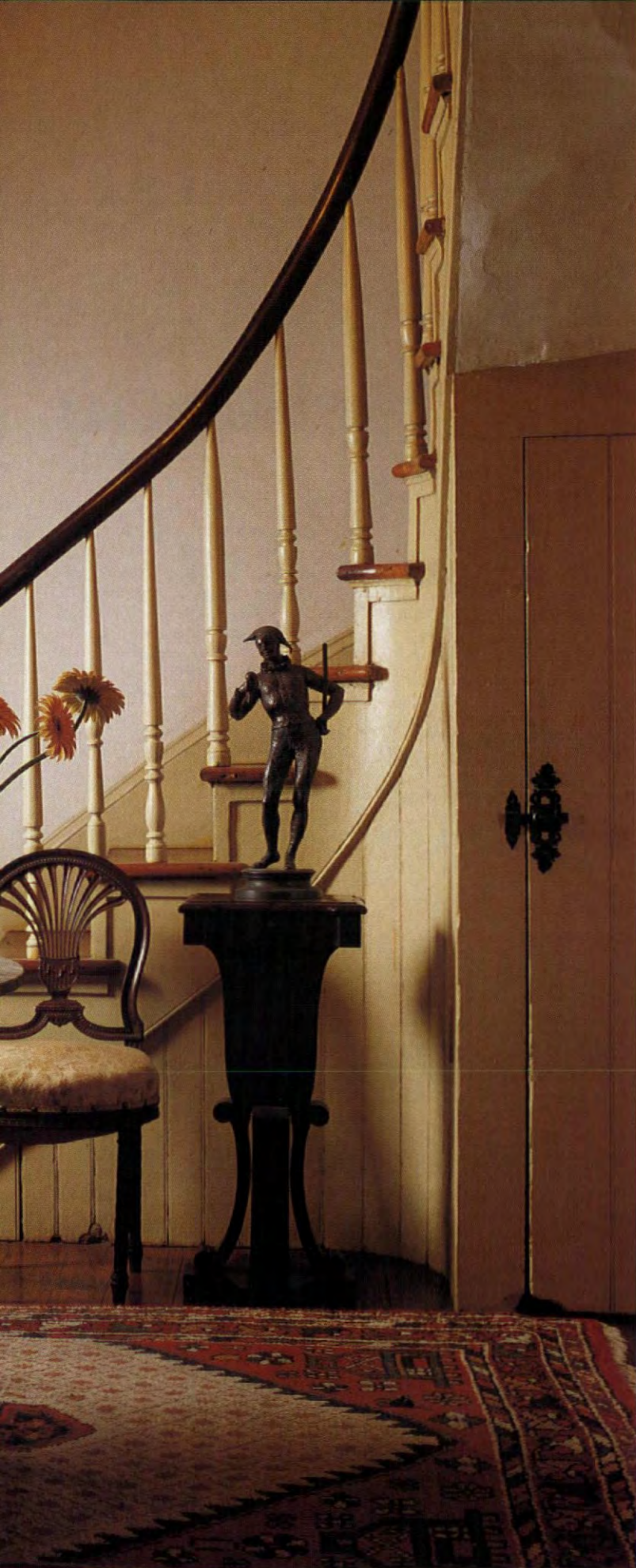
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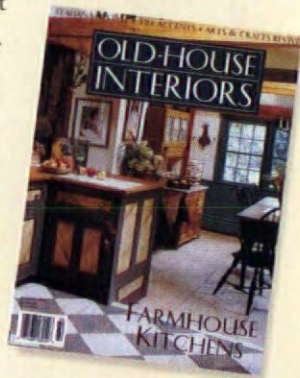
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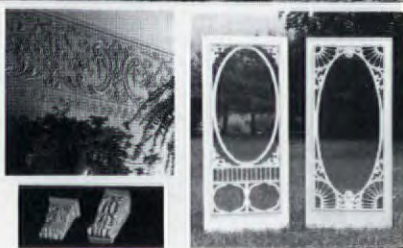





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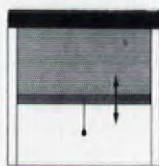
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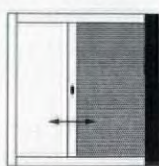
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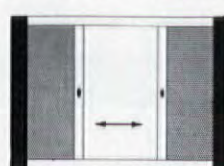
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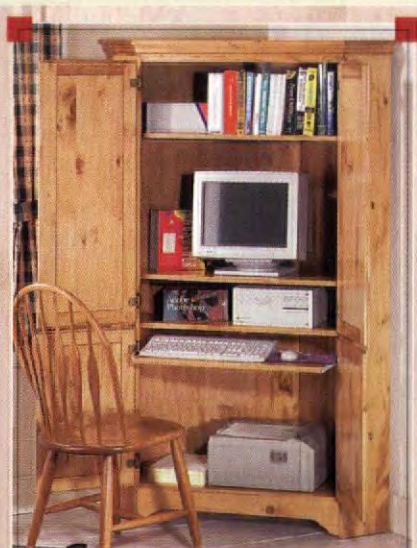


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Events

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ROCKLAND COUNTY, NY — Rockland County Executives' Historic Preservation Merit Awards, Country Supper and Dance, May 18, 4 p.m. at the historic Jacob Blaauvelt House, Historical Society of Rockland County, NY. 1997 winners will be honored. \$45. (914) 634-9629

JOLIET, IL — This Olde Housewalk, Sunday, June 22, Joliet, IL, from 1-5 p.m. Explore one of Joliet's oldest National Register neighborhoods, featuring six vintage homes, horse and buggy rides, musical entertainment, antique cars, refreshments, porch lunches (by reservation only). Advance tickets \$8, \$10 at door. For reservations and information, contact Alice Kraus, (815) 722-3068.

KENOSHA, WI — "Restoration Faire" at the Kemper Center, May 17. Sponsored by ABATRON Inc., the Preservation Week event features topics relevant to residential building restoration. Architects, designers, and contractors will speak on stone, masonry, and terra cotta restoration, wood restoration, late-19th and early-20th-century wall coverings and color schemes, and residential gardens. Registration is \$8 and includes a box lunch. Seating is limited. To register, contact ABATRON at (800) 445-1754.

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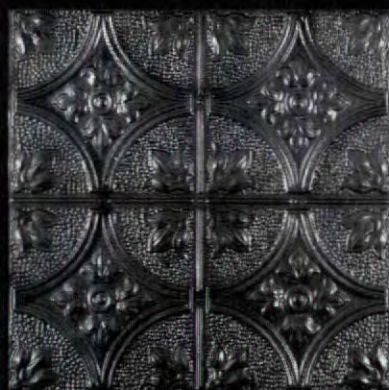
DUBUQUE, IA — 10th Annual Dubuquefest House Tour sponsored by the Old House Enthusiasts Club. Narrated tour of five of Dubuque's splendid stock of older homes. View excellent displays of restoration, creative decorating, and art. May 17-18, 10 a.m.-5 p.m. Admission \$8. for adults; children under 12 free. Includes shuttle bus service to each home. Call (319) 556-8668.

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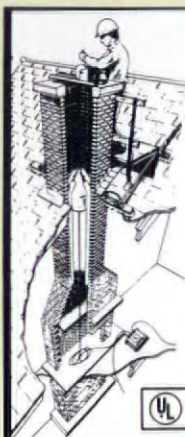
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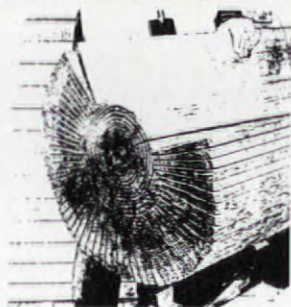
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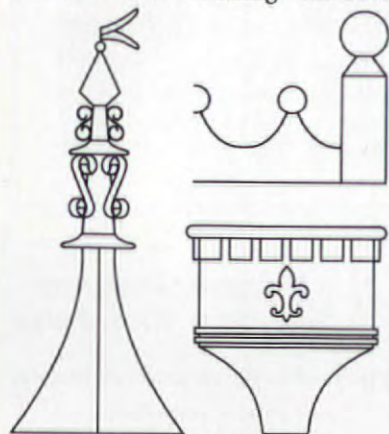
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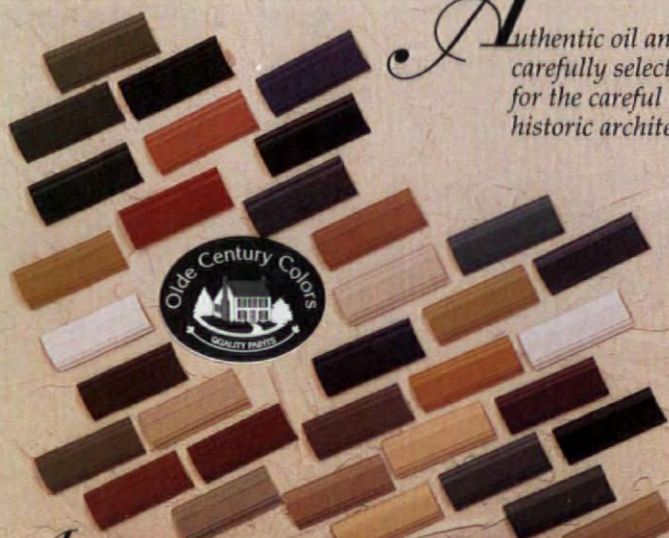
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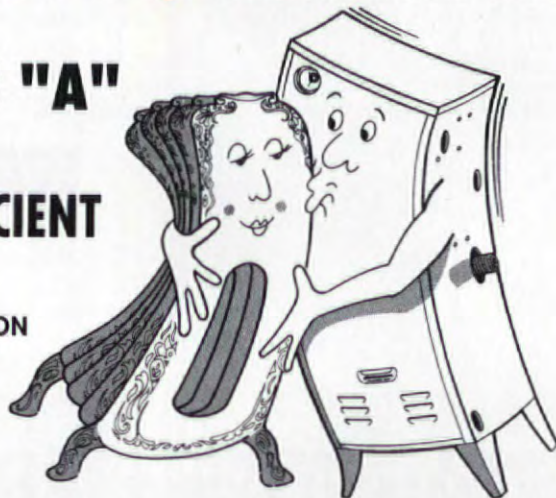
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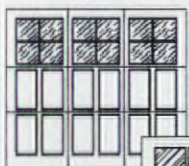


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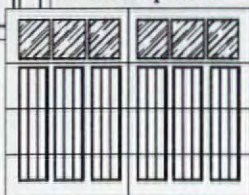
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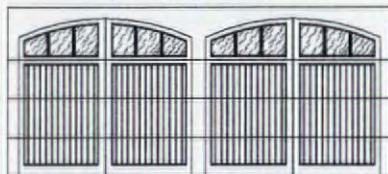
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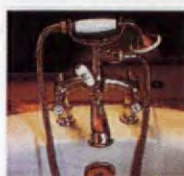
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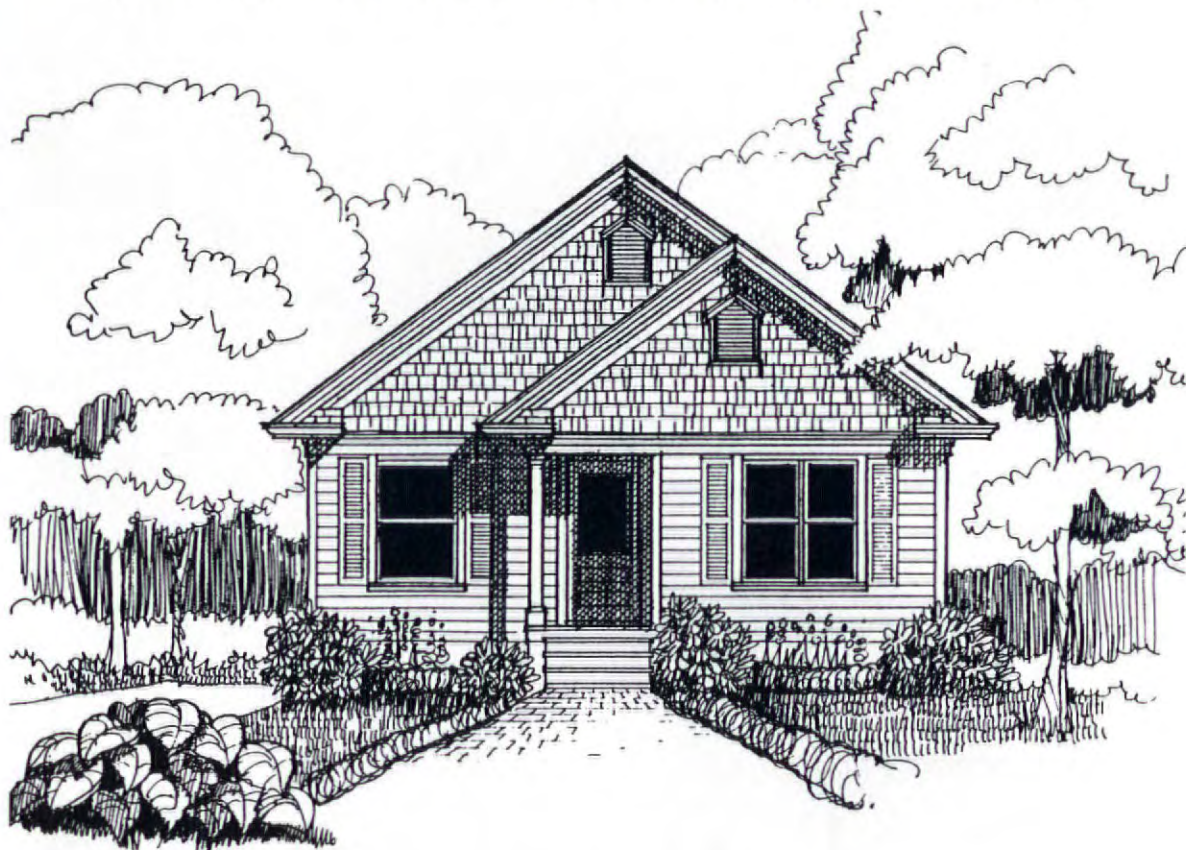


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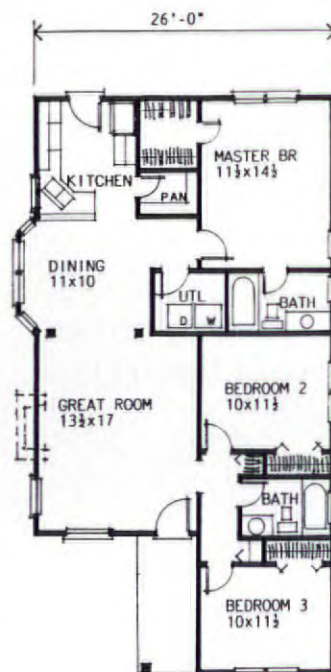
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Plan RT-07-PV

Cost	\$170
Set of 5	\$230
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Bedrooms	3
Bathrooms	2
Square Footage	1,144'
Ceiling Height	8½'
Overall Dimensions	
Width	26'
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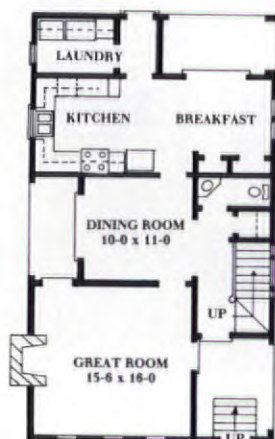
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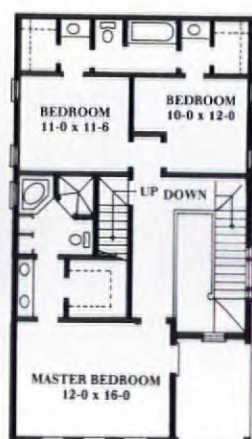


THIS FEDERAL-STYLE ROW HOUSE DRAWS ITS inspiration from the elegant side-houses of Charleston's South of Broad neighborhood. The distinctive side entry layout is the result of rotating the house so that the gable end faces the

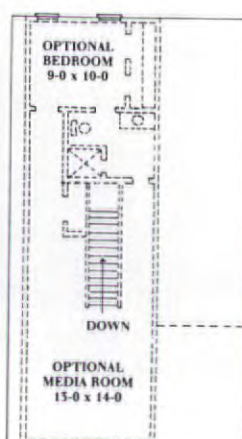
street. The floor plan, which totals a compact 1,772 square feet, includes a well-proportioned great room, formal dining room, breakfast area, and three bedrooms. There is ample room for expansion on the third floor.



First Floor



Second Floor



Third Floor

Plan HR-19-EA

Cost	\$200
Set of 5	\$260
Set of 8	\$300
Bedrooms	3
Bathrooms	2½
Square Footage	1,772'
First Floor	893'
Second Floor	879'
Ceiling Height	
First Floor	10'
Second Floor	9'
Overall Dimensions	
Width	34'
Depth	74'



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- Detailed floor plans showing dimensions for framing. Some may also have detailed layouts and show the location of electrical and plumbing components.
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- Building cross sections: cornice, fireplace, and cabinet sections when needed to help your builder understand major interior details.

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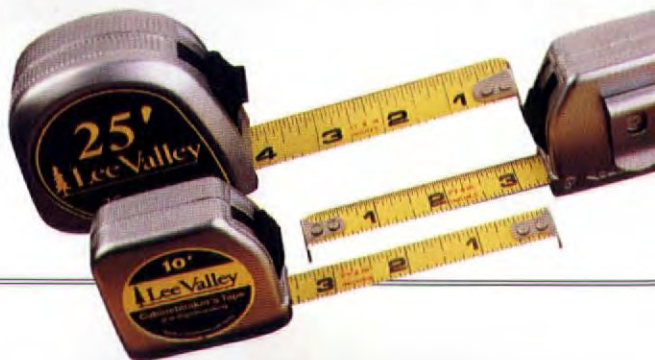
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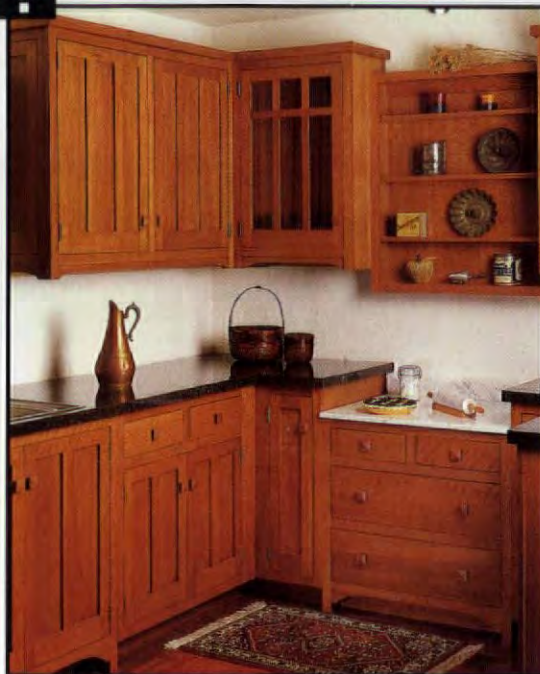
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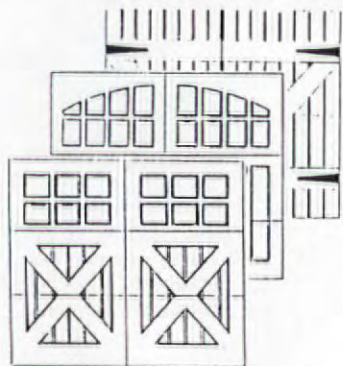
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Some of the old shingles were dirty and peeling, but a few repairs set them right (top). Joanne chips away at the worn asphalt tiles on the porch floor (right)—one of dozens of jobs we completed together over the years.

them. A few paint coats later, it was clear that Joanne had led us on another successful voyage.

Tunneling Through Walls

LIKE LAYERS OF PAINT, THE DAYS, months, and years peeled away. Most of the time I was ready and willing to follow my wife's lead. Joanne had a single-minded belief that our home should be as beautiful and comfortable as we could possibly make it. Yet I must confess I found myself getting in touch with my inner handyman. There actually came a time when I created my own project.

Our stairway was enclosed by two walls, like a tunnel to the second floor. I couldn't picture how to open it up until a photograph in a cooking magazine inspired me. I came up with the idea of putting in a hand rail and balusters where none existed.

We handled the demolition of the walls ourselves, but the rest of the job was complex enough to require the help of a carpenter. The final result was a slender



hand rail with two gooseneck turns, one at the top landing and one at the bottom.

I'm not sure what had gotten into me. Maybe I was beginning to agree with Joanne's philosophy—that every crazy idea made the house more beautiful or comfortable and was therefore worthwhile. Maybe I had inhaled too much paint stripper. I was becoming unsure of my own sanity. Meanwhile, my wife was so proud of me that she let me sketch out the design, adding just a few of her own touches.

Joanne remains the captain. Every time I think we've embarked on our last adventure, she discovers another hidden treasure. Just the other day, she was looking at the outside of the house saying, "You know, I don't like the rough stucco on the bottom storey. It doesn't look original." I might have to decide whether to jump ship or tie myself to the mast again.



When Joanne and I began our voyage into the uncharted depths of restoration, we had no idea where we were headed. Joanne stripped through nine layers of paint to reach the original oak cabinets (top left). When she was finished, we found brass fleur-de-lis hinges (top right). Joanne added a top landing to our stairwell job—which meant calling in a carpenter (right).



Joanne began talking about how much she hated the aluminum siding on the top storey. She kept saying how lovely the old shingles must have been. One of our neighbors had found a picture of the house taken in 1920 that showed ribbon coursing, which alternates wide and narrow courses of shingles. Once that photo was framed and hanging in the kitchen, I began to detect a gleam in Joanne's eye and a certain restlessness in her speech that I'd seen before. I knew the other shoe would eventually drop.

It fell like a steel-toed boot. Another neighbor claimed to remember that when the aluminum was put up 30 years ago, it was nailed right over the shingles. That was all Joanne needed. Some people see the past flash

before their eyes at moments of truth. I saw my future: money, time, work, and mess. From that point on, I knew taking down the siding was inevitable.

I climbed a ladder and pried back a corner of aluminum to inspect what was underneath. Briefly, I thought about lying, but couldn't bear the thought of her later discovering the truth. Yes, the shingles were still there and seemed to be in fine shape.

When we had our roof reshingled that summer, we asked the roofers to rip the aluminum off the sides of the house. Underneath were hundreds of cedar shingles, overlapping each other just like in the picture, a piece of local history revealed. They were dirty and peeling, but sound. Our painter took the time to carefully hand-scrape

Shipping Out with a Restorer

BY JOSEPH MARRA

ONE FRIDAY NIGHT, NOT LONG AFTER WE BOUGHT our old house, I came home to find a lone light shining eerily from within. You know how people who've been burglarized often sense something amiss when the key touches the lock? I felt similar trepidation.

As it turned out, my instincts were right. I found my wife Joanne on a stepladder in the pantry, razor blade in hand. The sinister beacon was a drop-light. White paint chips littered the floor around her. "These cabinets are oak," she said, smiling her most convincing, confident smile. She made it sound like she had discovered DNA.

That weekend began our first voyage on the roiling seas of restoration. The journey has lasted more than 15 years, and for most of our marriage. I now know Joanne was right about stripping the oak cabinets, and so many other projects. At the time, though, I just couldn't understand what possessed her to begin scraping through nine layers of paint without knowing what lay underneath.

Getting My Sea Legs

IT'S NOT THAT I DIDN'T TRUST HER. WE BOTH LOVED OUR pre-World War I Bungalow in Bayside, New York, and it clearly needed work. You buy a place you can afford and fix it up, right? There was no way I could accuse her of leading me astray in that regard.

What I came to understand was that our home had

so many features—oak woodwork, glass doors, high ceilings, deep porches—that the superficial cleanup we had initially planned (or I had, anyway) would not do it justice. Just like a Federal spending bill, things mushroomed.

Once Joanne set her hand to the tiller, she never looked back. It was a few years, however, before I became accustomed to the hard labors of a seaman. My apprenticeship began as we stripped, sanded, and tung-oiled

our way through the pantry and kitchen. The work was often back-breaking, but it was very satisfying to see the gleaming oak woodwork emerge. Underneath all that paint was an unexpected bonus: brass hinges in a fleur-de-lis design, a recurring motif throughout the house.

Slowly, we transformed our lives and our house. Once we finished the kitchen and pantry project, we began work on the front porch. After some preliminary work on the windows, Joanne argued for—and won—a new oak floor.

Weeks of chipping up

old asphalt tile followed. Since the porch is enclosed, we added a radiator so our kids could play there in cold weather. Joanne insisted on painting the radiator with a fancy pattern to show off the raised ornament. Then came a new front door and, last but not least, carpenter-built window boxes made of cedar.

Searching for Shingles

EVERYTHING LOOKED SHIPSHAPE. ALL THAT WE NEEDED was the right kind of furniture to enhance the beauty of our restored house. The big, messy jobs were done—or so I thought.




When we bought our Bungalow (above), the ribbon shingles on the top storey were hidden under aluminum siding. Once this photograph (left) from 1920 surfaced, I knew Joanne would insist on restoring the shingles.

WILL THE PLATER DO YOUR JOB IN-HOUSE?—Many platers specialize in only one finish because it is easier to treat the water for environmental contaminants. They job out other finishes to shops across town or in the next state. This increases the chances for lost parts or lack of quality control. Choose a plater who will do the work on-site and will be there to follow your instructions.

WHAT KIND OF EQUIPMENT IS IN THE SHOP?—Generally, bigger equipment will yield a better job. A well-equipped plater will have at least one floor-mounted polishing lathe with 8" or larger wheels, plus a continuous belt sanding machine to level surfaces so they are truly flat—difficult to do with a wheel. It also pays to ask about tank size. Large tanks mean there is more of a reservoir of metal and chemicals to minimize color change during the plating process—resulting, say, in a brass job that varies from orange to yellow. A tank of at least 300 gallons is required for a quality brass job.

HOW WILL THE PARTS BE LACQUERED?—Sprayed-on lacquer is preferable to dipped lacquer. Dipping hardware can contaminate the lacquer with polishing dust that will dull the finish. Baked lacquer is more durable than air-dried lacquer because it cross-links the polymers in the coating. Ask whether the lacquer is tinted. Some refinishers use tinted lacquer because it hides a lot of sins in brass and bronze polishing or plating.

DOES THE PLATER REGULARLY HANDLE RESTORATION HARDWARE? Request to see finished work. If the plater specializes in old-house parts, he or she will have the care to inventory and keep track of your job (say, by sets of door hardware), the skill not to dull corners and details during polishing, and the experience to recognize beautiful antique metal finishes. 

Special thanks to Jack Neu of Strassen Plating for technical help with this article.

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Be on Your Metal

In the 1920s, Henry Ford may have had the cheek to offer car buyers any color so long as it was black, but fiercely competitive hardware manufacturers needed to lure the buying public with myriad metal finishes. At the time there were no less than 33 standard hardware finishes recognized by the U.S. Government, many more promoted by individual manufacturers. Some were workhorse industrial coatings, such as zinc galvanizing, designed solely for protecting ferrous metals from rust, and still widely used. Others, such as Bower-Barffing, were unique but short-lived chemical treatments with both practical and aesthetic properties. These six hardware finishes are only a sampling of the variety once available to homebuilders and homeowners.



**BOWER-BARFF
ON CAST IRON**
A rust-inhibiting iron
finish produced with
heat, steam, and
chemicals.



**OLD COPPER ON
WROUGHT BRASS**
A highly popular
finish, the copper
plate is oxidized, then
selectively buffed.



**DARK SANDED BRASS
ON WROUGHT STEEL**
Brass plate oxidized
to green-black, then
treated to bring up
highlights.



**BRASS PLATE ON
WROUGHT STEEL**
One version of brass
on stamped steel;
each manufacturer
had their own.



**BRUSHED NICKEL
ON WROUGHT BRASS**
Nickel plated on
stamped brass, then
treated for a satin finish.



**SANDED BRASS FINISH
ON WROUGHT BRASS**
Solid stamped brass
oxidized and treated
to accent corners.



In electroplating, the hardware is submerged in a solution using hooks or wires.

What is Plating?

Metal coatings—or plates—have been applied to objects for decoration or protection since ancient times. Gilding was used by the Egyptians. The Romans perfected ways to solder silver to common metals, or coat iron weapons using a copper solution.

The most common modern method is electroplating, where electricity



Polishing is an important part of all metal refinishing. Both base metals and final plates need to be polished for a quality job.

is applied to two metals in a solution—a process akin to charging a battery. In the basic electroplating operation, the parts to be plated are hung on the cathode (negative terminal), while a bar of brass, zinc, nickel, copper, or other plating metal is hung on the anode (positive terminal).

When both terminals are dipped in a tank and DC current is applied between them, the plating metal disassociates itself from the bar, moves into the solution, and is then deposited on base metal parts

as a thin, uniform layer. Platers can control the thickness and nature of the plate by selecting the time in the tank, amount of metal in the tank, electric current level, and so on. Other factors, such as tank size, solution makeup, metal purity, and skill of the plater, all have their influence on the quality of the final plating job.

Depending upon the kind of work they seek, plating shops may also be equipped to finish solid or plated hardware with decorative effects. Oxidized finishes that enhance the metal with a pleasing patina are produced by treating the hardware with chemicals, gasses, or heat. Brushed surfaces may be the result of a chemical or mechanical process.

surface imperfections resulting from stripping or the original casting process—that will only be magnified by the final shiny plate if left untouched. There may also be hills and valleys that mar what is supposed to be a dead-level surface.

After polishing, the base metal is copper-struck in the best work. In this step the plater applies an intermediate layer of copper to help the plating stick to the base metal. When applied in a heavy coat, copper is also used to fill surface imperfections and permit another polishing of the surface. Some platers will skip this step if they can get the base metal clean enough for the final plate to adhere, but generally copper striking is the sign of a quality job.

Striking is followed by plating on the finish metal. The plate too needs to be polished for the final appearance, then further treated if a decorative effect is desired. The final step for much hardware is a coat of lacquer, which protects doorknobs, lamp parts, and the like from oxidation.

Dealing with Platers

METAL PLATING IS A LARGE, WIDESPREAD field, with the bulk of the companies servicing vast orders for the industrial market—nuts and bolts, telecommunications connectors, or automotive and aerospace parts. In contrast, refinishing and replating old-house hardware is a specialty (often “mom & pop”) business. Most shops are relatively small: under seven employees, plus the proprietor.

Unfortunately, the increasingly stringent environmental regulations of our era, while good for the planet at large, have hit the plating industry hard. Plating and its related operations consume gallons of water, and they produce heavy metals as a waste product. The fallout is, platers large and small have been forced to become even more specialized. Here’s what to ask when shopping for a restoration plater:

IS THE COMPANY’S MAIN BUSINESS PLATING OR POLISHING?—It is easier to refinish and polish solid hardware than it is to go through the plating process. In most cities, the phone book has multiple listings for platers, but some really do just polishing and sub-contract the plating. Also, watch out for the operator that tries to repolish old plating at the price of a new plating job.

TH THE PLATER

ishes on Architectural Hardware BY GORDON BOCK

matches the original appearance, then you have a solid-metal item that was not plated. If the scratch shows a different color, you have a plated item. Non-ferrous base metals such as copper or brass were quite common for even mundane parts because they were easy to form and work.

Hardware made after 1945 that shows a silver color is probably pot metal (some mixture of zinc). Aluminum, too, was often used in the 1920s and 1930s, especially in lighting fixtures. A silver coating over a base metal, particularly on lighting fixtures, is usually silver or nickel plate. Nickel is extremely hard, while silver is soft; you can wear through the coating with fine steel wool. Also fresh silver looks white, while nickel has a yellow cast. Chrome did not appear until the 1920s and is distinctly blue in character.

Creative finishes were far from rare (see "Be on Your Metal," p. 59). Many solid and plated surfaces were antiqued by dying the clean metal then removing the dye in selected areas with buffing wheels. Corners and recesses may still show these black or brown treatments. Most solid hardware needs only to be polished and lacquered to regain its original appearance. However, if you have, say, an antique copper finish on solid brass or iron, then the hardware must be replated.

The Plating Process

REPLATING IS NOT LIKE REPAINTING; YOU can't just overcoat the old metal, even with good preparation. Not only will the plating refuse to stick, but it also won't produce an attractive, renewed surface.

The first step in quality replating is stripping off lacquer, paint, old plate, corrosion, and grime down to base metal. Like a lot of processes, the choice of method and care of the craftsman have a big influence on quality. Some platers still use a steel wire wheel for stripping—an anti-



Hard and shiny, nickel-plated cast iron makes up the brightwork on most pre-1920 wood or gas stoves. Replating this much metal will cost at least \$300, but will restore the stove to like-new appearance.

quoted and potentially damaging method for soft metals. Others opt for one of the "gentle blasting" technologies, such as glass or urethane bead media, that are used for delicate machine parts. Chemical stripping and reverse-plate stripping generate hazardous materials. These processes are preferred for some jobs (removing nickel plate from solid brass, for example), but require special disposal permits.

Once the object is stripped, it should be polished to smooth and level the base surface without removing details. The hardware may have pin holes and occlusions—minute



Plating Pitfalls

An experienced plater will be able to tell you in advance what to expect from a replating job. Four iron ball-and-claw table legs (top) took a new brass plate fine, but the heat cracked the glass—as predicted. This cookstove rail (below) will have to be disassembled before plating because it's hollow.



A DATE W

Restoring the Decorative Me

EVER POLISH A ONCE-BRASSY LAMP TO FIND it's rusting under the dirt? Ever clean a dull grey doorknocker and discover it's delightfully more detailed than you ever suspected? Chances are that's because the surface of the hardware has a decorative metal finish.

Before 1940—especially prior to the 1920s—there were literally scores of metal finishes and effects. All manner of working hardware for doors, windows, and cabinets, as well as the metal brightwork on lamps, stoves, and even furniture, might be treated to enhance the appearance (or performance) of desirable base metals like brass and bronze, or plated to make cast iron and steel look more attractive. In the best quality work, even screw heads and washers were finished to match the hardware.

Metal finishes are beautiful and highly durable, but decades of use and exposure eventually wear them out—as countless old-house doorknobs will attest. What many folks don't realize is that it's possible to restore most metal finishes to their original luster. Just bring the parts to your friendly neighborhood plater.

Know What You've Got

BEFORE WE GET TO ADVICE ABOUT FINDING and hiring a good plater, let's back up a bit. You must determine what the base metal is and what the finish is. First, examine the back of a part from a sheltered location to get some idea of its original appearance. A reddish color indicates rose brass or bronze; yellow is brass; silver is nickel or German silver (a low percentage of silver mixed with base metals to permit a high polish). Next put a magnet to the hardware. If it sticks firmly, the part has an iron base (cast iron or stamped steel) with plating to prevent rusting.

If the magnet does not stick, scratch the back surface with a sharp awl or screwdriver in an inconspicuous spot. If the scratch

Nickel, not chrome, is the metal plate in old houses. It fails in telltale flakes (right), but is readily renewed, as this restored fan and stove trim show. Nickel is also an authentic finish for reproduction lighting.



and make it easier to spot holes and areas that need patching.

Repairing Plates

FILL HOLES SMALLER THAN A DIME WITH A latex caulk that contains silicone. For larger holes, try repairing the damaged area with polyester auto body filler, available in hardware and auto supply stores. If necessary, you can level and shape the filler as if you were patching a car door. Shortly after the filler has been mixed with hardener, it begins to set up. While it is in this soft, rubbery state, it is easy to shave and carve with a "cheese-grater" blade (such as Stanley Surform brand). Then, when it's fully hardened, sand it smooth. Read the manufacturer's directions carefully and experiment with the filler before attempting any repairs. It's also possible to mold a small replacement section using auto body filler and a hobby mold-making kit, but you'll need to experiment with techniques to cast and attach the finished patch.

If the damage is not in a featured part of the pattern (say, the fill band between the cornice and the border), you may be able to patch it. Use a piece of salvaged sheet metal that matches the original pattern as closely as possible. The patch should be about 2" larger than the hole. Fold the edges under $\frac{1}{2}$ " inch and cut off the corners at an angle with a pair of tin snips. Then clamp the patch in place and attach with pop rivets.

Replacing Plates

PLATES THAT ARE SEVERELY DAMAGED OR rusted through can be replaced with new ones. In some cases, the original pattern may still be available from long-time manufacturers (see "Suppliers"). Replacement plates are relatively inexpensive—about \$2.50 to \$3 per square foot.

Plates usually come in standard dimensions of 2' x 4' or 2' x 8', or in 2' squares. Typically, they overlap slightly and "button" together at the edges. To remove a damaged section, coax out the original conehead-shaped nails or brads with a 6" tacking bar, taking care not to bend or rip adjacent plates. Since the plate edges will be sharp, be sure to wear work gloves when you're handling the material. If you dent the flanges of surrounding pieces, pound them flat with a hard rubber mallet.

Before installing the new section,



Raising the Pattern

An easy way to show off the relief of an embossed tin ceiling is to highlight a raised design with a darker or lighter version of the basic ground color, or with complementary colors. This three-step technique works well even over heavily encrusted paint.

- 1) Apply the highlight coat first. Allow this to dry thoroughly.
- 2) Apply the second coat, working the paint well into the deeper impressions.
- 3) Using a pliable sponge or soft cloth, quickly wipe the paint off the areas you want to showcase. You should see the highlight color emerge along the highest points of relief.

prime both sides and paint the surface with two coats of oil-based paint. You should be able to nail the plate directly to the existing furring strips. Otherwise, cut a section of $\frac{1}{2}$ " plywood and screw it to the ceiling for a nailer. Drive 1" conehead nails into the small raised bumps, or buttons, that occur at regular intervals in the pattern.

Painting the Ceiling

IF YOU'VE EXPOSED ANY BARE METAL, GIVE your ceiling the full sealing treatment. Apply a primer coat followed by two finish coats of an oil-based paint suitable for metals. Don't use latex or other water-based paints—rust will begin to form immediately. Avoid painting when the humidity is above 80 percent.

A $\frac{3}{4}$ " roller should have sufficient nap for a ceiling with a $\frac{1}{2}$ " relief. Thickly covered ceilings will need fewer coats. Correctly applied, a plain or decorative paint job will give your metal ceiling an edge that should last well into the next century. 🏠

Thanks to Neal Quitno of W.F. Norman Corp., Sheldon Gruber of AA-Abbingdon Affiliates, Glenn Eldridge of Chelsea Decorative Metal Co., Ed Soucy of Ring Leg Furnishings, and Matt Miller, AIA, for technical help with this article.

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Framed by wood beams, a metal ceiling takes the place of plaster in this early-20th-century home library.



Frescoes of Steel

RICHLY DETAILED, AFFORDABLE, AND VIRTUALLY indestructible, metal ceilings have never gone out of style since they first appeared *en masse* in the 1880s. During a heyday that lasted from 1900 to 1930, hundreds of simple and intricate patterns were stamped in steel. Manufacturers drew freely from classical Greek, French Renaissance, Gothic, Rococo, and Empire sources for inspiration.

Initially twice as expensive as plaster ceilings, by 1910, these raised, embossed metal panels were cheaper than either plaster or wood. Always popular for commercial buildings, "tin ceilings" quickly found their way into homes. Residential patterns tended to be less ornate than commercial designs. They were suited to the smaller rooms of a house and often mimicked the fine plaster decoration and coffered ceilings that were out of reach for most middle-class homeowners.

Entire rooms could be decorated with pressed metal, including ceilings, mouldings,

cornices, medallions, friezes, wall plates, and wainscots. Some manufacturers even hawked their merchandise as an ideal surface material for bathroom and kitchen walls—a recipe likely to produce rust.

The basic components of a ceiling included plates, borders, fillers, and cornices. The central plates were edged with a narrow border. Next came a stippled filler. The cornice or cove moulding provided the finishing touch, lapping the filler and visually anchoring the ceiling to adjoining walls.

While most residential ceilings were painted a matte white, that didn't keep turn-of-the-century manufacturers from actively hyping decorative techniques, including polychroming and gilding. Plates or panels were usually painted a light color, with darker tints used for medallions and cornices.

The handful of original manufacturers who survive today still produce original patterns that date to the late-19th and early-20th centuries. Struck from original steel dies, these replications are often so exact that one company (The W.F. Norman Corp.) simply reprints its 1908 catalog as its current pattern book.

The coffered and fleur-de-lis patterns at top left, reproduced from an early-20th-century catalog, are still widely available. The W.F. Norman pattern (bottom) has never been out of production.

AS THE FIRST PANELS OF A 1960S DROP ceiling come down, you see the unmistakable embossing of a "tin" ceiling overhead—a raised pattern of fleur-de-lis or circles laid out in a rectangular grid. Some of the paint is popping off; water stains and rust mar the surface. Can you salvage this miracle material of the late Industrial Age? With a little know-how and elbow grease, you bet your tintype you can.

Pressed out of sheet steel or sheet iron, metal ceilings were occasionally tin coated, but they were rarely made of solid tin. These easy-to-install ceilings were embraced by late 19th-century homeowners as one of the first cheap fixes for failing plaster. While there's no one way to approach every repair on a pressed metal ceiling, if you stick to a few sound techniques, you'll be on your way toward a turn-of-the-century fix-up of your own.

Removing Paint and Rust

METAL CEILINGS WERE MEANT TO BE PAINTED. Multiple coats of paint effectively seal the seams between plates, creating an unbroken layer of protection that thwarts rust. When breaks in the paint layer occur, they're usually warning signs of hidden water damage. Keep in mind that a 30-gauge, metal ceiling is only 1/100th of an inch thick. If there's rust, there's even less metal left. The best rule of thumb is to remove only surface rust and the loose or peeling paint that scrapes easily away. Since you'll be working on a surface that's likely to contain lead paint, take appropriate steps to reduce your exposure to paint chips and dust (see "Getting the Lead Out," July/Aug. 1992).

Most metal ceiling experts recommend using a 1" wire brush of medium stiffness, applied with just enough force to dislodge loose paint without gouging. If you're too enthusiastic with the brush, you may crush the embossment, especially where there are intricate patterns. You can also use a medium-bristle rotary brush attached to a drill. Expect to do some hand brushing in corners.

Another technique for removing loose paint is to bat the surface with a wire loop. This method is particularly appropriate for ceilings where most of the paint no longer bonds well to the steel surface. Make a loop



Quick Seals for Steel

The high relief of a metal ceiling offers a forgiving surface for minor repairs.

(1) Use steel wool to remove surface rust. It isn't necessary to remove all rust, just the scale and powdery material that prevents fresh paint from adhering to the ceiling.

(2) Fill in small holes with latex-based caulk that contains silicone. Although it's water-based, it doesn't contain enough moisture to create flash-rust.

(3) Patch larger holes with auto body filler. If the hole is more than 2" across, first back up the area to be patched with a piece of flexible 1/4" wire mesh. Then apply a base coat of the filler, followed by a finish coat. The filler can be shaped, shaved, or even molded to recreate some of the detail lost to damage. You'll need to work fast, since the filler hardens quickly.

at the end of a length of flexible, 16-gauge construction wire, and fasten it at the bottom. The finished bat should be about the length of a fly-swatter. Working in sections 2' square, bat the ceiling with the tool; the loose paint should fall right off.

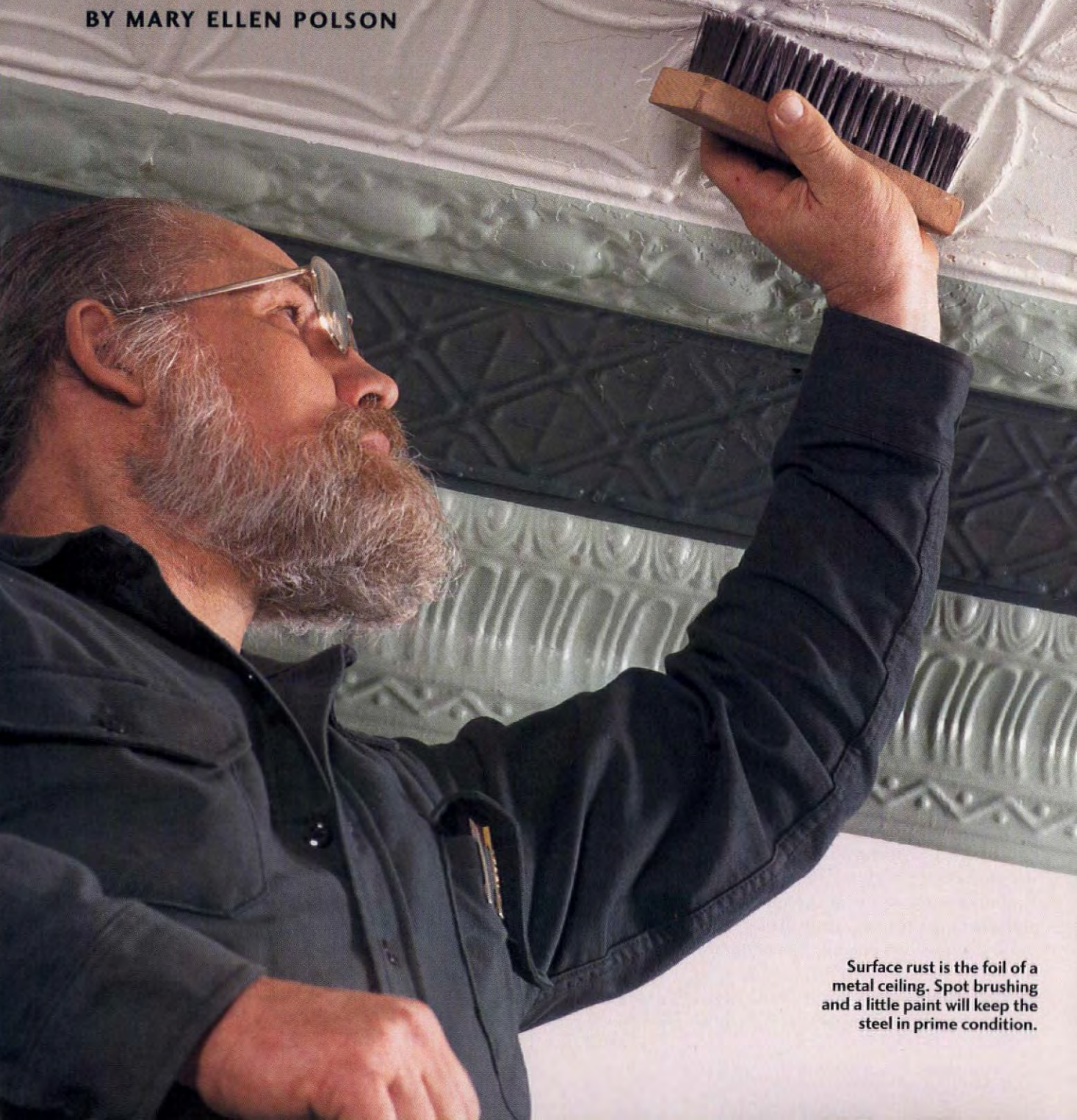
To remove rust, use medium-grade steel wool or aluminum oxide sandpaper. If an area is heavily rusted, give it a couple of coats of paint. This will build up the surface

H O W - T O

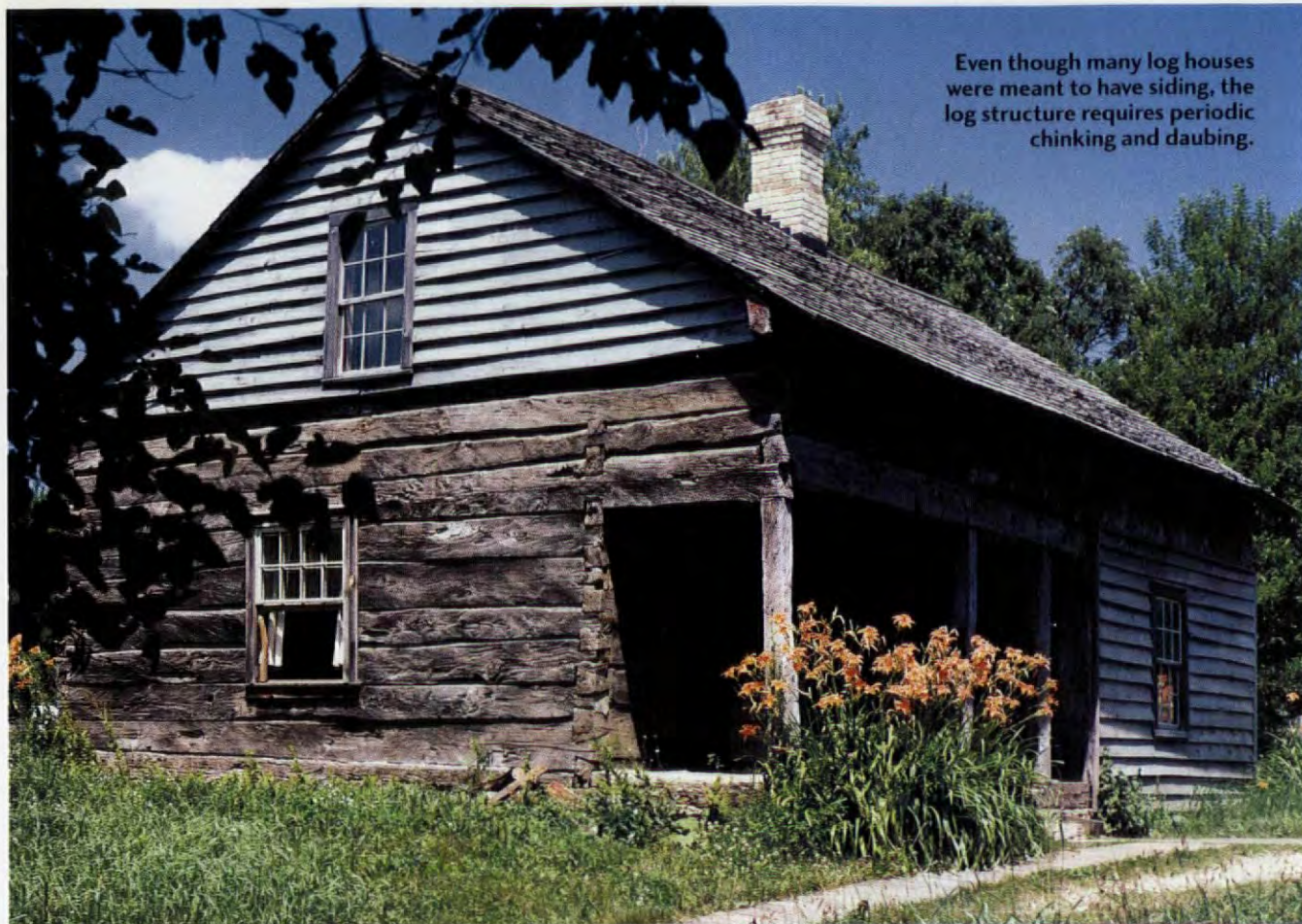
Making the Most of a Good Impression

You don't need to be a metalsmith to restore a tin ceiling.

BY MARY ELLEN POLSON



Surface rust is the foil of a metal ceiling. Spot brushing and a little paint will keep the steel in prime condition.



Even though many log houses were meant to have siding, the log structure requires periodic chinking and daubing.

and Don'ts of Insulating," May/June 1996). Thin daubing passes the moisture quickly and efficiently, but thick daubing will keep the moisture inside longer, which can cause rust and rot.

Continuously dip the trowel into water to keep it clean and so the surface will silk up and smooth out. Historically, the finished daubing surface was as smooth and flat as possible. A sleek finish propels rain off the walls faster. A rough surface that is irregular, full of exposed wood or stones (chinking), or given a brushed finish will have more surface area to slow and absorb runoff.

Insulation Breakdown

ONCE THE EXTERIOR DAUBING HAS SET UP (over about 12 hours), move inside to insulate. Kraft-faced fiberglass batt insulation is the most common choice, but will lose its R-value if it gets wet. It also draws mice and other small rodents, who will nest in the wool, though they generally do not destroy it. Cotton insulation has the same thermal qualities as fiberglass, but if the material gets wet and dries out again, it retains its R-

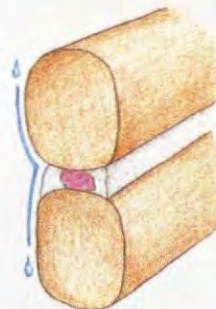
value. When rodents nest in cotton, they usually destroy it.

A better insulation, though expensive, is Air Krete (Palmer Industries, 10611 Old Annapolis Road, Frederick, MD 21701, 301-898-7848). It's an air-entrained concretelike material that is sprayed in place and completely fills the void. Air Krete provides R-3.9 per inch, will not harbor pests or rodents, and resists fire. It's non-toxic, and its R-value is not reduced if it gets wet.

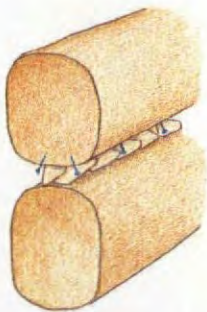
With the insulation in place, install lath on the interior. Because water runoff is not a problem, you can choose a flush surface against the upper log. Apply the daubing with the methods used on the exterior.

The method described above is not only affordable, but will extend the protection to the log frame for up to 60 years. 🏠

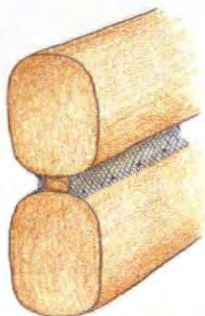
TOM MOATES restores log houses and other historic buildings, including his own home in Floyd, Virginia. DOUGLASS C. REED, president of Preservation Associates, in Hagerstown, Maryland, has restored hundreds of log houses and has written several references on the subject.



Most old-time exterior daubing was flush with the lower log's face and recessed $\frac{1}{2}$ " to 1" behind the upper log. This profile facilitates drainage of rain and snow. To accommodate the thickness of the daubing, nail the lath about $1\frac{1}{2}$ " back on the upper log and $\frac{1}{2}$ " to $\frac{3}{4}$ " back on the lower log.



Because of the potential for rust, some log house experts eschew metal lath. Instead, they anchor the daubing to the log above—where gravity is working against them—with a line of galvanized nails spaced every 4" with about 1" of nail exposed. They trowel the daubing over the nails.



Wire mesh lath should fit snugly, but it must remain as flat as possible. If the lath cups in a concave form, the center of the daubing mix may become too heavy or fall out during installation. If the lath bows out in a convex form, the daubing may be too thin in the middle and could crack horizontally.



Top: Daubing is generally applied in two coats: a rough scratch coat and a smooth finish coat. With enough experience, though, you can apply the mortar in a single step. Two coats may be easier for novices, but it often creates thick results. **Above:** Cut an R-19 (6" thick) batt about 1" wider than the crack. This way it will fill the joint and stay put. Paper or foil should face the interior—the source of heating and cooling. (In the Southwest, place the facing toward the exterior.)

will stick to the hoe in a wet chunk, hang there for a second, then fall as a blob. If it is too wet, the hoe will move through it like potato soup, and the mix won't stick to the hoe at all. If your mix gets too wet, simply add the proper proportions of dry ingredients. Finally, add the hydrated lime.

Applying Science

IF THE SUN IS OUT AND THE WEATHER IS hot, try to arrange the day's work in the shade. Keep the direct sun off the wet daubing as much as possible. If it dries too quickly, it will not be as strong and may crack. An occasional light misting from a garden hose while it cures will help.

Start at the end of the joint that corresponds to your dominant hand. (Righties start at the right; lefties at the left.) The direction of your work has to do with marrying the mortar "mud" against the previous trowelful. As you work each load of mud into place, it knits better if you push it against the previous batch. Before you start daubing, make sure you have mixed enough mud to complete the entire joint. If you stop mid-

way, the seam will be noticeable and unsightly.

The daubing process is similar to re-pointing brick masonry. Put a load of mud on a plasterer's hawk and hold it under the crack. Using a small pointed- or square-edged trowel, apply the mortar one trowelful at a time. Until you gain some experience and skill, you will almost surely push the mortar through the lath. Keep at it until you get the feel—your touch should be light enough so the mortar stays put, but hard enough that you push some mortar through the lath, creating diamond-shaped fingers on the back. These keys will droop and then dry, bonding the mortar to the lath.

After the joint is full, go back over the entire length to smooth the surface. Have several different sizes and shapes of trowel handy because the joints will vary along the logs' twists and turns. Always use the largest trowel that fits in the crack. Fill in all voids left at the edges and maintain a ½" thickness on the outside of the screen. If the material is too thick, it can retain the moisture that migrates through the wall because of climatic change (see "The Dews



ter. You'll find sandy deposits that are fairly clean high up on the banks. Shovel the sand into plastic bags and haul them back to the site. Then dump them in 2x10 frames (like cold frames without the cover) to dry. These river sands aren't clean, which gives the mortar an authentic look. For practical purposes, though, use only about $\frac{1}{3}$ river sand. The other $\frac{2}{3}$ should be store-bought, washed masonry sand.

Let's Get Cooking

USE A MORTAR BOX TO MIX CAREFULLY MEASURED batches. Never prepare more daubing than you can use in 30 to 60 minutes so it doesn't dry in the pan. Thoroughly combine mortar mix and sand with a hoe. Next add water—only a little at first—and chop it back and forth. It'll be too dry, but mix it fully and only add water gradually until the mud has the consistency of biscuit dough. Passing the threshold from too dry to too wet takes an amazingly tiny bit of water.

The mortar should be wet enough to work into the lath, but dry enough so it won't fall through it. When it's right, the mud



Above: Rethinking can add a crisp and finished appearance to a log house. Left: Custom cut the lath to fit the dimensions of the joint. Below left: Nail it securely in place, but do not nail on or around wet daubing.



Above: Inspect each log thoroughly. Wire brush, pick, and generally clean out all punky places. Right: Replacement is work for a contractor experienced in log houses. It only makes sense if damage is extensive and suitable new logs are readily available.

DAUBING RECIPE

This makes strong, flexible daubing. You can adjust the basic mix to your specific needs.

- 1 part type N mortar (white)
- $\frac{1}{2}$ part hydrated lime paste
- $\frac{3}{2}$ parts sand (one-third gathered from a local river bank)



chinking because new materials add strength, durability, and insulation to the building—without changing its appearance.

If you're rechinking, take the opportunity to add structural support. Cut 2x4 blocks that snugly fit between the logs. The nominal $3\frac{1}{2}$ " lumber width should not get in the way of the chinking and daubing. Otherwise, select 2x3s or other stock.

With the blocks in place, install metal lath to hold the daubing (see illustration, p. 50). Work on the exterior first to seal the building. Begin by cutting plasterer's diamond metal lath (26"x 8' stock is handiest) fitted to fill the joints. Or you can cut the lath over-size, nail the bottom edge, and fold the top

edge into the profile of the log above. Nail the lath along the top and bottom edges and into the 2x4 blocks. Be sure to recess the lath on the upper log (see illustration, p. 51). Use roofing nails, which have large heads, and nail securely every 4" to 6".

Make sure the wire lath is not too close to the surface. If it pops through, the resulting rust will be extremely destructive. Also test the lath by tapping it with your fingers. If you see a noticeable bounce, it needs more nails. Springy lath will flip daubing back out as you trowel it on.

Recipe for Success

NEW DAUBING MUST BE PLASTIC ENOUGH to move with the logs during changes in the weather and should look authentic in color and texture. High-tech chinking compounds sold for new log home kits are tempting, but they don't look right and are not suitable for the conditions of a historic log house. You have to make your own daubing.

If the existing daubing is historic, or if you find remnants of original materials, salvage a bit as a model for your new mix. Break apart some solid pieces and review the color, aggregate distribution, and size of the components. Crush some into a powder to examine the sand.

Start with the basic daubing recipe at left, then customize the ingredients to match existing materials in your building. It's best just to buy ready-mixed mortar, such as type N, which contains lots of lime for soft daubing. Standard portland cement is very hard and can do more damage than good as wood fibers grind against the rigid daubing. Select white mortar because gray is not a historic daubing color.

Hydrated lime does not have to be slaked, however pre-wetting hydrated lime makes it easier to mix and provides a stronger bond. Slowly pour the hydrated lime into a clean garbage can with a few gallons of water in the bottom. As you pour, stir it into a thick paste.

Using local sand is the best method for getting authentic color and texture. (Mortar colorants never look quite as good, plus they may fade over a short time and create uneven color.) The vast majority of original daubing contained stream-sediment sand gathered nearby. Go to the nearest stream or river after a period of high wa-



In this case, workers rechinked with wood chunks and then redaubed each joint before proceeding.

many other critters that live in chinking.

As you proceed, you'll have to determine how much daubing to remove. For museum buildings, where the goal is maximum preservation, specifications call for restoring only the damaged areas. For homeowners, however, rechinking the entire house may be preferable. It provides an opportunity to install electrical wiring, to find and repair damaged logs, and to insulate.

Strike each log with a hammer. The sound it makes will tell you about the log's condition. A sharp, solid ring indicates a good interior; a dull thud indicates a hollow log. Strike softly enough so you don't make dents. Mark areas of degradation with chalk on the log faces.

If you find localized rot, epoxy consolidation is a cost-effective repair that retains original logs. The drawback is that epoxy fillers are lighter in color than wood. (If the rotten sections are small, you can fill them with daubing.) The other option, log replacement, is costly and usually unnecessary.

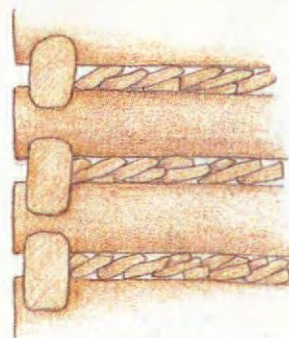
Logs are generally oversized for the structural loads they support, so don't assume that a compromised log has to be replaced. When in doubt, hire an engineer.

When working around obvious deterioration, especially at corners and openings, brace the logs directly above with 2x6s anchored to solid ground. Tack with at least two 20d double-headed nails. Beware when a rock or wood chunk doesn't readily fall out. It may support the logs above.

Most log-house owners are on the lookout for termites, yet a bewildering array of other insects and larvae love to call logs home. So, while the joints are open for inspection, bring a pest control expert on site.

Sound Chinking

STONE AND MASONRY CHINKING OFTEN SURVIVE longer than organic chinking, such as wood chunks cut from the logs during construction. You can reuse original chinking if it's in good condition. Yet even strict historic restoration projects often replace old

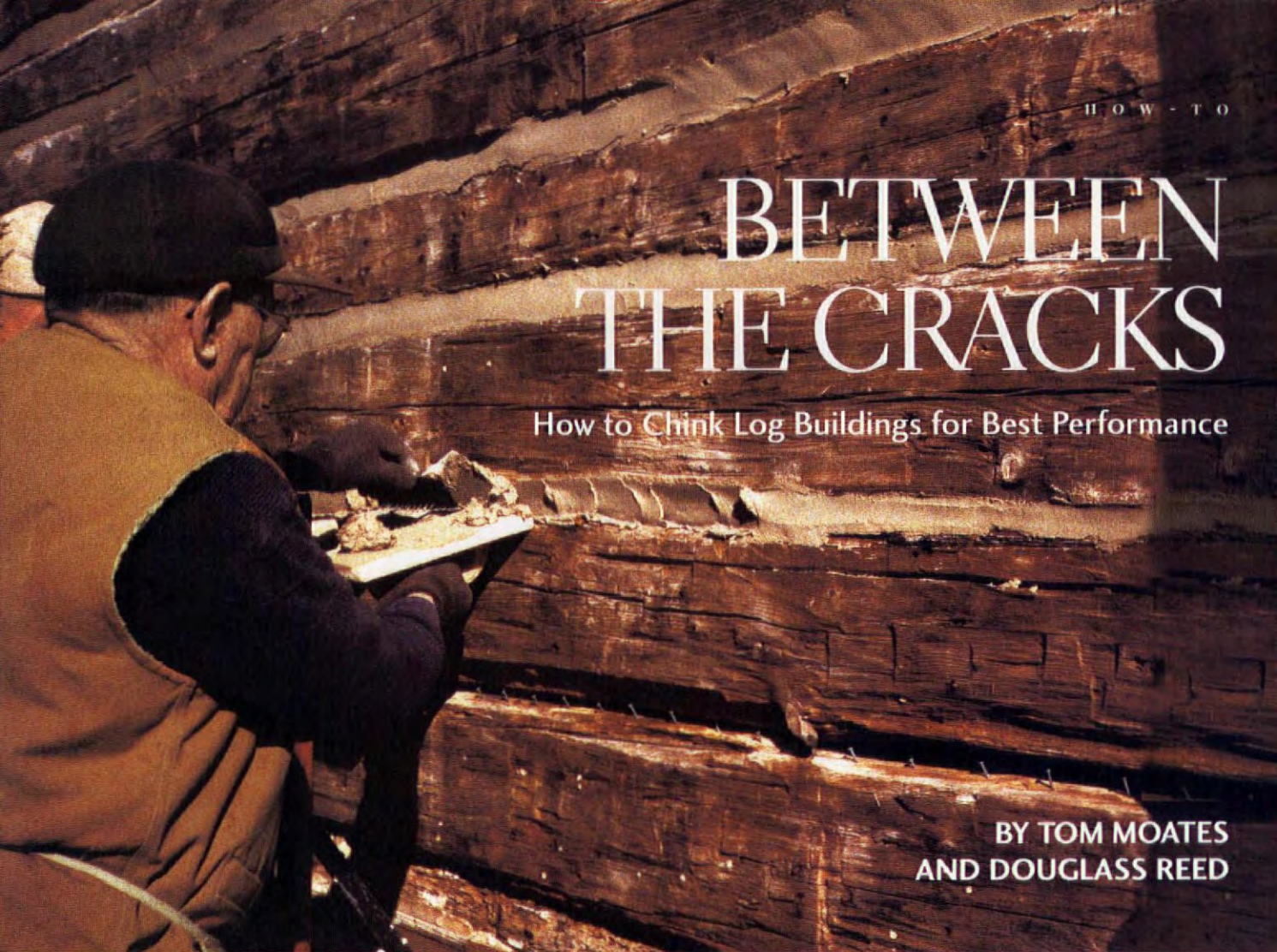


The strength of log construction comes from its stacked corners; chinking and daubing provide weather- and animal-proofing. Nonetheless, shifting, rot, or pest infestation may transfer the structural load onto the chinking.

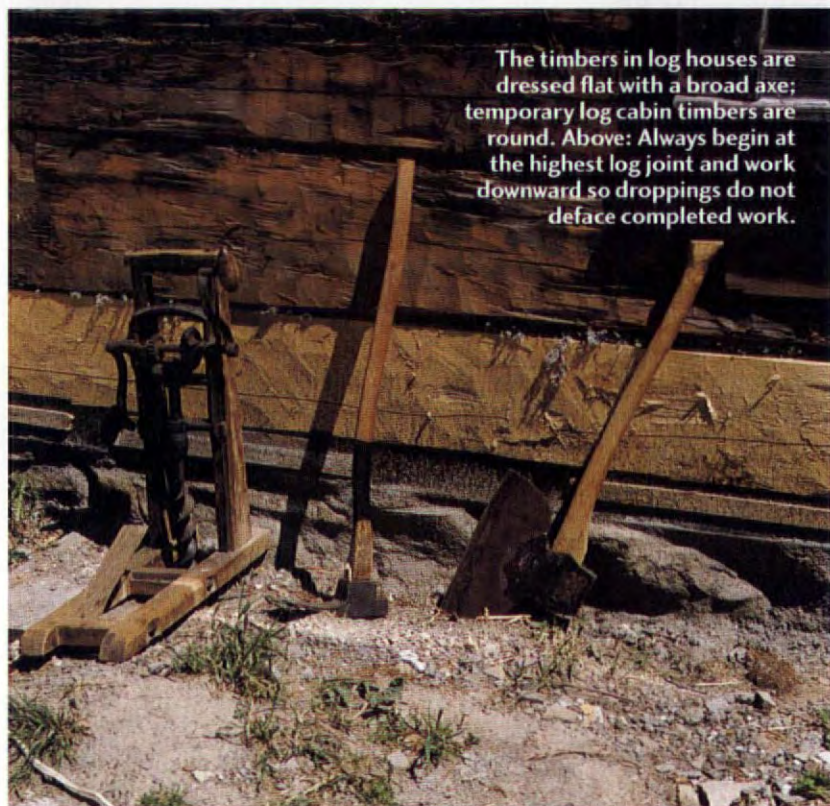
BETWEEN THE CRACKS

How to Chink Log Buildings for Best Performance

BY TOM MOATES
AND DOUGLASS REED



The timbers in log houses are dressed flat with a broad axe; temporary log cabin timbers are round. Above: Always begin at the highest log joint and work downward so droppings do not deface completed work.



LOG HOUSES ARE NORTH AMERICA'S true home-grown architecture. In a continent rich with timber, they provided many of the first permanent dwellings. Whether they hide under the clapboard siding of a prosperous farm homestead or bare their notches as architect-designed Rustic retreats, an estimated 50,000 log houses still stand today.

The least durable part of the sturdy construction is the filler between the logs: stones and wood chunks called *chinking* covered with mortar called *daubing*. Log houses with exposed walls need these materials replaced every 20 to 30 years (80 to 100 years if they're protected by siding). Here's how to renew chinking and daubing.

Daubing Demolition

OLD DAUBING SHOULD COME LOOSE WITH THE tap of a hammer, but for tough spots use a prybar or masonry chisel. Compressed air works well for cleaning hard-to-reach spots. Watch out for bees, snakes, squirrels, and the




The new steel (1) clamped to the original I-beam (2) for fastening.



Top: The open soffit after structural steel has been installed. Note the fastening plate installed on the inside of the fascia. The steel strips are furring for the stucco lath. Above: The finished cantilever.

Once the cantilever was in position, they set about strengthening the members.

The team bolted pieces of angle iron (L-shaped steel) to the ends of the old I-beams using joining plates. Next, they fastened the new steel to the wood framing in the overhang at several points. They installed steel plates on the fascia to pull it in, straighten it, and attach it firmly to the new steel. Workers also installed plywood gussets between the rafters and the soffit joists, to add strength and rigidity to the cantilever. They attached narrow steel furring strips and then steel mesh lath to the soffit for the stucco.

The ultimate indicator of success in the Purcell-Cutts House restoration is that casual observers cannot tell the museum did any work. "Many people visit the house and tell us how lucky we are that we didn't have to do anything" to it, said former Curator Michael Conforti. 

The Purcell-Cutts House is open to the public during the second weekend of every month. General admission is \$3. Call for or write for information and for reservations, which are required: The Minneapolis Institute of Arts, 2400 Third Avenue South, Minneapolis, MN 55404, (612) 870-3131.



William, Edna, and their children.

Little House of the Prairie School

While it existed between 1909 and 1922, the firm headed by William Gray Purcell & George Elmslie (or P&E, as the architects called their firm) was the most prolific among the Prairie School practitioners following the lead of Louis Sullivan and Frank Lloyd Wright. More than 50 P&E designs, mostly houses, were constructed. They are scattered from Portland, Oregon, to Woods Hole, Massachusetts, but most of P&E's work was done in Minneapolis, the site of their main office.

P&E began work on a house for Purcell and his family in 1912. Construction, including a modest expansion, was completed in 1915. Interestingly, Purcell's wife took the role of client for the project, and the original drawings refer to the house as the Edna S. Purcell house. The house's last private owner, Anson B. Cutts Jr., bequeathed it to The Minneapolis Institute of Arts in 1985, along with an endowment earmarked for restoration.

Purcell left a significant written record about his house. In memoirs, he wrote that the design reflected the life lived by his family. Purcell lovingly recorded where, what, and when the family ate (the hearth; bread, milk, cookies, and apples; Sunday evenings). He wrote with pride about the house's mechanical systems, including the screw-drive automatic coal feeder and the air conditioner, neither of which, he noted, worked very well.

Utterly Beaming

Many residential buildings require structural restoration—for sway-backed ridges, sagging floors, or spreading walls. Additions, too, often mean redistributing the weight of the old house over a wide opening. To do any of this, you'll need the help of strong beams.

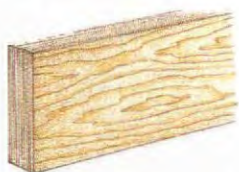
Many of the modern manufactured beams used for new construction make excellent retrofit materials for old houses. Steel I-beams are the strongest option, but not necessarily the best because of the difficulties in cutting and welding the material on site. Engineered wood is easier to work, cheaper, and often available as stock material. Some options to consider:



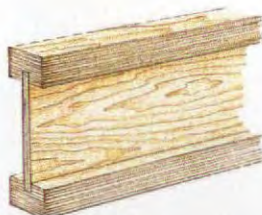
WOOD



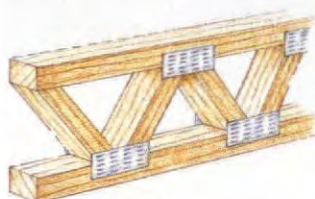
GLUE-LAMINATED LUMBER



LAMINATED VENEER LUMBER



I-JOIST



TRUSS

WOOD: The original structural material, long wood timbers are weighty, large, and, these days, hard to come by. Plus, they may contain structural imperfections, such as knots.

GLUE-LAMINATED LUMBER (GLUE-LAM): The engineered beam most widely used in old-house restoration, glue-lam is composed of four or more layers of stock, each about 1 1/2" thick. The boards are end-joined to create any desired length and bonded face to face with adhesive. Glue-lam beams are very strong, can be virtually any length and dimension, and a wide variety of shapes, such as round or pointed arches. You cannot, however, notch or pierce them for pipes or ductwork.

LAMINATED VENEER LUMBER (LVL): Made by adhering thin wood veneers, LVL is a wood sandwich much like plywood, except the grain in the veneers is parallel. Standard LVL beams run 1 1/2" to 3 1/2" wide, but they can be sistered for thicker beams. That means you can bring each piece into the building individually before assembling them into a bulky beam. It's also very easy to work. You cannot notch or pierce it, however, and it's unwieldy for spans longer than about 20'.

I-JOIST (I-BEAM): The top and bottom of a beam do all the work. As gravity tries to bow the member, it compresses the top and stretches the bottom. The material in between simply holds the top and bottom together—and adds weight and mass. So the I-shaped beam has wide flanges with a thin web between them. I-beams are narrow, light-weight (about 2 pounds per linear foot for most applications), and as strong as an equivalent wood joist. You can order them in any length and can pierce the web. Handle with extreme care during transportation, site-storage, and installation.

TRUSS: The truss consists of two chords with diagonal members running between them. The result is a strong beam that can carry heavy loads across long expanses. Trusses are commonly used for the wide, flat roof spans of industrial settings. A big plus is that it's easy to pass ducts and pipes through trusses because of the open spaces. Also, trusses are the only material besides glue-lam that you can order in a variety of shapes, including the structure of an entire gable roof. You cannot modify trusses in the field.

ance is tight. To provide enough strength, wood members—even engineered lumber such as glue-lam—would have been too big.

The glue-lam beams were too long to bring through the house and up the stairs. So Kopp and MacDonald took advantage of the leaking built-up roofing, which needed replacement anyway. Restoration workers removed the old roofing, then cut "doors" in the sheathing to insert the reinforcing materials.

Return of the Folding Wall

THE SAGGING MAIN ROOF HAD LED TO INTERIOR problems, too. In an early attempt to halt the roof's descent, someone had placed 2x4 bracing in the attic between the second-floor ceiling and the roof. Instead of stopping movement, the bracing forced the ceiling down with the sagging roof.

This chain of events affected one of the house's most unusual elements: a folding wall between two upstairs bedrooms, much like the dividers in convention halls and classrooms today. (Late in life, Purcell wrote proudly that the wall was a practical example of the Modernist dictum, "form follows function," a quote from fellow Midwest architect Louis Sullivan). The folding wall, now bearing weight from above, became compressed, slightly bowed, and inoperable.

Stabilizing and leveling the roof elements relieved some of the pressure, but it didn't free up the mechanism, which includes a track in the ceiling. To finish the job, workers strung steel supporting cables between the roof rafters and the ceiling above the track, then tightened turnbuckles to lift the track into place (see photo, p. 42).

Lifting the Cantilever

THE SAGGING FIRST-STOREY CANTILEVER was a simpler repair. After removing the stucco from the soffit and discovering that the steel I-beams reached only halfway into the 7' eaves, Kopp devised a solution. Had the I-beams been long enough to reach the front edge, there might never have been a problem. The cure was simply to lengthen them (see illustration, p.41). The restoration team jacked up the cantilever to its proper position. They built T-shaped posts from 2x4s and set them on screw jacks under the outer edge of the cantilever (see opposite).

job. This advantage was crucial since it was impossible to specify exact dimensions ahead of time. (Workers had to jack the structure up to the correct position before they could measure for reinforcing members.) Second, welding inside the dusty, cramped quarters of the attic would be too dangerous. Kopp chose glue-lam over solid wood because the material is stronger. Even if 32'-long, solid wood beams could have been found, which is doubtful, they would need to be much thicker than glue-lam to have the same strength and stiffness—a particular problem given the tight clearances involved.

Kopp did specify steel for rectangular tubes—key elements in the structural system that were bolted to the four original ridge rafters as stiffeners (see opposite). In this case steel worked better than wood because it resists bending forces about 20 times better than solid fir of the same dimensions. That means the steel reinforcement tubes are relatively thin, so they can extend out near the ends of the ridge rafters where the clear-



Prairie innovation: the Purcell interior.

Why Did It Fail?

Even with the original plans and voluminous writings left by Purcell, just why the roof framing was under-built is unclear. It's a matter of debate among Purcell-Cutts House restorers. There are three leading theories: First, it may be the result of cost-cutting by William Purcell,

the house's original owner and co-architect. Records show that Purcell worried about the cost of his house, but that his taste was expensive (above). Second, it may be that, with an attitude of "aesthetics-now-pay-later," the architects knowingly chose undersized framing in an attempt to achieve a thin roof profile. Because of lack of work due to World War I, Purcell and his family moved from the house after only a few years, so he probably never had to deal with the sagging cantilevers. Third, the wrong framing may represent decisions made by carpenters, who constructed a highly experimental house. They could not have had much, if any, experience in creating 7' cantilevers.

The first-storey cantilever has been leveled and stabilized. Workers have replaced the stucco and are wrapping up a day's work in this photo shot as documentation of the project.





Top: The glue-lam beam made a good place to fasten an electrical junction box. Note, too, the steel tube used to stabilize the ridge rafter. **Above:** Cables and turnbuckles pull the second floor up and free the guideway for the folding wall. **Right:** Curator Jennifer Komar operates the folding wall, a favorite stop on house tours.



over the years, someone had added stucco to the undersides to make the soffit appear level. This started a vicious cycle: the weight of more stucco contributed to the sagging, which was "corrected" by more stucco. Preliminary surveys found as much as 4" of stucco in some soffits.

To devise a solution that effectively straightened the cantilever, stabilized the main roof, and preserved as much of the building fabric as possible, the museum put together a restoration team led by architect Stuart MacDonald and consulting engineer Elmer Kopp. Together, they found a way to avoid a total replacement of the roof structure, which the museum simply could not afford.

Raising the Roof

IN ORDER TO LIFT THE MAIN ROOF FRAMING members to their original position, Kopp and MacDonald had to find a bearing point from which to stabilize the rafters. Original construction drawings showed a steel I-beam in the second-storey floor supporting a wide span of ceiling above the open-floor plan below. If the beam existed as it was drawn, it could become the much-needed bearing point. The plans showed that all loads placed on the I-beam would be transferred through strong structural elements directly to footings in the basement.

As drawn, the beam was located in the space beneath two closets. Curators had decided the closets were not critical for interpreting the history of the house, so they were disassembled to gain access to the space. To the delight and relief of all, the I-beam was there, exactly as drawn. Kopp and MacDonald were able to design a structural skeleton to take advantage of this support (see illustration, p. 41).

They built two wood columns extending from the I-beam to the attic, where they each support the middle of a 32' glue-lam beam (see "Utterly Beaming," p. 44). The ends of the beams extend to the exterior walls, which bear them. Since the beams had to be positioned over windows, rather than solid wall, workers reinforced the headers over the openings. Then they built conventional 2x4 framing from each beam to the rafters.

Kopp considered a steel beam, but rejected the option for several reasons. First, workers could easily cut wood to size on the

IN 1912 WILLIAM PURCELL, A PROMINENT Prairie School architect, designed a cutting-edge house for his family. He included innovations such as an automatic coal feeder for the furnace, air conditioning, and an open, utilitarian floor plan. The construction, too, was revolutionary. For example, the cantilever roof over the first-storey wing projects 7' without the support of post or pillar. It's one component of a climate control system intended to manage sunlight as it enters the house at different angles through the seasons.

Despite a modern design that included steel I-beams—or perhaps because of it—this building was plagued by structural problems for years. When the Purcell–Cutts House, as it is now called, was bequeathed to The Minneapolis Institute of Arts, the main roof was sinking and the first-storey cantilever was sagging, so the museum began a major restoration campaign aimed not only at stopping the progressive deterioration of the roofs, but bringing the building

back to its original state. A look at the materials and methods they chose is a good education in today's options for load-bearing members and how they can be introduced in old houses of any scale.

A Two-Headed Dragon

THE PRIMARY OBJECTIVE WAS TO STABILIZE the main roof—a gently sloping hipped structure typical of the Prairie School. While the 2x6 roof rafters and ceiling joists might have sufficed for the triangular geometry of a gable roof, they were seriously undersized for the low pitch—barely 1' of rise over 4' of run—of Purcell's roof. As a result, each plane of the 30' x 40' hipped roof had begun to drop.

A secondary goal centered on leveling the projecting first-storey roof. This cantilever (a structural member that overhangs its supports) drooped as much as 4" because the two steel I-beams that carry it only extended half the length of the projection. To make matters worse, as the cantilever drooped

Opposite: The Purcell–Cutts House is a significant example of Prairie School architecture, which rejected historical styles and looked for inspiration to the rolling prairies of the Midwest. **Below:** The stabilization project focused on two structural faults, the main hipped roof and the cantilever that overhangs the first-storey wing.

ANATOMY OF A RESTORATION

In the main roof, restorers constructed a framework from the second-storey floor to hold the ridge rafters. In the cantilever over the first-storey wing, they extended the short beams to the full 7' of the overhang.

