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JANUARY/FEBRUARY 1997

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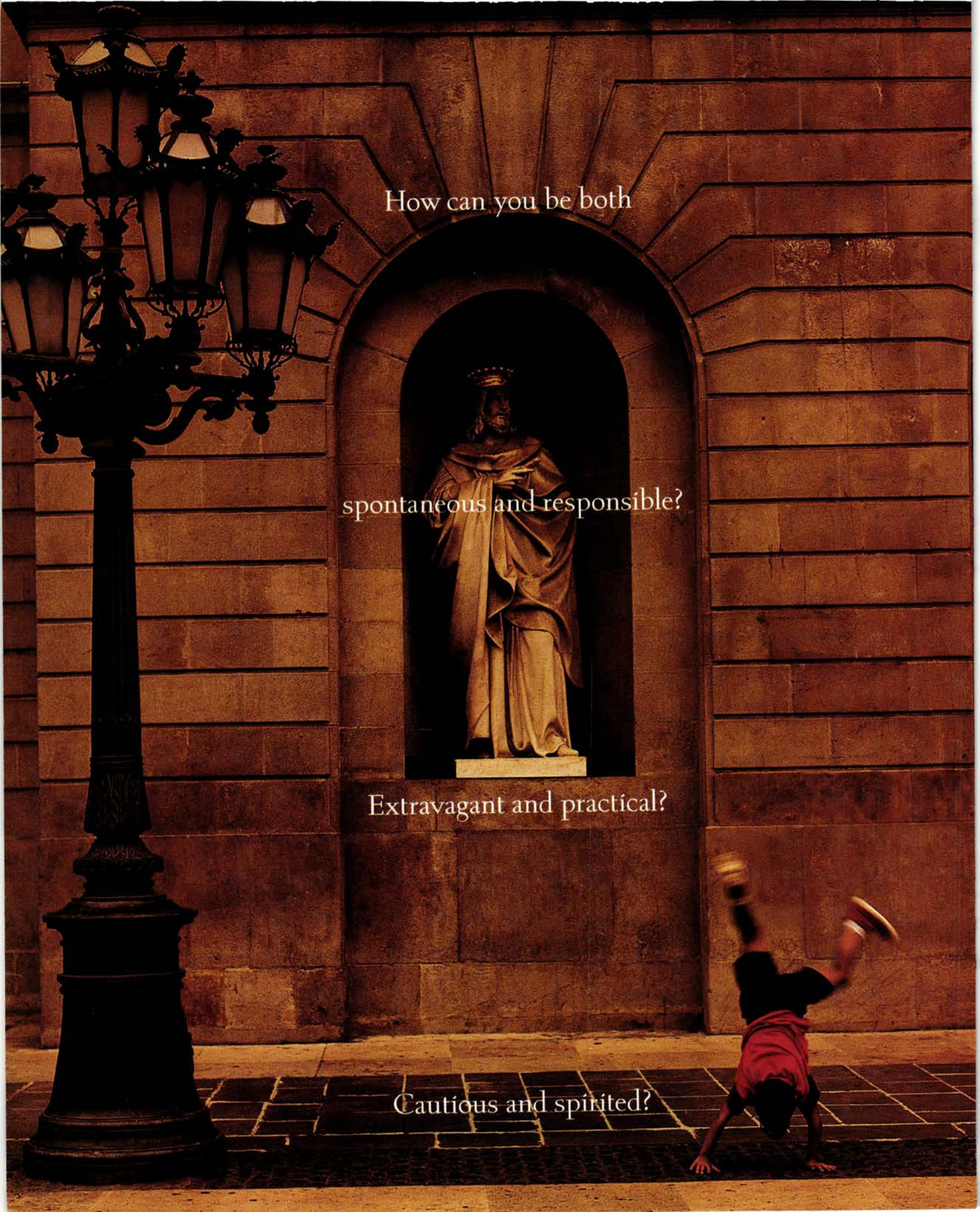
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PHOTOGRAPH BY MICHAEL LLEWELLYN

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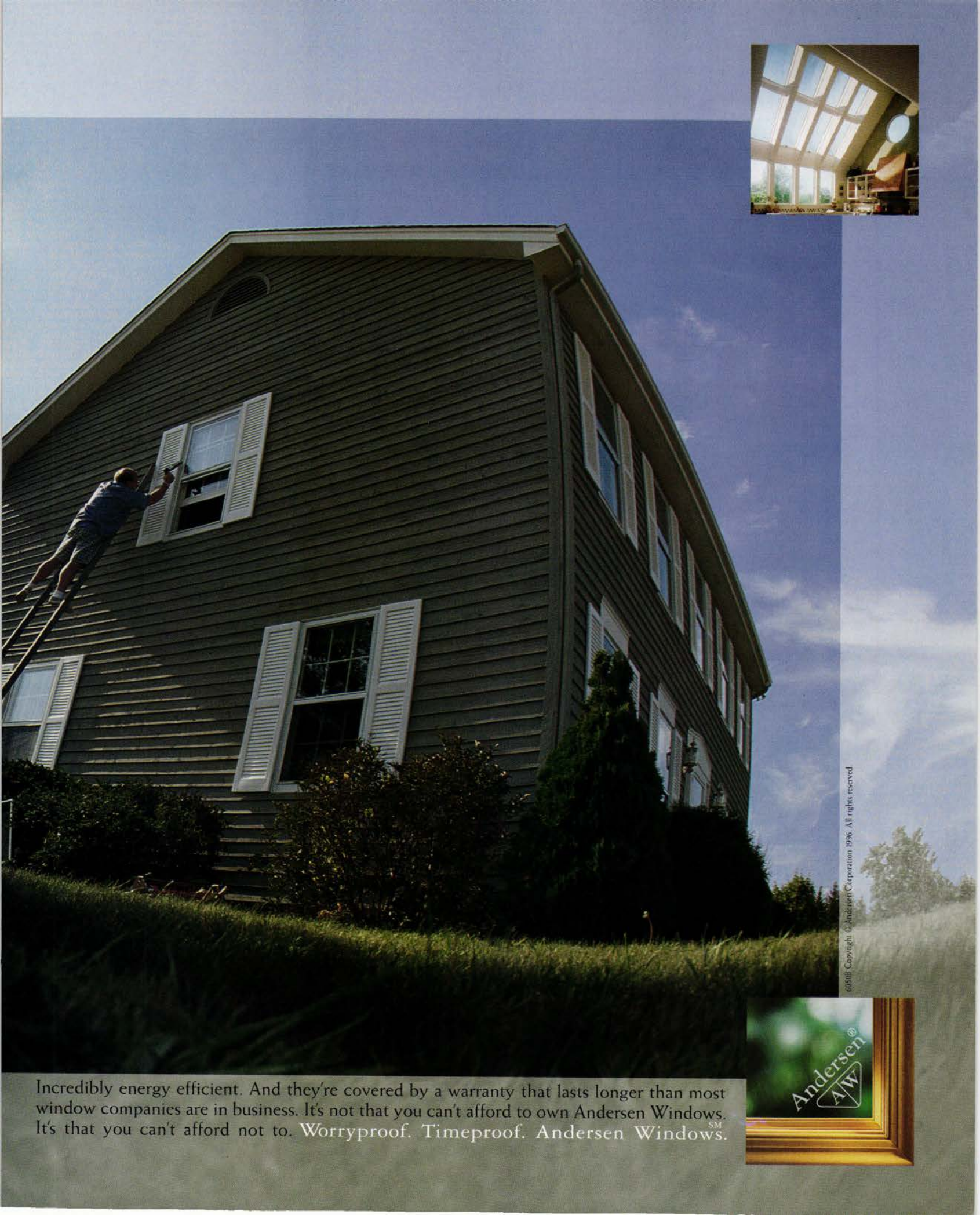

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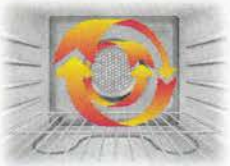

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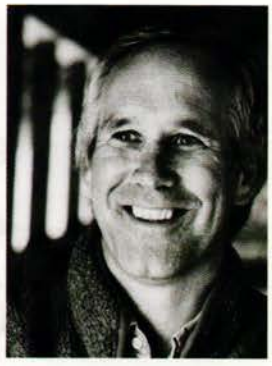
features

Bit parts, p. 104

JANUARY/FEBRUARY 1997

Farewell to Nantucket, p. 62

Window pain, p. 96



Framer's log, p. 88

Rolling rock, p. 105

On the cover: Tedd Benson's crew raises high the roof beams on a job in Woodland Park, Colorado. Photograph by Aldo Rossi

PHOTOGRAPHS, CLOCKWISE FROM TOP LEFT, BY KOLIN SMITH, KELLER & KELLER, ALDO ROSSI, KELLER & KELLER; ILLUSTRATION BY CLANCY GIBSON

(Continued on page 10)

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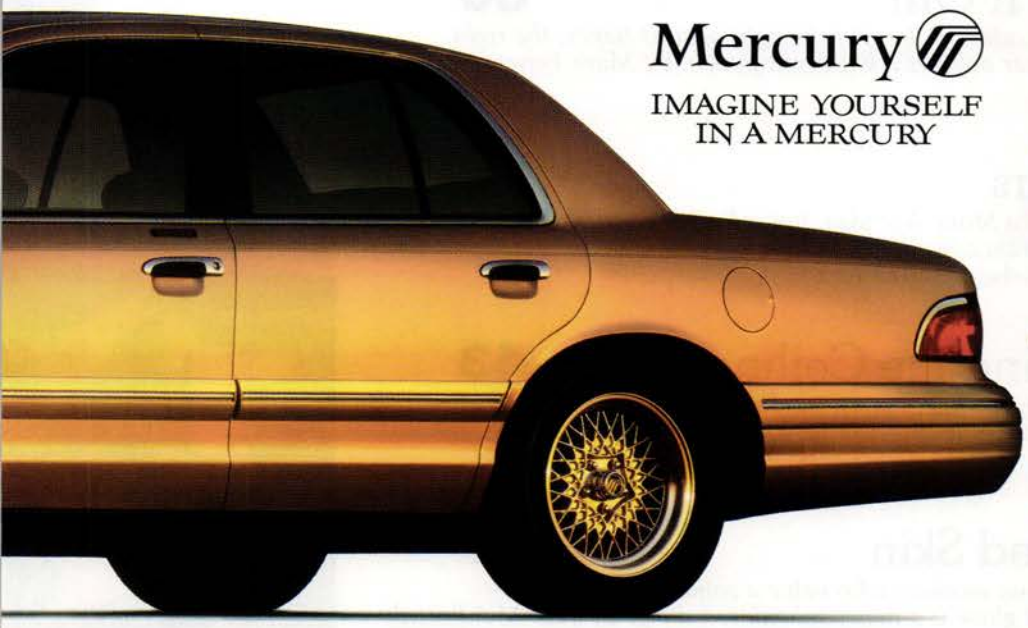
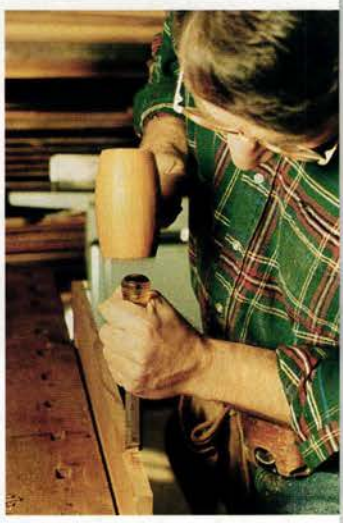


cury Grand Marquis.

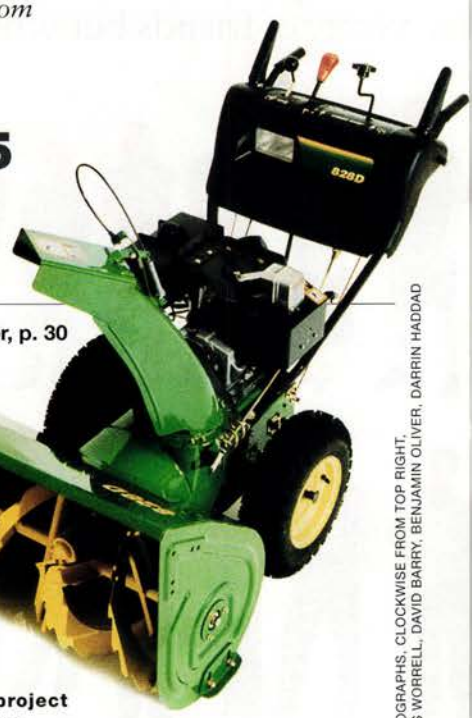
has plenty of friends but who also knows how to treat them.

up front

Good grips, p. 47



Paring knife, p. 36



Winter warrior, p. 30

Plus

Starting gate, p. 25

Visit *This Old House* on the World Wide Web to read about our project houses, view articles online and get up-to-the-minute appearance schedules for the crew. www.pathfinder.com/TOH/

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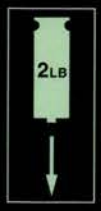

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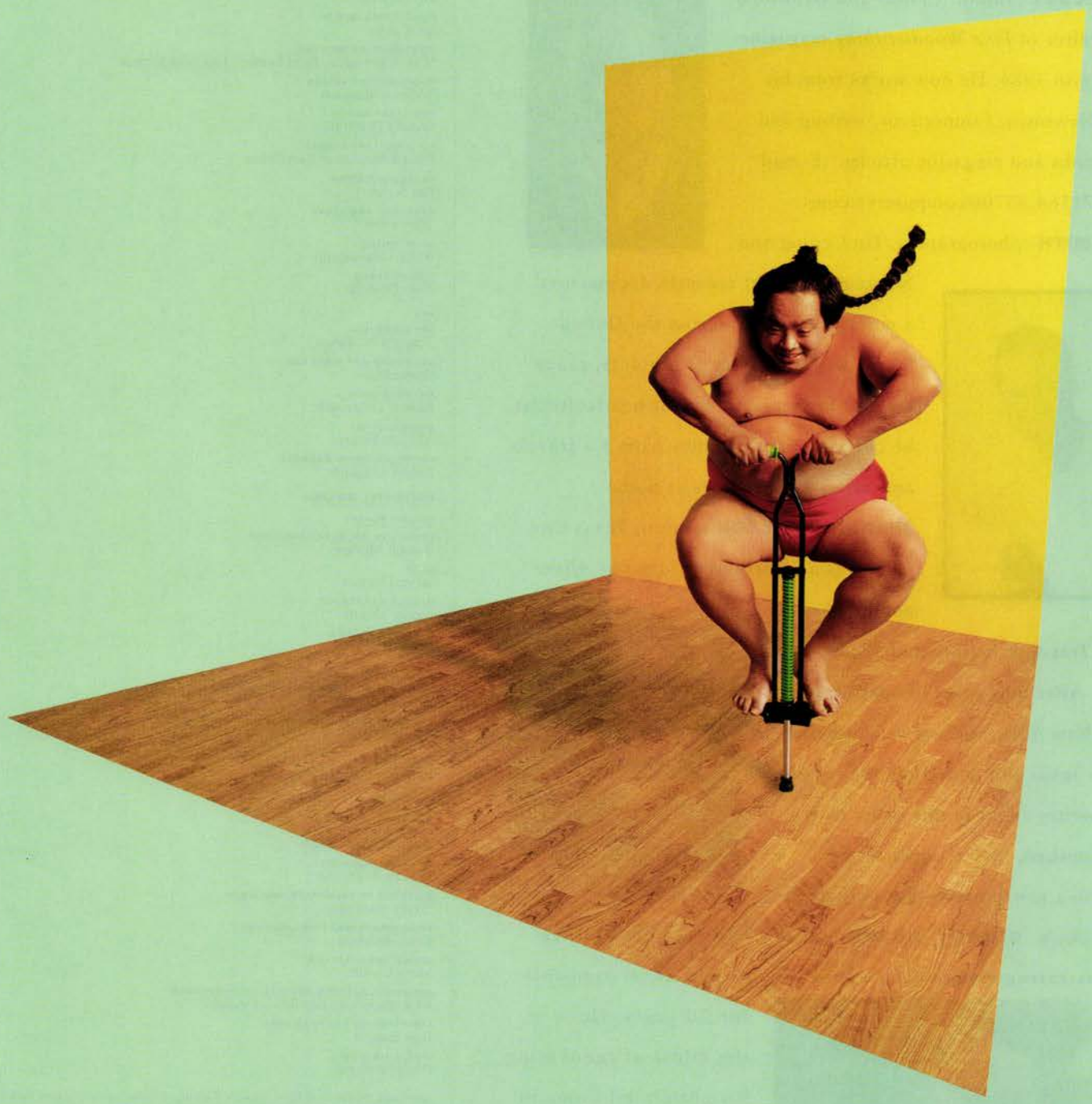

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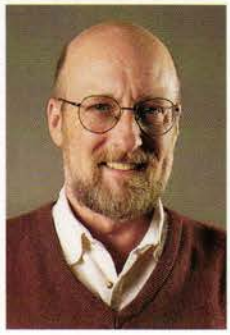
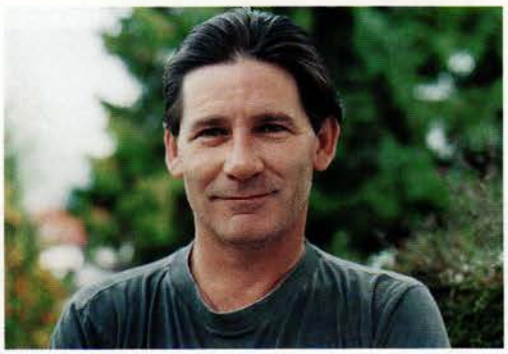


JOHN KELSEY (author, Chisels and Drill Bits) was the editor of *Fine Woodworking* magazine from 1976 to 1984. He now works from his home in Newtown, Connecticut, writing and editing books and magazine articles. (E-mail address: 71564,3570@compuserve.com)

KOLIN SMITH (photographer, Tin Ceiling and Nantucket finale) recently documented a monthlong drive across the United States with portraits of builders, ranchers and farmers. An ardent horticulturist, he collects plant samples from his travels and raises bonsai trees at home.

JEANNIE RALSTON (author, Texas Cow Palace) is a contributing editor at *Allure* and has written for *Life, Travel & Leisure* and *Texas Monthly*. After nine years of apartment living in New York, she and her husband moved to Texas and undertook the restoration she writes about in this issue. Now that it's finished, they're eager to get involved in a new project—but only if it's someone else's. **CLANCY GIBSON** (artist, Drill Bits poster) has been illustrating magazines, record albums and advertisements for 20 years. He is in the midst of renovating his childhood home in Vancouver, British Columbia, where he lives with his wife and daughter.



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PHOTOGRAPHS, TOP TO BOTTOM, BY MITCH MANDEL, TOM WOOL, ROBB KENDRICK, BETTY GIBSON

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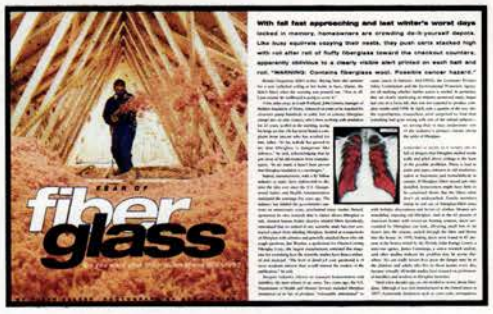
Letters

After reading "Fear of Fiberglass" in your September/October issue, I immediately thought of the air ducts at my workplace, which are lined with fiberglass insulation. I would guess that this is the case in many office buildings, and that fiberglass in the home is just a small part of the problem.

Kevin Stenholm
Farmington, MN



For two years, the Occupational Safety and Health Administration (OSHA) has been wrestling with the problem of regulating indoor air quality, and its April 1994 preliminary standards proposal included fiberglass on a list of "air contaminants of concern." As employers await the outcome, harbingers of future problems accumulate. Among them are a 1994 settlement of $825,000 to a woman in Riverside, California, over work-related exposure to fiberglass, and a standoff between University of Wisconsin faculty and administrators over possible health problems from spray-on fiberglass ceiling insulation. Until there is a change in OSHA regulations, you can ask your employer to bring in an industrial hygienist to measure the amount of airborne fibers to see if samples exceed guidelines established by the National Institute for Occupational Safety and Health (NIOSH), a federal research agency. The procedure usually takes a day and costs a few hundred dollars. If your employer is uncooperative, you can anonymously request a Health Hazard Evaluation from NIOSH at 513-841-4382.

A year ago we had fiberglass blown into our house, and since my husband has asthma, we asked the salesperson about the safety of this product. Assured that it was safe, we went ahead with the installation. If I had seen your article a year ago, I would have had nothing done—not even roll insulation. I wish we'd had the information sooner.

Theresa Mendez
Chicago, IL

Although there is concern over the health effects of airborne fibers, the experts we interviewed say there is little to fear from fiberglass that is properly installed in a closed-up wall or ceiling cavity or in a little-used area such as an attic. However, fiberglass particles can easily contaminate other parts of the house as you enter and exit the attic. Always wear a dust mask when entering any room that has exposed batt or loose-fill fiberglass. To find out if there's a problem with airborne fibers in your living space, call the American Industrial Hygiene Association (703-849-8888) for a list of qualified consultants.

Last night I lost an antenna rotator, a garage door opener, a television and a furnace-blower motor to lightning. How can I protect my house from future lightning damage?

Kim Metzger
Shelby, OH

Property damage from lightning strikes reached $250 million in the United States last year, more than hurricanes, tornadoes and floods combined. Yet thunderbolts can be tamed. Lightning rods, also called air terminals, will divert most strikes if installed at the high points of a roof and wired to 10-foot-long copper or steel rods driven into the ground. Installers should be certified by the Underwriters Laboratory or the Lightning Protection Institute. Lightning arresters installed on the main circuit-breaker panel and on cable TV and phone lines offer further defense. Underwriters Laboratory says arresters should be used with plug-in surge protectors placed between outlets and sensitive electronic gear. To learn more, visit the Lightning Protection Institute's Web site at http://www.lightning.org and watch for our upcoming article on lightning rods.

Regarding your article in the September/October Extras on the sale of 19th-century patent models: Your readers should be aware that the United States Patent Model Foundation is not connected with the U.S. Patent and Trademark Office in any way. Although you stated that it would use proceeds to display the collection in schools and museums, we believe the Patent Model Foundation has been selling the models since 1989 without holding any such exhibitions.

Richard Maulsby
Director of Public Affairs
U.S. Patent and Trademark Office
Washington, DC

According to Nancy Metz, executive director, the United States Patent Model Foundation is a private, nonprofit organization that acquired the world's largest collection of patent models from a donor in 1989. The foundation administers the Invent America program, which has been holding national invention competitions for schoolchildren since 1987. In 1994, the foundation began selling a small portion of the collection to raise money for traveling displays of the models, but this aspect of the program, Metz said, is "still in the planning and development stages."

punch list

definition: a list of items incorrectly done or remaining to be fixed on a construction job

- Several of the photographs accompanying the November/December article on drywall ("Wonder Rock") were incorrectly credited. The gypsum quarry on page 38 and the drywall plant on page 42 are by Francesco Bittichesu; specialty drywalls (pp. 38-39) are by James Worrell; drywall recycling (p. 42) is by Keller & Keller.

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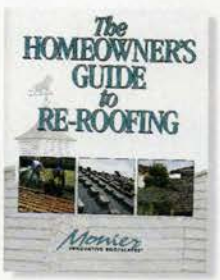

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Moving Disasters

How to destroy a perfect renovation in one day

BY JEANNE MARIE LASKAS

My friend Philip recently finished renovating a three-story Victorian he bought for a song. The project took two years of his life, countless hours of anxiety and many helping hands from faithful friends.

Tonight we're all here in the center hall, congratulating Philip. We're marveling at our work: the stained glass, the gingerbread trim, the meticulously polished brass hinges. We've brought housewarming gifts and champagne. Philip is aglow. "You people mean so much to me," he says. "Friendship is the one true gift."

Then he says: "So, you want to help me move Friday night?"

Move? Hello? Moving is not technically part of home renovation, is it?

No one volunteers. There is much staring at shoes. We are friends who believe in supporting each other but we are, um, busy Friday night.

Then Nancy, perhaps the most nurturing of the group, volunteers. Then she volunteers me. Then she volunteers some big strong guys she knows. Nancy, a casting agent, has whole file drawers full of big strong guys in need of work.

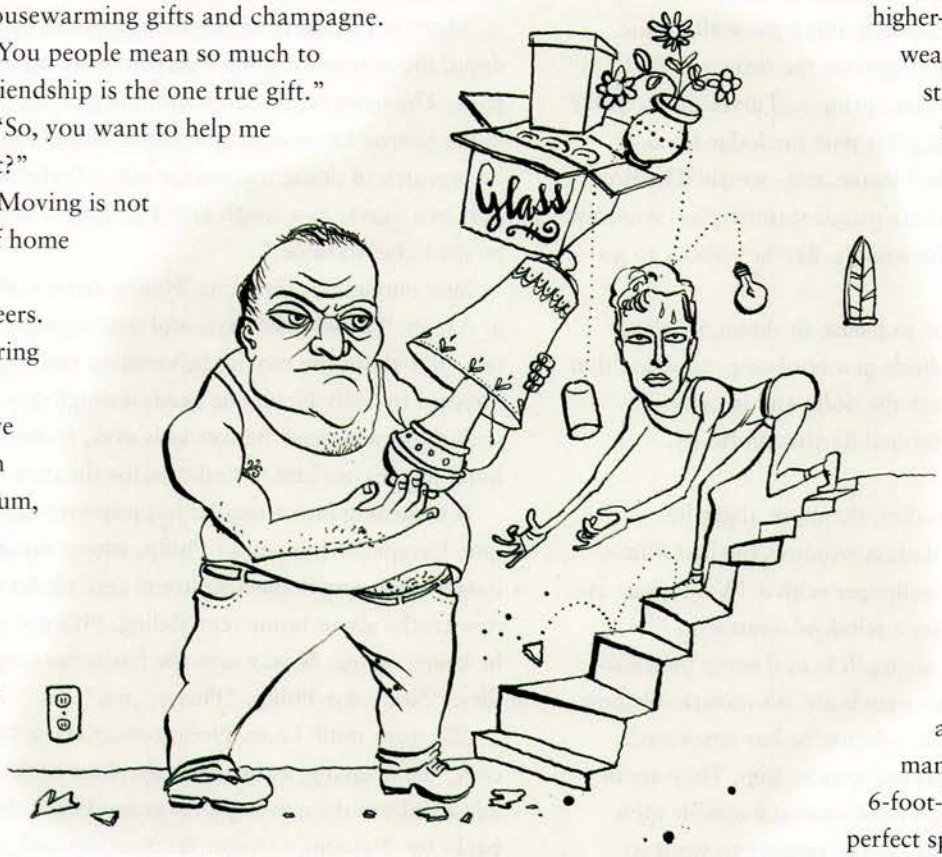

ILLUSTRATION BY MARTIN MAYO

And so one week later, on Friday at 5 p.m., the crew assembles. Big Louie walks in. He's wearing tight black jeans and pointy cowboy boots with higher-than-necessary heels. He's wearing a slinky tank top—two strings covering each bulging tattoo-covered pectoral muscle—for maximum effect. He seems to have worked on this look.

He says, "Hi. Where's Nancy?"

Nancy is late. Big Louie seems unhappy with this news. In fact, he seems unhappy with the world at large. He is a man who appears to have a constant need to throw a punch.

Another big guy walks in. Aaron. He's the anti-Louie. An angel of a man, Aaron is lanky, just over 6-foot-7, and his chiseled face is a perfect specimen of human anatomy. He dreams of being an actor, a Sidney Poitier for the 21st century. Meanwhile, he models underwear for store catalogs. Looking out at the sea of boxes, lamps and dust balls this job represents,

Aaron smiles and says, "Let's get started!"

Big Louie growls. "*I'll say* when we start and when we stop."

He tells us what to lift and when to lift and where to put stuff. He does little lifting himself. He's afraid of sweating. He doesn't want to mess up his makeup. Aaron tells me this in the basement, while we box up the laundry room. Aaron says Louie has complexion issues. Aaron says Louie hopes to score points with Nancy as a result of this move. He says Louie wants to be a star.

We get the first load finished, then squish into the U-Haul cab and head over to the new house. We open the door. Big Louie tells us what to lift and when to lift and where to put stuff. Philip has had enough. He struts his puny self right up to Louie's chest and says, "Hey, how about actually lifting something?"

This turns out to be a misguided request.

"You want me to lift?" Louie says. "Okay, I'll lift." A certain testosterone awareness overcomes him. He lifts the bed's box spring over his head and commences climbing the staircase. He does not make it. The corner of the box spring—screech—leaves an impressive scratch along the wall. Louie manages to get the box spring lodged on the staircase. Philip is wincing. Louie is angry at the box spring and gives up on it. He retrieves the bed frame, cannot get it past the lodged box spring, becomes angry at the bed frame and—crash! The bed frame goes sailing through Philip's prized stained-glass window.

Philip makes a lot of breathy sounds, like he's about to go into cardiac arrest.

Aaron and I try to tell Louie to please sit down, to please stop, but he is on a roll. He wheels in a bookcase, unaware that an eggbeater is stuck underneath the dolly and is carving a deep gouge into the newly refinished hardwood floors.

"Ahh!" says Philip.

The more mistakes Louie makes, the more angry he becomes. He curses the stained-glass window, the bed frame, the wood floor. He snags the wallpaper with a TV antenna. He beheads a sconce. He amputates a window treatment.

"Ahh, uhh, ahh!" Philip is saying. It is as if every punch to the house is felt by Philip on his own body. It's remarkable how attached a person can become to a house he has renovated.

Aaron is talking to Louie, trying to calm him. They are in the bedroom. Louie is holding a heavy antique marble table that is supposed to go in an alcove. He appears to want to throw the table through the window, or perhaps into the fireplace. He has a determined look. Aaron grabs the table.

Philip says, "Whew."

Aaron lowers the table into the alcove. When he stands, he bangs his head on the low ceiling, thus forcing his head to ricochet fast as a speeding bullet back into the marble table. The corner of the table goes right between Aaron's eyes.

He spins around in pain. Blood is everywhere, everywhere Aaron spins, all over Philip's new Berber carpet. The room is rapidly taking on the look of a murder scene.

"Uh, Aaron," Philip is saying.

But Aaron is howling in pain. I grab a towel. I can see the slice down his forehead, just missing his right eye, the perfect right eye of the perfect model angel face now marred for life.

To say nothing of Philip's house. Philip's dream house.

Aaron is seeing stars. I lay him down on the cool bathroom tile, apply ice. Louie says, "Come on." He says we are making a big deal out of nothing. We ignore him. This angers him. "And where's Nancy?" he says, leaving the scene of disaster, thump, thump, thump, down the steps, slam, out the door, and off he goes.

It is as if every punch to the house is felt by Philip on his own body.

There is a moment of silence as this reality sinks in. "Ding dong, the monster is gone," Aaron is saying through the ice pack. The news rejuvenates him. He gets up, goes over to look in the mirror. He says maybe a scar would look good. He says he was sick of doing underwear ads. Maybe now he could get a part in a movie as a tough guy. He says, "I think a scar could be my ticket to fame."

Sure enough, as if on cue, Nancy arrives. She takes one look at Aaron. "Wow!" she says, and sure enough, as if on cue, she tells him about the movie she's casting starring Julie Harris and directed by Sally Field. She needs a tough-guy lumberjack, and with that awful gash between his eyes, Aaron has the perfect look. She invites him to audition for the part.

It is turning into a regular happily-ever-after story for everyone. Except, of course, for Philip, whose dream house is no longer the house it was just hours ago. Philip is discovering new truths about home remodeling. "It's not over till it's over," he keeps saying. Nancy says she has some carpenters in her files. "No," says Philip. "Please...no."

We work until 3 a.m. Philip is near tears. "It's over, it's really over," he is saying, as he closes the door of the empty U-Haul and climbs in the cab to pull it around back. Beep, beep, he backs up. Varoom, varoom, he goes forward, unaware that the door of the truck has hooked itself to the latch on his fence gate.

He heads down the street, taking a good portion of the picket fence with him.

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extras

sticky stuff

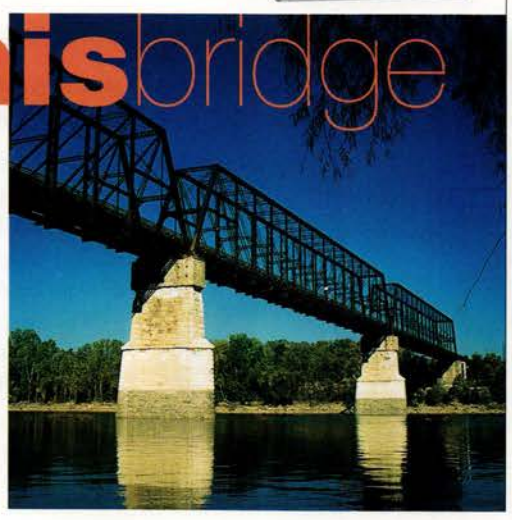
Tape comes in a dizzying array of widths, colors, materials and degrees of stickiness. Which one to pick depends on the job: Some tapes need to be waterproof, others must be resistant to changes in temperature. Permanent repairs require strong adhesives, temporary uses need less holding power. Our dangling dozen: 1. Hook-and-loop tape allows unlimited sticking and unsticking. 2. Polyethylene tape stands up to heat, cold and damp; good for mending vinyl outdoor furniture. 3. Metal repair tape follows contours easily, works well on gutters. 4. Foam mounting tape, sticky on both sides, holds mirrors while mastic sets. 5. Self-bonding rubber tape forms a waterproof mass; great in emergencies. 6. Fiberglass-reinforced indoor carpet tape makes seams nearly invisible. 7. Fabric-backed duct tape seals ducts, also works on broken tool handles. 8. Sheathing tape seals joints in housewrap and insulation panels. 9. Painter's tape holds drop cloths with an upper adhesive layer. 10. Vinyl tape insulates electrical connections. 11. Patch-and-repair tape mends torn bookbindings and ripped vinyl upholstery. 12. Outdoor carpet tape, sticky on both sides, anchors carpet to a deck.

PHOTOGRAPHS BY DARRIN HADDAD

Perfect Patchwork

Patched plaster or drywall has a way of announcing its presence—it's practically impossible to get the patch to adhere and keep it smooth. *This Old House* contractor Tom Silva solves these problems by using window screening over the patch and holding it in place with two or three layers of joint compound. He starts by cleaning out the hole and screwing a drywall patch to the studs or lath. Next he smears the area with joint compound and presses on a piece of window screen (fiberglass or aluminum work equally well) cut somewhat larger than the patch. When the joint compound is dry, he smooths on a second coat and the job is done. If he's in a rush, Tom stirs a bit of veneer plaster and water into the joint compound for the first layer. It hardens in 45 minutes instead of overnight.

buy this bridge



Two fine examples of 19th-century North American truss bridges are available for free—almost. Both bridges, located in Missouri, must be dismantled and removed at the new owners' expense. The bigger span, the 1887 Francois Chouteau Bridge, right, is a third of a mile long and will cost about $15 million to move (think of the tolls you could collect). The smaller span, the 1897 Havana Bridge, is only 160 feet long. Both are being replaced by newer models.

BRIDGE PHOTOGRAPH BY TREY CAMBERN

(See Directory, page 113, for details and sources)

Wireless

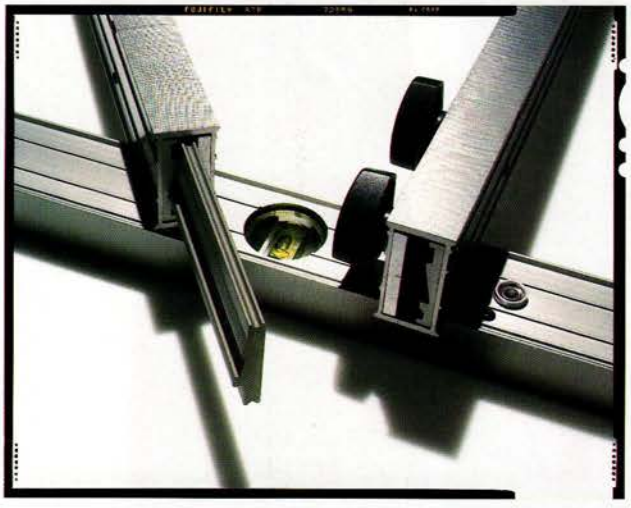
At first glance, this hollow plastic baseboard—with or without wood grain—isn't too appealing. But when homeowners need an easy way to get power and the only options are miles of extension cords or metal raceways, faux molding becomes more attractive. Electricians, including *This Old House*'s Paul Kennedy, relish the prospect of extending wires without dismantling historic walls. There's another benefit: safety. Old-house wiring is responsible for 40,000 fires each year, says Ken Giles of the Consumer Product Safety Commission. Anything that makes replacing it easier may save lives. Homeowners can install the molding themselves. The cost is $8 per lineal foot; corner pieces are available, or the material can be cut with a miter saw.

Home, Home...on the Web

Eco-friendly homeowners, take note: The Center for Building Science's Web site (http://eande.lbl.gov/CBS/VH/) provides answers to questions on home energy use and features the Heating/Cooling Simulator, an interactive tool for lowering fuel bills. Considering solar? Stop by the Maine solar house (http://solstice.crest.org/renewables/wlord/). Owner William Lord offers an under-the-hood tour of his solar-powered home, including a month-by-month rundown of energy bills, detailed house plans and animated diagrams. For a high-tech salute to straw, bury yourself in http://www.strawhomes.com. This conglomeration of articles, listings and links has become the cyber town hall for fans of straw-bale construction, a traditional American building technique that has garnered increasing popularity thanks to its low cost and use of renewable materials.

Talkin' 'Bout a Levelution

Anyone who builds soon discovers that one level isn't enough. A 2-footer is fine for putting in a small window, but a 6-footer works best when it's time to hang a door. That's why Dane Scarborough and Jesse Vint invented Levelution, three interlocking sections that can be combined to make 2-, 4-, 6- and 8-foot lengths. The patented Vectorlock joint, which joins and aligns each section with the turn of a knob, is the key to Levelution's success. No tools are necessary, and, because there's no external bracing, all edges are usable. Scarborough claims the joint maintains an alignment of 1/500 of an inch and can survive a 25-foot fall without damage. Accuracy is an impressive 3/64 of an inch over 8 feet. Reading even the 8-footer is easy—each section has horizontal and vertical bubble vials that can be recalibrated. Levelution's aluminum is tough and scratch resistant, and the pieces fit in a slim, 4½-foot-long case.



caulk tip

Caulk, applied sparingly to joints, is the secret of a seamless paint job. *This Old House* painting contractor John Dee has a technique for cutting the tip of a caulk tube that minimizes waste and, instead of depositing the caulk in blobs, makes a crisp corner. First he cuts a 45-degree angle as close as possible to the tip. Then he sands the opening with 120-grit sandpaper glued to the inside of a piece of 90-degree molding. This creates a tip that can be pushed tight against the joint. Some finger-smoothing may be required.

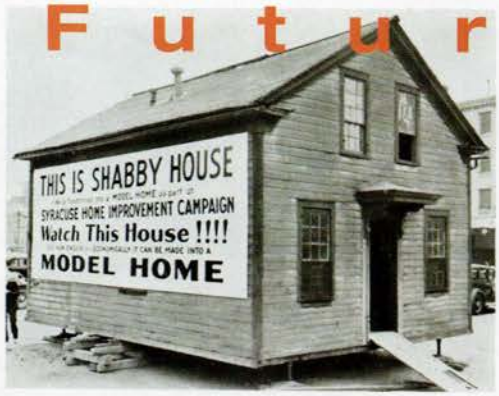
"Carpentry begins with a **rule** and a **pencil**."

Norm Abram

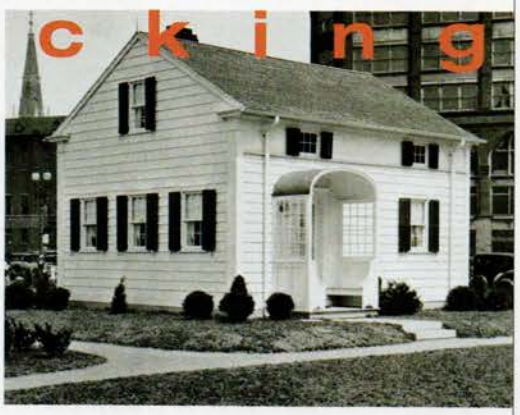
(See Directory, page 113, for details and sources)

ILLUSTRATION BY SCOTT MENCHIN; CAULK PHOTOGRAPH BY KELLER & KELLER

Future Shocking



In 1934, the Syracuse Society of Architects embarked on a campaign to create business for its members by producing a booklet that showed how the modest house at left could be transformed into the modern and luxurious one at right. The society's design included features considered opulent in those days: electric switches, phone outlets, washable wallpaper, rubber kitchen floors and—sit down for this one—clothes closets.



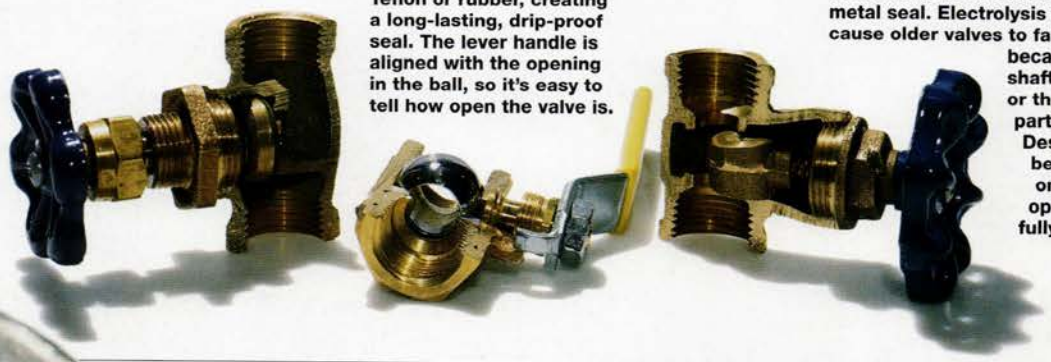
Open and Shut

All three of these valves shut off water, allowing a sink or heating system to be repaired. But many pros prefer the type in the middle, says *This Old House* plumber Richard Trethewey.

Stop Valve: Also known as a globe valve, it seals with a washer that eventually must be replaced. It can be used as a throttle to control water flow, but it is best as an emergency shutoff only.

Ball Valve: The stainless-steel ball presses against Teflon or rubber, creating a long-lasting, drip-proof seal. The lever handle is aligned with the opening in the ball, so it's easy to tell how open the valve is.

Gate Valve: This original shutoff valve works with a metal-to-metal seal. Electrolysis can cause older valves to fail, either because the shaft breaks or the inside parts bind. Designed to be used only fully opened or fully closed.

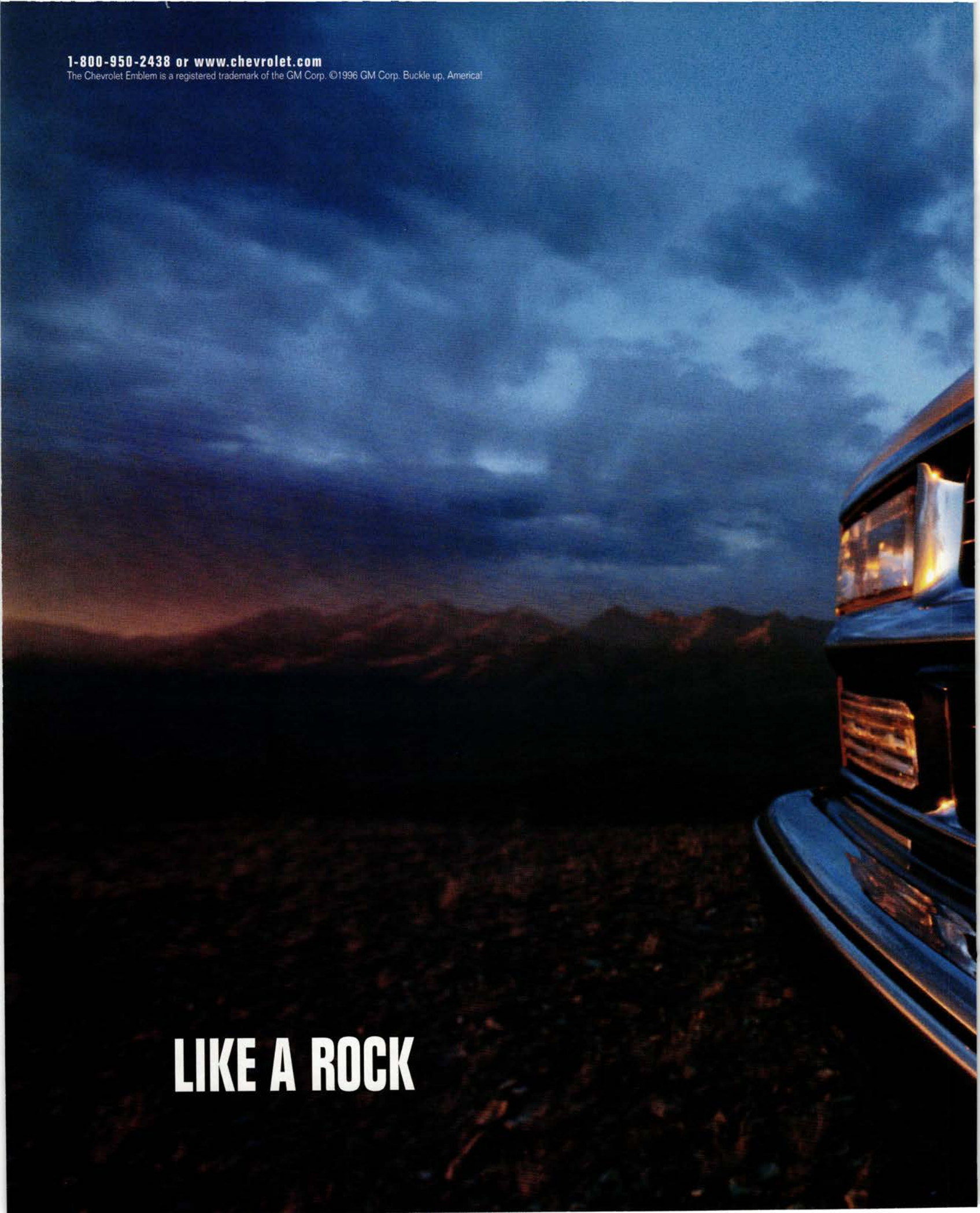


No measuring tape handy? One inch is about the diameter of a quarter.

Blight Makes Might

The Motor City Blight Busters know how to grab attention: They drive up to a house in their 1971 black ambulance, lights flashing and siren screaming. A nonprofit group that demolishes, renovates and occasionally builds houses in Detroit's blighted neighborhoods, the Busters use the ambulance to tell the neighbors they're there to help. With only six employees, the group relies on volunteers—as many as 1,500 during special projects. While they normally seek permission from the homeowners before starting work, they're not averse to taking matters into their own hands. The group was recently fined by the city for leveling an abandoned house—as the neighbors cheered. "We're in a war," says founder John George, pictured below with a team of employees and volunteers. "Somebody's got to win back our neighborhoods."

(Continued on page 28)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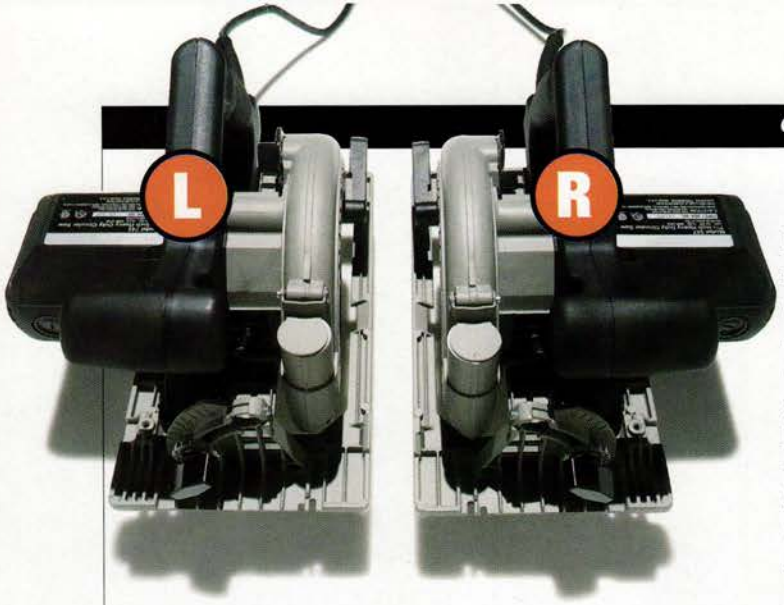
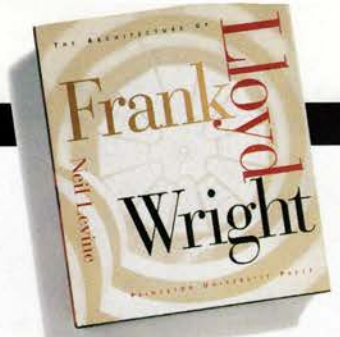
LIKE A ROCK



Left Behind

For lefties, right-handed tools range from inconvenient (the dust bag is in the way on electric sanders) to dangerous (the motor is on the wrong side of the circular saw). The left-handed 10 percent of the population must learn to be ambidextrous or search for mirror-image versions of tools, such as these left- and right-handed circular saws.



Wright **Mind**

Everything you didn't know about Frank Lloyd Wright's work and then some is in Neil Levine's new 524-page book, *The Architecture of Frank Lloyd Wright.* Rare photographs, reproductions of Wright's original architectural drawings and even a few scribbles show his nascent ideas and how they evolved.

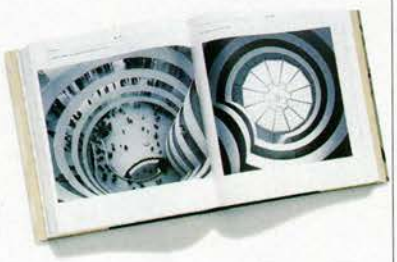


ILLUSTRATION BY STEVE WAXMAN

Events and Appearances

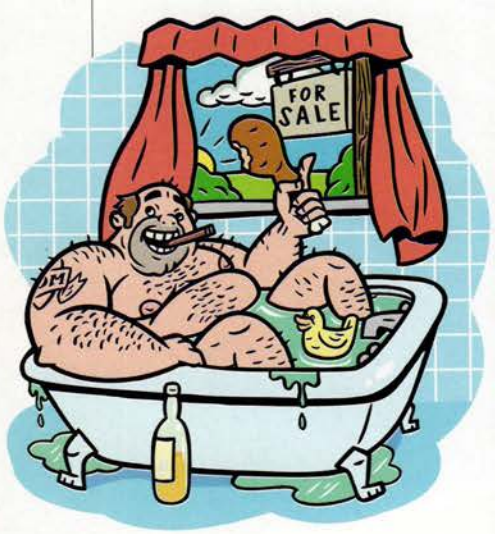
Norm Abram January 25–26 The NAHB Builder's Show
Astro Domain Complex, Houston, TX 800-368-5242

Steve Thomas January 24–26 The NAHB Builder's Show
February 8–9 Orchard Supply How-To Fair San Mateo Expo Center, San Mateo, CA 408-365-4212
February 21 Surfaces Show Sands Expo & Convention Center, Las Vegas, NV 800-624-6880

Tom Silva January 24–26 The NAHB Builder's Show
January 31, 1997 Mid America Home Improvement & Do-It-Yourself Show
I-X Center, Cleveland, OH 216-631-6274
February 17 Home Show Valley Expo Center, Methuen, MA 508-681-9000
February 22–23 Red River Valley Home & Garden Show FargoDome Fargo, ND 701-232-5846

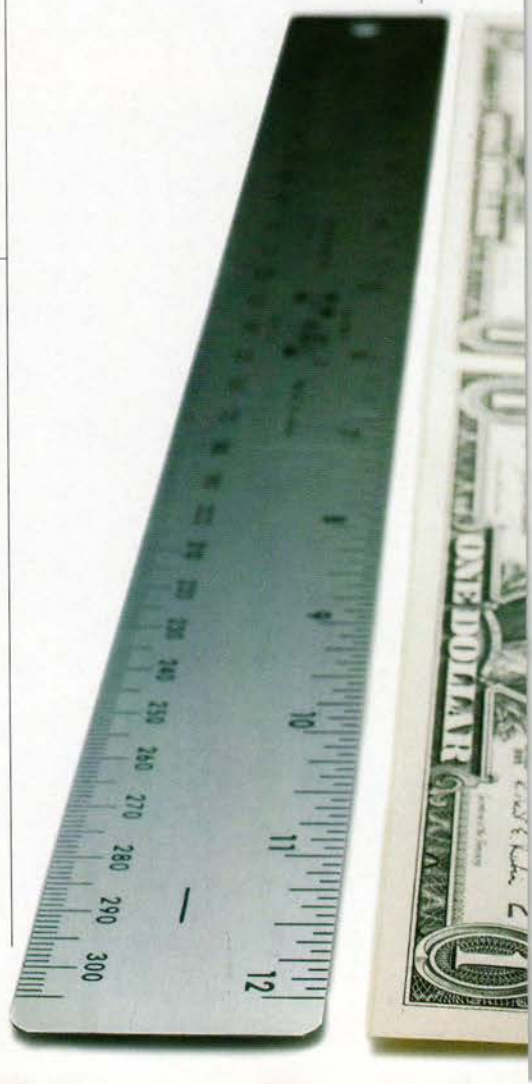
Richard Trethewey January 25–26 The NAHB Builder's Show
January 25–26 Houston Home Builders Show Valley Expo Center, Houston, TX 508-681-9000
February 22–23 New England Home Show Boston World Trade Center, Boston, MA 800-469-0990

Virgin houses



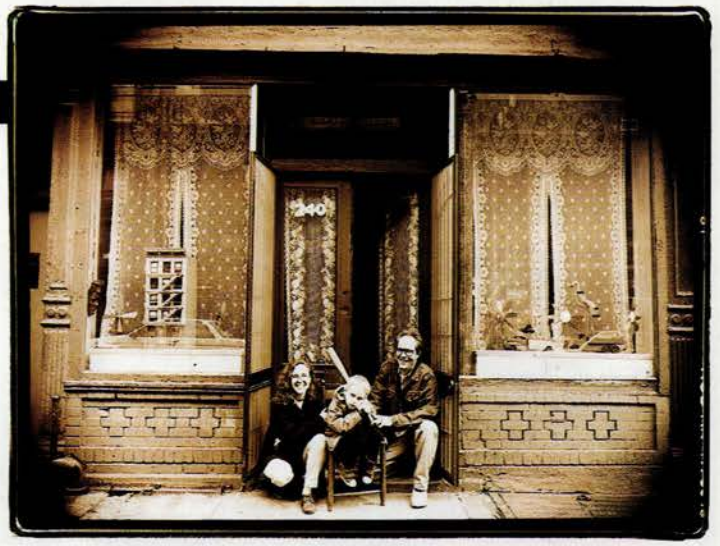
The following editorial is reprinted from Small Home Gazette, *a Minneapolis-based newsletter for old-house owners:*

If you admire a house with a heart and a history, you probably won't appreciate the way newspaper real-estate sections dismiss older homes. Here are a couple examples. "When Elaine Baron was about to move from Rochester, Minnesota, to the Twin Cities area, one of the big decisions she faced was whether to buy a used home or to start fresh." Is there really a choice between "used" and "starting fresh"? Even more outrageous: "Is it better to buy a new house or a nearly new house? [Some] real-estate agents say that a nearly new house can be a better value. Still, most who buy in America have a strong preference for a virgin home." A what? The reporter continues: "It's the same allure as a new car. To many minds, a master bedroom where no one has ever slept is equivalent to a car with an odometer that shows zero miles. And car upholstery that's hardly been touched is equated with a new bathtub where no one else has lounged." A virgin home, this writer reports, "has sex appeal." Well! This implies that we old-home lovers not only have lower moral standards than "most who buy in America," but also plants in our minds a creepy suspicion that someone (probably unattractive) has lounged in our tub and used who-knows-what other conveniences!...Now buyers have to worry about their house's virginity. Sure, you love your older home—but what will people *think*?



(See Directory, page 113, for details and sources)

STOREFRONT LIVING



Affordable, close-in housing is scarce in many cities. But urban homesteaders are slowly converting abandoned storefronts to warm, comfortable homes, despite the security and privacy problems posed by large expanses of street-level glass. When the American Institute of Architects met in Minneapolis last year, a seminar on converting storefronts drew more than 200 people. Now Chicago's Department of Planning and Development has published a 90-page guide to the legal, financial and aesthetic issues involved. Some code requirements are specific to Chicago, but most of the guide, which includes case studies complete with floor plans and budgets, would be useful anywhere. As for those enormous windows, planners suggest using plants, shades that pull up from the bottom and frosted glass to screen off the inside without sacrificing the storefront look or bounteous natural light. Security ideas include retractable grills, glass block and safety glazing. New Yorkers Jenny Dossin and David Marshall, shown here with son Jack, protect their doors with gates and narrow side windows with bars. "We concluded people would be less likely to break the big windows," Dossin says.

STOREFRONT AND GRAFFITI PHOTOGRAPHS BY JASON SCHMIDT

"A house can have a resonant meaning that **defies explicit analysis**."

Duo Dickinson, architect

Let It Snow

Snow guards are merely decorative in summer months. But in winter, when these modest metal or plastic prongs keep savage-looking clumps of snow and ice from sliding off the roof and crashing down on property or people below, they assume great importance. Research by a U.S. Army engineering laboratory found many types of guards don't do what they're supposed to—they deform or pull out under even light snow conditions. Manufacturer standards and design criteria "are all over the place," says a spokesman for the lab, and installation instructions are often inadequate. For instance, several companies recommend installing guards at the eaves, a surefire way to create ice dams. The researchers' suggestions: Avoid guards secured by adhesives (those attached with rivets performed best) and, in areas with heavy snow, use several rows of guards installed well above the eaves.

goodhood

Pitch, a derivative of roofing tar, is nasty stuff. Although it's an effective waterproofer, it can nip holes in the exposed skin of anyone working with it. So a pitch hood comes in handy. This one, made of light, stretchy dacron, is thin enough to allow the wearer to breathe easily but thick enough to keep stinging droplets out.

One foot is roughly the length of two $1 bills laid end to end.

Graffiti Beam

Physicist Dennis Matthews was experimenting with powerful lasers for use in outer-space imaging—until graffiti artists brought him down to earth. Dismayed by graffiti near his home in Half Moon Bay, California, he came up with Nd:YAG (short for neodymium-yttrium-aluminum-garnet), a powerful green laser beam that spews photon waves at 1,000 pulses per second, turning spray paint, but not the building beneath it, to dust. Sodium-bicarbonate sprayers, a widely used graffiti buster, employ high pressure (3,000 pounds per square inch), but can damage surfaces. They're also slow and labor-intensive. Matthews is at work on a $2 million laser prototype capable of cleaning 30 times faster than soda sprayers; he predicts that a commercial version will ultimately be available for about $250,000.

Blow It Off!

When snow reigns, a thrower quickly becomes your favorite tool **BY MARK FEIRER**

PHOTOGRAPHS BY BENJAMIN OLIVER

They are noisy, cantankerous, bulky, difficult to start, heavy, awkward, polluting and look weird. But when a blizzard is just getting started at 10 inches, and the 4x4s with plows can't make it to their customers because the snow is too deep to push, this tool will become the most important one you own.

Nothing moves snow like a good snowblower (known in the trade as a snow thrower). Crank it up, move it out and watch the flakes fly as you carve through the drifts. And, hey, why not clear the neighbor's driveway while you're at it? What's another 15 minutes of walk-behind for everlasting friendship?

Invented shortly after World War II as the wintertime counterpart to the power lawn mower, these machines with their toothy grins come in a baffling array of configurations. Light-duty models have electric motors or small, weed-whacker-size gas engines. They're practically weightless and highly maneuverable, but their usefulness is limited to clearing steps or small decks. The mid-duty versions have two-cycle gas engines (fuel mixed with oil) of five horsepower or less and weigh under 100 pounds. Most scoop snow with quickly spinning, rubber-edged augers or paddles and kick it out the

TRACTION DRIVE LEVER
engages wheels

DEFLECTOR CONTROL

SPEED & DIRECTIONAL CONTROL

HEADLIGHT

GAS TANK

STARTER HANDLE (IN BACK)
pull when electric start is unplugged

BELT COVER

NO BEAUTY

Even New York City's stylish Beauty Bar, a hairdressing salon turned camp watering hole, can't make a snowblower look chic. But that ugly maw is really beautiful when it chews through winter's wet, flaky stuff.


AUGER DRIVE LEVER
engages auger
DISCHARGE CHUTE CONTROL
CHUTE DEFLECTOR
828D
SPARK PLUG
DISCHARGE CHUTE
AUGER HOUSING
IMPELLER
SHEAR PIN
breaks if auger jams, protecting gears
BUSHING
should be metal, not plastic
SKID PLATE
keeps auger off pavement
GREASE FITTINGS
for lubricating auger shaft
AUGER GEARBOX
AUGER

discharge chute in one step or stage. The auger also pulls the machine forward as it spins, a problem on gravel drives. Heavy-duty snowblowers feature four-cycle gas engines of four horsepower or more and have two snow-throwing stages: a slow-turning auger that feeds snow to the base of the discharge chute, and a spinning impeller that fires the snow up the chute and out 30 or 40 feet. These monsters often weigh 300 pounds, so part of the motor's job is to drive both wheels, or in some models, bulldozer-style rubber tracks. Plug-in electric starting is an option, but all machines have pull-ropes in case the engine konks out far from an outlet. There are two hallmarks of a good machine: grease fittings along the auger axle and metal bearings or bushings at its ends.

Finding the right snowblower depends less on hardware than on weather. In Massachusetts's wet, heavy snows, *This Old House*'s landscaping contractor Roger Cook needs two-stage, 12-horsepower machines with plenty of muscle. If he were working in Colorado's light, fluffy powder, a less powerful single-stage machine with six horsepower might be sufficient. More powerful snowblowers also clear wider swaths, making fast work of troublesome drifts. Cook's advice: Look for a machine that can handle slightly heavier conditions than you anticipate. "If you buy one for average conditions, you'll get stuck when the big blizzard hits," he says. Besides, overworking a snowblower too small for the job is the quickest route to a big repair bill.

Getting the most out of a snowblower takes some practice. Snow intake is regulated either by how hard the machine is pushed (single-stage models) or by what gear it's in (two-stage machines). Beginners in control of a rumbling, churning snowblower typically make two mistakes: either they try to gobble up too much snow too fast, clogging the chute or jamming the auger, or they baby the engine and get nowhere. It takes time to find the right touch, and what works best varies with the depth and heaviness of each snow. Remember to keep the revs up; the air-cooled engines powering most snowblowers work best at full throttle.

The best way to find out about snowblowers, Cook says, is to "borrow one from a friend and clear his driveway." Don't let a shiny paint job or a slick sales pitch sway your buying decision, he cautions. "Sitting in the showroom, they all look like they could throw snow like crazy."

(Continued on page 34)

Make friends with a broom handle

Want to know who reads snowblower owners' manuals? Here's Roger Cook's survey method: "Check any emergency room after the season's first snow." That's where the nonreaders are seeking attention for their hand injuries.

It's oh so tempting to reach in and clear a jammed auger, but when it suddenly starts turning again, your mitten will likely be full of, well, never mind. Even if the engine is off, there could still be enough torque on the auger to chew up a hand. The best way to loosen chute clogs and auger jams is with a broom handle. Just make sure to turn the machine off first. Cook pulls the wire off the spark plug to eliminate any chance of accidental start-ups.

Rooster tails of snow spewing out of the chute look great. Yet those graceful plumes contain ice chunks and rocks that can crack windows, decapitate light posts and clobber kids and dogs. Keep track of where the snow is going, and don't reposition the discharge chute without first surveying the landing zone.

IT AUGERS WELL

The auger of a single-stage snowblower does more than move snow—it pulls the machine forward with its rubber edge. While the big two-stage units typically leave some snow behind, single-stagers scour a driveway clean.

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8582

Super **Shovels**

Snow sticks are the featherweights of the snowblower world. Still, they can punch down steps or across decks as long as the snow isn't too wet or too deep.

PLUG 'ER IN
Portable electric snowblowers trade range and power for lightness, quiet and convenience. They're ready for shoveling anything within reach of a 14-gauge extension cord.

FILL 'ER UP
It's a weed trimmer on snow duty. The 2-cycle gas engine lets this 12-pound model go wherever there's snow. And there's no tether to the nearest outlet.

Blower Care and Feeding

"The best snowblower," says Cook, "is the one that starts." The problem is that snowblowers are ignored and unnoticed until—egad!—the storm of the century arrives and we want them to work like tops. When a snowblower won't start, the reason can usually be traced to old gasoline, says Chris Geyrk, whose equipment-repair shop is a magnet for balky blowers whenever it snows. "Most of the repairs I do involve stale fuel," reports Geyrk. He recommends that snowblower owners buy gas in the late fall and winter (when it has additives that help prevent fuel-line freezes), use it within 60 days or so (before gum and varnish deposits start choking the carburetor), and add liquid fuel stabilizer to every tank to aid starting. At the end of the season, drain all the gas from the tank, lines and carburetor or run the engine dry.

Cook figures that the best time to fix problems is before it snows and before parts supplies run low. He replaces the oil every year, and the spark plug too, keeping the old one as a backup. A quick tour with a socket wrench tightens up any loose hardware. A rusty discharge chute can slow snow down, so Geyrk suggests sanding and repainting it. Some folks even spray the chute with cooking oil (it's biodegradable) to slicken the surface.

Cook always salts away a few extra shear pins. These sacrificial fasteners, which hold the auger to the drive shaft, break off if the auger jams suddenly. They save the rest of the drive system from expensive repairs.

Worn drive belts are another common problem, particularly late in snow season. When the auger is overtaxed or the impeller is frozen with slush, the belts slip and wear. Cook replaces them every four years, or whenever they look frayed, and he stocks an extra belt set, just in case.

(See Directory, page 113, for details and sources)

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Looking for a Good Chisel?

The details of handle style and blade length govern what a chisel can do. Chisel blades with single bevels and flat backs are self-jigging—the blade wants to continue riding along the flat surface it has just cut. Chisels with a bevel on both sides are for carving or lathe-turning, not carpentry or furniture making. Wooden handles are comfortable but can split if hit too hard. Make sure the handle lines up with the blade. Handles with metal hoops can take substantial swats from wooden mallets but not from steel hammers. Plastic handles always line up and almost never break, even when hit with a steel hammer. Short-bladed, stubby chisels are popular with carpenters. Furniture makers prefer longer blades for their reach. Blade steels in American, European and Japanese chisels are uniformly excellent, with the right hardness (Rockwell 60 to 64) for sharpness and durability. Shun bargain chisels from anywhere else; they frequently use soft steels of dubious quality.

1. and 4. Whether fitted with a handle made of wood or polypropylene, modern bench chisels (also known as firmers) have beveled blade edges for getting into tight corners.

2. The mortiser has a thick, square-edged blade and a high-impact plastic handle that can withstand the mighty blows and prying needed to chop deep mortises by hand.

3. This elegant *nomi* or Japanese chisel displays laminations of 100-year-old wrought iron repeatedly folded and hammered like a samurai sword for resilience. Superhard (Rockwell 64) blue steel is forged to the edge and back. Nomi have hollow backs that must be flattened as the edge wears down.

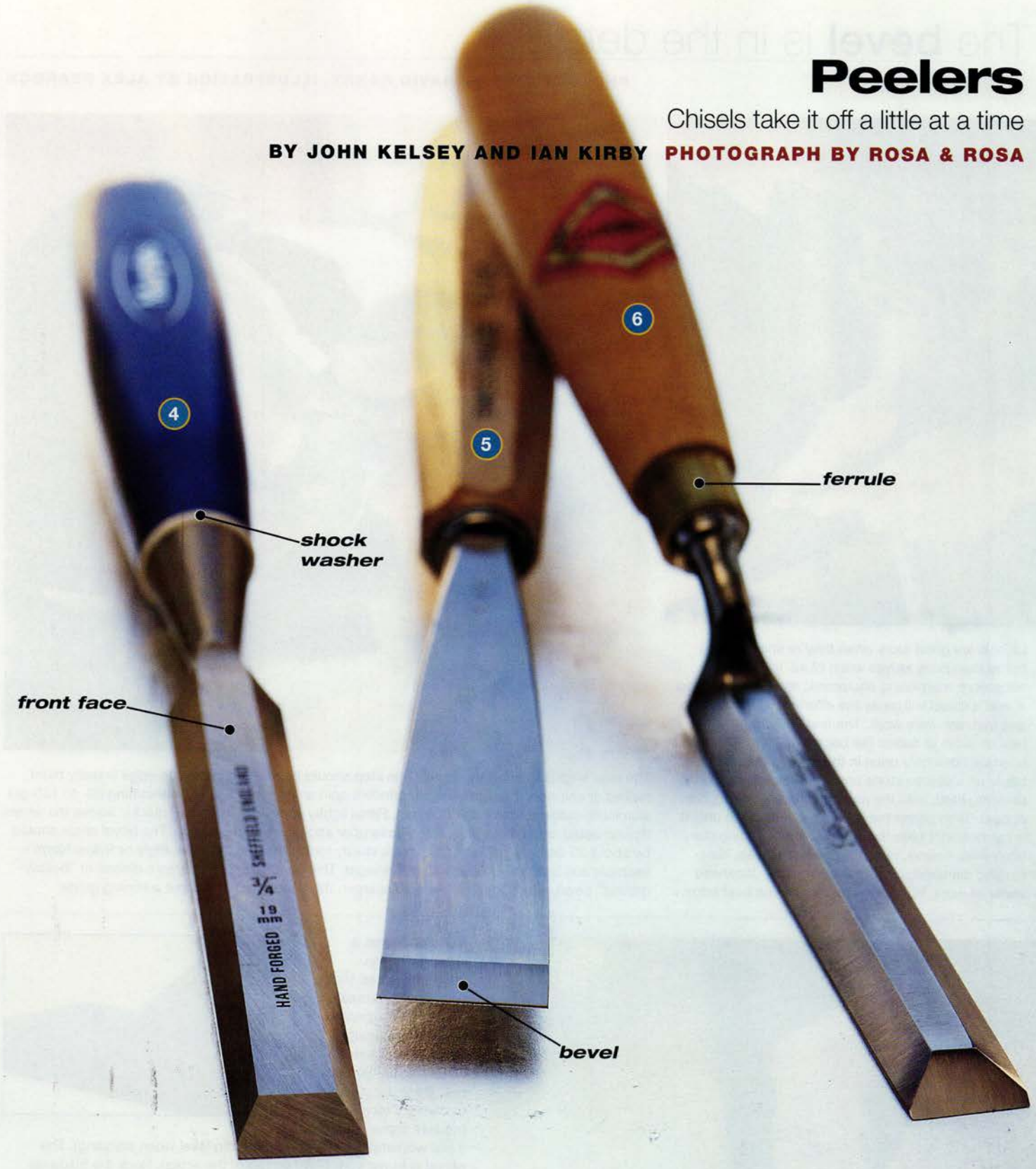
5. Carving chisels have thin blades that taper, top and bottom, to the keen edge needed for working in the round instead of on the flat. An octagonal handle won't roll off a bench.

6. A cranked-neck chisel keeps the user's knuckles out of the way when trimming plugs on a floor or long dadoes on a bookshelf.

Peelers

Chisels take it off a little at a time

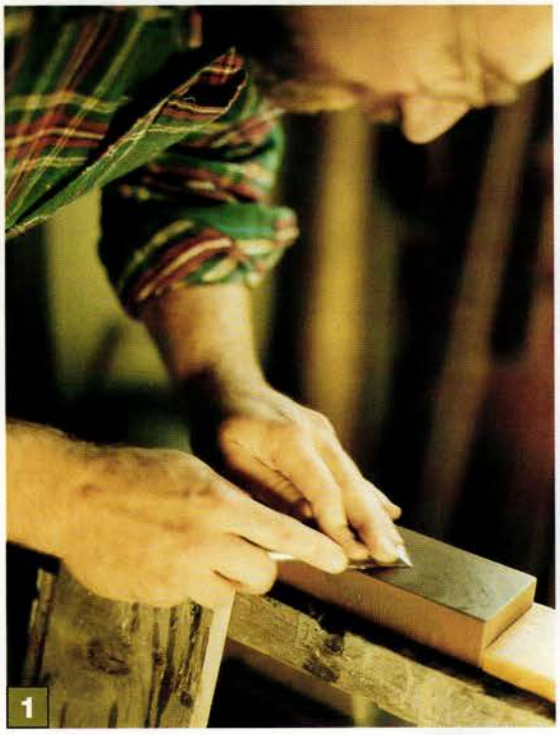
BY JOHN KELSEY AND IAN KIRBY PHOTOGRAPH BY ROSA & ROSA



the idea behind a chisel is stone-ax simple—a hunk of sharp metal stuck on a handle. Perhaps that's why many are used as paint scrapers, glue chippers and can openers. Their real purpose is to cut wood: to slice tissue-thin shavings off dovetails in a drawer, or a thousandth of an inch off the tenons of a beam. No furniture maker, stair builder or timber framer could survive long without one. Neither could *This Old House*'s master carpenter, Norm Abram. Norm wraps his chisels in a canvas roll with individual pockets, which keeps the edges sharp and nick-free. He uses these blades *(Story continued on page 40)*

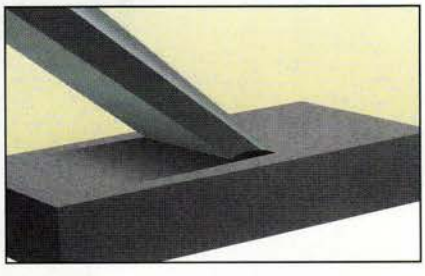
The **bevel** is in the details

PHOTOGRAPHS BY DAVID BARRY ILLUSTRATION BY ALEX REARDON



Chisels are great tools when they're sharp but no better than putty knives when blunt. Invest in the necessary sharpening equipment and practice using it, and a chisel will repay the effort with smooth cuts and fast, accurate work. The first thing to do with a new chisel is to flatten the back face, something that need be done only once in the life of a tool. Lay the blade on a coarse stone and work it back and forth, pressing hard, until the arced machining marks disappear. Then polish the back on a finer stone until it is mirror-bright near the edge. Any sharpening station needs coarse, medium and fine stones. Newfangled diamond, old-fashioned oil and Japanese water all work, but water stones give the best edge.

The next step is to grind the bevel. This step should be repeated when an edge is really blunt, nicked or chipped. The best electric grinders spin an 8-inch wheel of cool-cutting 60- to 120-grit aluminum-oxide abrasive at 1,800 rpm. Press lightly and move the chisel quickly across the wheel. If overheated, steel turns blue, loses its temper and won't hold an edge. The bevel angle should be about 25 degrees off the back. Use a sturdy tool rest set at the right angle or follow Norm's example and brace the blade with a forefinger. This bench grinder creates a dished or "hollow-ground" bevel, which makes it easy to sharpen the bevel (step 3) without a honing guide.



Grinding leaves a sharp but weak-edged blade, so the final step is to create a second sharpening bevel. Sharpening should be repeated whenever the blade is dull. Begin by placing the bevel's face on a medium stone set on a low workstation (one about fingertip level when standing). The secret is to get your body on top of the action. Rock the blade up and down to find that magic spot where both front and back of the bevel are touching the stone, then lift the heel a bit (see illustration). Pressing firmly, with both hands on the blade, work the chisel back and forth with the cutting edge perpendicular to the direction of travel (see photo). The movement comes from the shoulders, not the wrists and elbows, which is why it's important to be positioned right above the stone. The result is a beveled edge of about 35 degrees. Pause and feel for a little burr on the back of the blade, near the edge, Once it's raised, move over to the fine stone and polish the bevel until the burr is gone. Then flip the blade over and give the back a quick polish. Test keenness by shaving off a few arm hairs or dragging the edge across a thumbnail. Or better yet, simply go work on wood.

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to cut mortises when hanging doors, to square up the round corners left by routers and to make cabinet dovetails. But Norm also carries two beat-up chisels in his tool belt. There's a sharp, 1-inch "stubby" he uses for installing lock hardware, and a dull inch-wide clunker with a plastic handle. "I use it to pry things apart and as a putty knife. It's great for scraping caulk and paint," he says.

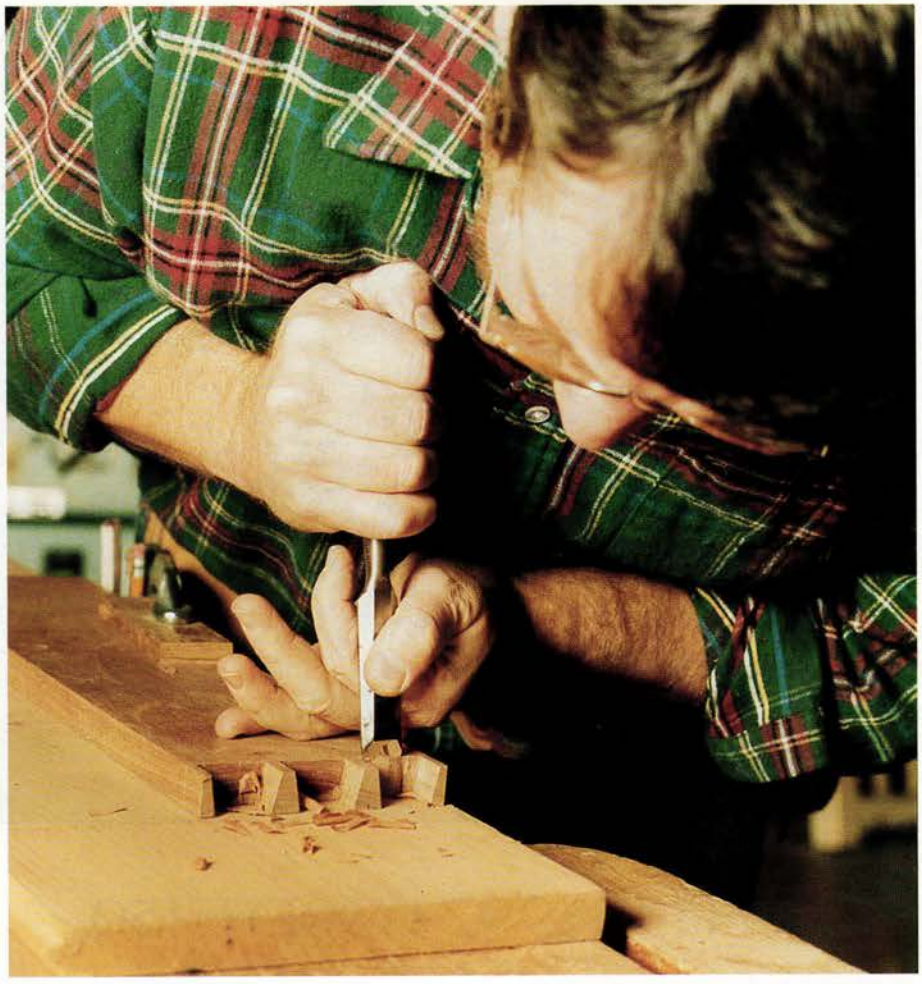
"In the workshop, you've got to have sharp chisels for refining mortise-and-tenon joints, even if you use a router. You can chisel a rounded mortise square, or you can pare a sawn tenon round so it fits the routed mortise." Norm also grabs a chisel to trim wood plugs flush or any other time there's a stray bit of wood to remove.

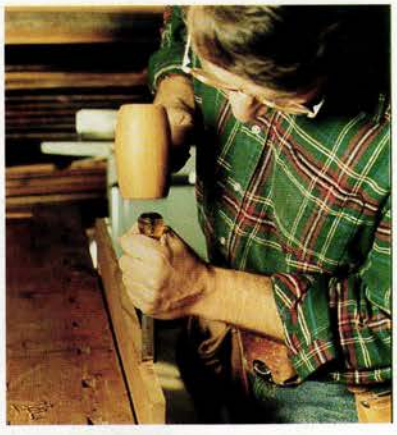
Good chisel technique depends on grip and body stance. A chisel should be steered with the shoulder as well as the arm, but powered with the lower body. While one hand applies pressure to the handle, the other hand guides and directs. The back of the guiding hand should be braced on the workpiece with the blade trapped between index finger and thumb, near the business end.

There are two basic ways to cut: vertically and horizontally. Either approach can be applied to long-grain wood surfaces as well as to end grain. Vertical paring is the power cut for slicing through a lot of wood in a hurry. The chisel's bevel should face the waste side of the cut. Rocking the chisel from side to side helps it slice tough wood.

Horizontal paring allows maximum visibility and control, which makes it perfect for fine work. The chisel is held as an extension of the forearm, pocketed into the palm, with an index finger alongside the blade. Body weight, not arm power, pushes the chisel through a cut. A timber framer or furniture maker trimming an ornery piece of oak sets his elbow in his hip and drives forward from the knees. For smaller, less stubborn work, Norm simply locks his elbows and leans into the cut.

A chisel is meant to take off wood with a series of slices, never with a single big bite. When chiseling out a hinge mortise, for example, first make a series of shallow vertical slices, then shave them away with a horizontal cut (see photographs at right). Likewise, cutting across end grain may splinter the back side of the wood if done too recklessly. Chisel first from one side and then from the other. Go all the way across only when shaving off the last sliver. For safety, always keep both hands behind the cutting edge, and don't hold the workpiece with one hand while whittling away with the other. If the chisel slips, it's often good-bye to some blood and tendons, or perfectly good fingers.





TOP: When removing the waste between dovetails, Norm holds the chisel like a dagger in one hand and braces the other on the workpiece, gripping the blade firmly to locate and control the cut. Bending forward at the hips powers the tool through the wood. MIDDLE: To cut the mortise for a hinge, Norm first marks the edge of the hinge leaf with a utility knife, then makes a series of shallow vertical cuts with chisel and mallet. Here he's most comfortable holding the chisel's handle, but when control is critical, he'll pinch the blade near its cutting edge. BOTTOM: The next step is to pare horizontally, the best technique for fine work. Norm cradles the handle in the palm of his right hand and grips the blade with his left to guide and stop the cut. The power comes from his lower body, feet and knees as he leans into the work.

(See Directory, page 113, for details and sources)

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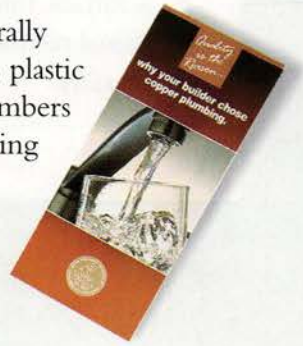

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The plumbing in 9 out of 10 plumbers' homes.

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Steeling the Ceiling

Instead of flat plaster, a fancy face

BY THOMAS BAKER

PHOTOGRAPHS BY DARRIN HADDAD

ARCHIVE PHOTO

A turn-of-the-century ad sings the praises of pressed metal. Border pieces such as the one at left cover a ceiling's perimeter. The dimpled "buttons" along the edges help to camouflage nailheads.

When Kathy McGraw Bentley first saw the tin ceiling in a neighbor's Nantucket kitchen, she knew she had to have one in her own.

The Victorian-style embossed metal—with its intersecting squares and circles surrounding classic acanthus-leaf shapes—would add just the right decoration to the kitchen of her 1887 Victorian, the site of the fall *This Old House* TV project.

Pressed metal, as it used to be called, reached the height of its popularity in the late 1800s and early 1900s, mimicking expensive ornamental plaster ceilings. It appealed to the Victorians' love of exuberant decoration and their thrifty taste for anything that was mass-produced. Dozens of patterns stamped into inexpensive sheet steel could be chosen from catalogs. A room's

worth could be freighted anywhere and quickly installed by tradesmen using nothing more than a hammer and tin snips.

As a decorative covering, pressed metal was the 19th-century equivalent of the modern dropped ceiling. It was touted in advertisements for its ability to hide unsightly cracks and protect against falling plaster and for its sanitary—not to mention "vermin-proof"—surface. But as tastes veered toward simpler styles, metal ceilings became unfashionably quaint. During World War II, metal shortages nearly killed the industry.

A few companies managed to hang on, and today there are at least five producing original patterns. One of the survivors, AA-Abbingdon, of Brooklyn, New York, supplied the ceiling for the Bentleys' kitchen. Kathy had to pick out patterns for all three parts of a typical tin ceiling: field plates, borders and cornices. Two-by-four-foot field plates cover most of the 230 square-foot ceiling, cornices curve over the corners and border plates bridge the gap between cornice and field. Using the room's layout and dimensions, Abbingdon calculated how much material was needed, adding about 15 percent for waste, and shipped 190 pounds of stamped steel to Nantucket.

Tin men Ric Emery, left, and Joseph Topham prepare a border piece for the Bentleys' new kitchen.

Contractor Bruce Killen prepared the ceiling by screwing sheets of half-inch plywood into the joists. When the patterns have a deep negative relief, with the embossing pressed up toward the ceiling, the sheets have to be nailed to a grid of 1x2 furring strips, the traditional method of installing tin.

Carpenters Ric Emery and Joseph Topham, who were installing their first metal ceiling, found that putting tin on a ceiling is like tiling a floor. "It's all in the layout," Emery said.

To start, Emery and Topham snapped chalk lines along the midpoints of the room's length and width. From there, they marked off as many full rows of field panels as could fit without being cut. Then they snapped four more lines to mark the perimeter, creating a border that was the same width all around. A final set of chalk lines on the walls showed where the cornice's bottom edge would land.

With the layout done, the installation went quickly. As Topham held the somewhat floppy field plates against the plywood with a push broom, Emery fastened them with special cone-head nails. He drove the nails at precise points indicated by dimpled buttons pressed into the plates every 6 inches.

Tin snips or power shears cut pieces to fit into corners or along short courses. Unfortunately, both tools tended to flatten the profile of the more deeply embossed borders and cornices. On those, Topham cut more slowly and then restored the profile with pliers. The only other problem was medical: Instead of splinters from wood, the carpenters had to contend with razor-sharp edges. "It dinged us up pretty good," said Emery, ruefully examining his hands. "But hey, this was fun."

To hide the seams, Emery swedges the panel's edges tight by tapping on a beveled block of wood. A good way to disguise the tin's overlapping joints is to start the installation along the wall farthest from the room's main entry so that the exposed edges face away from the sight line. With a few coats of paint, the steel will be protected from rust. In time, the edges and nailheads will all but disappear as the ceiling is repainted. Then, says designer Jock Gifford, "it will look absolutely luscious."

Shearing and snipping

RIGHT: To speed the work, carpenter Joseph Topham ripped long straight cuts with a power shear, which also produced razor-sharp curls. He used tin snips to make miter cuts on the border pieces because they didn't flatten the embossing.
FAR RIGHT: Emery cut the openings for light fixtures with a fly, a drill-driven circle cutter.

PHOTOGRAPHS BY KOLIN SMITH

Tin Types


TIN-PLATED STEEL


STEEL

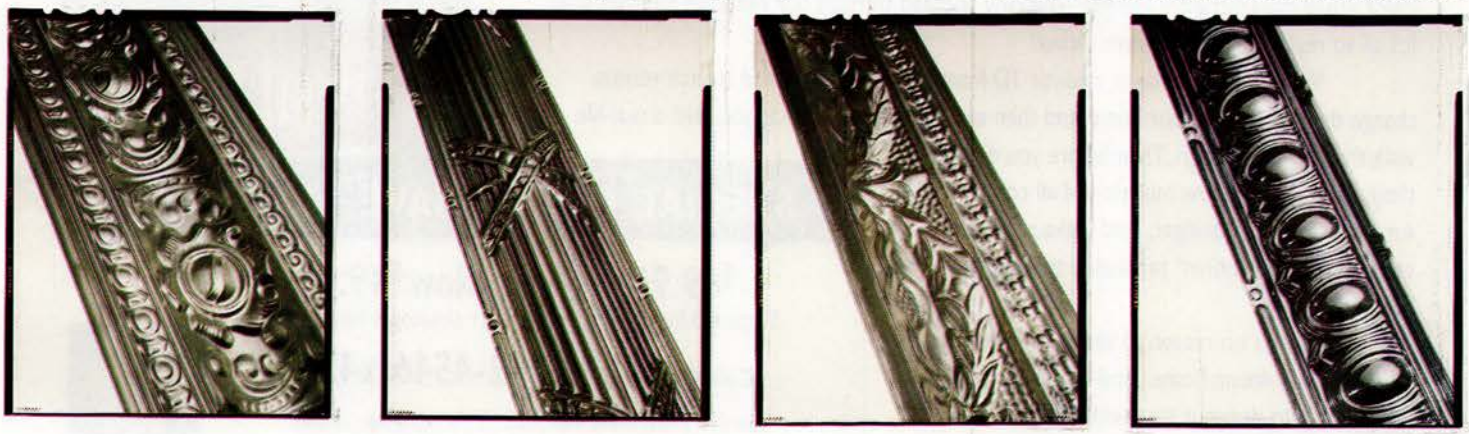

BRASS


BRASS


FACTORY-PAINTED STEEL


TIN-PLATED STEEL

The lively patterns in pressed metal have a purpose that goes beyond delighting the eye. They help camouflage both the edges and the tiny nailheads that hold them up. A pattern can repeat as often as every three inches, or it can take up an entire 2-by-2-foot panel. In general, tight patterns are best for small rooms with low ceilings. Medallions (second row right and left) can accent the base of a hanging light fixture. To stop corrosion, all except the prepainted panel (second row center) need a coat of paint or clear polyurethane.



Richly ornamented cornices give metal ceilings a finished look and visually connect them to the wall. For turning corners, manufacturers make mitered pieces. Like the panels, cornices are stamped out of 30-gauge (.0125-inch thick) sheet metal sandwiched between cast-iron molds. In W.F. Norman's Nevada, Missouri, factory, 3,000-pound drop hammers deliver the stamping power. Over time, molds can crack and wear out, but hammers pound on and on. No one knows how old Norman's are; they were bought used in 1898.

(See Directory, page 113, for details and sources)

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BOOKS THAT WORK

Second Skin

When the work gets rough, even tough guys get gloves

BY JACK McCLINTOCK PHOTOGRAPHS BY JAMES WORRELL

FLAME THROWER
This fireproof glove is clumsy, but its silica-based fabric can tolerate temperatures up to 2,000 degrees, about 350 degrees hotter than molten iron.

Jeff Shimonski works with spiny plants, stinging insects, sharp blades, rough rock, cement, chemical pesticides and alligators. It was one of the latter that finally convinced him he needed protection for his hands: It bit him.

"If I'd had gloves on, the alligator might not have taken the tip of my finger," says the curator of horticulture at Miami's Parrot Jungle. He wears gloves now, and he insists his crew wear them too.

A glove is expendable skin. Stonemasons, carpenters, electricians, butchers, arborists, firefighters, divers, oyster shuckers, lumberjacks, glassblowers, sheet-metal workers and alligator wranglers know an extra layer of leather, Kevlar or steel mesh can make a big difference. But the glove must fit the work as well as the worker. Surgeons, for example, wear the thinnest, flimsiest gloves to preserve their sense of touch, but those stretched sheets of rubber still protect against mighty diseases.

Wearing gloves is often a calculated trade-off between dexterity and safety. "My preference would be not to use them because you don't have as much feedback," says Mark Fitzpatrick, who managed *This Old House*'s Savannah project. "But I'm safety-minded, so I'd rather err on the side of wearing them. On a construction site, there's not much that can't hurt you."

Fitzpatrick has gloves for nearly every task: traditional cowhide and canvas gloves for demolition or any job with an abrasion risk; heavier, heat-resistant welder's gloves for cutting away the coping on a cast-iron balcony with a torch; cut-proof chain-mail gloves for grinding sharp blades; chemical-protection gloves to handle solvents from acetone to xylene (just as each compound has an ideal solvent, each solvent has a specific glove material to protect against it).

Leather gloves, made from the hide of a cow, pig or goat, are still best for many jobs, providing a true second skin. Cowhide is most common, offering a tough, abrasion-resistant skin over skin. Pigskin is breathable, breaks in nicely and dries soft even when repeatedly wetted. The lanolin in goatskin makes for suppleness, abrasion resistance and tactile sensitivity. Deerskin is good for insulated, cold-weather gloves. For maximum dexterity, glove mavens recommend sheepskin, which also contains lanolin.

Glove makers divide an animal hide into inner and outer layers. The outer layer, called top grain, is smooth and water-repellent. The inner layer is called split. Side split, from over the animal's ribs, is strong and dense. Shoulder split is coarser, stiffer and less expensive.

Some gloves are made of space-age materials such as Viton, PVA, Spectra, nitrile, polyurethane, even stainless-steel thread. Each can add to the protections of leather or fabric: a slip-free grip for greasy jobs, padding to absorb the shock of heavy work, thermal insulation, protection from cuts, punctures, toxic chemicals and biohazards.

Whatever the threat, some stubborn souls still use their bare hands, preferring the maneuverability of the sports car to the armor of the tank. Among them are Nantucket contractor Bruce Killen, Boston stonemason

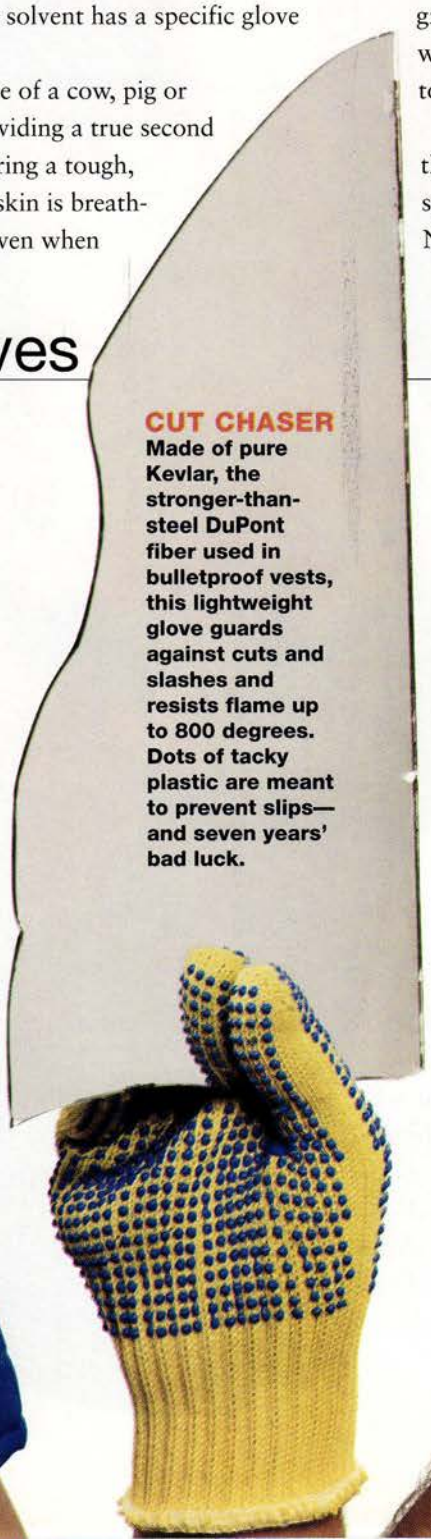
Gee-Whiz **Gloves**

CHILL KILLER

Cold hands may betray a warm heart, but when temperatures plunge to –260 degrees, as happens when handling liquid nitrogen and dry ice, even the warmest hearts appreciate olefin-and-polyester-insulated Cryo-gloves.

CUT CHASER

Made of pure Kevlar, the stronger-than-steel DuPont fiber used in bulletproof vests, this lightweight glove guards against cuts and slashes and resists flame up to 800 degrees. Dots of tacky plastic are meant to prevent slips—and seven years' bad luck.



BLADE BLOCKER

The same type of protection that shielded the Crusaders from Saracen scimitars, now in stainless steel, safeguards the hands of butchers, shark feeders and surgeons.

Robert D'Eramo and Oakland, California, glass cutter Andreas Lehmann, none of whom wears gloves, even though they constantly work with materials that can slice or puncture their hands. Lehmann often sports bandaged fingers. "My trademark," he says with a grin.

"I don't like the heat and the confinement of gloves," Killen says. "You don't have the dexterity, and they catch dirt."

That was Shimonski's gripe before he had his run-in with the alligator. Now he would agree with Fitzpatrick, who has given a lot of thought to life's dangerous surprises. If you're wearing gloves, Fitzpatrick says, "you don't notice all the times you don't get injured."

A LITTLE LEATHER GOES A LONG WAY

For all the talk about high-tech fabrics, nothing feels, smells and performs quite like leather. 1. Clute-style gloves, with fabric backs and leather palms, are the cheapest and lightest. 2. Heavier Gunn-style gloves, with leather wrapping over the fingertips and across the knuckles, eliminate most palm seams. This one has a breathable, insulating membrane for cold-weather work. 3. Pigskin gloves are soft and pliable. 4. A three-quarter-back leather glove with a Kevlar lining combines natural and man-made products for maximum resistance to punctures.

FLAME FIXER

Firefighters don these Kevlar-covered nonslip gloves before hacking their way into burning buildings. The liners are waterproof. A leather pull strap makes them easy to get on and off, a plus when battling blazes—or barbecuing in the backyard.

DUCT DODGER

Woven into the yarn of this glove's liquid crystal polymer fabric is a stainless-steel thread, which reduces the chance of an errant slice.

SLICK STOPPER

For use around greasy machinery, this combination of terry cloth and nitrile provides good grip when work slips. Nitrile is an oil- and solvent-resistant rubber.

(See Directory, page 113, for details and sources)

The Better Half

Making a powder room perfect

BY JACK McCLINTOCK PHOTOGRAPHS BY KOLIN SMITH

It's the public room in a private house, and whether it's called a half bath or powder room, it's the one room where the family doesn't feel at home. Perhaps that's because the half bath isn't theirs but their guests'. It exists, as contractor Bruce Killen says, "so you don't have to clean up every time you invite folks over."

In Craig and Kathy McGraw Bentley's Nantucket house, the half bath is a bright space, white with touches of blue and brass. Tile covers the floor and wainscots the walls; the toilet and vanity are the principal fixtures. More than one visitor has called it the handsomest room in the house. That may be because its small size—4½ by 5 feet— imposed a discipline on materials, colors, patterns and shapes. The big master bathroom can be a place for sybaritic indulgence as well as hygiene. The half bath, being a public place, is more reserved. "In a tiny room like this," says designer Elaine Crowley, who selected all the tiles, "you don't want to overdo it."

Size imposed limits on the finish work too. Because it takes as many workers to complete a little room as it does a big one, they had to toil here serially: If they'd all been inside together, the room would have resembled a Volkswagen full of circus clowns. First the room was framed, wired, plumbed and sheathed. Only then could the tile-setter start.

A four-panel, Eastern white-pine door, one of the few surviving remnants of the original house, guards the elegant but tiny downstairs bath.

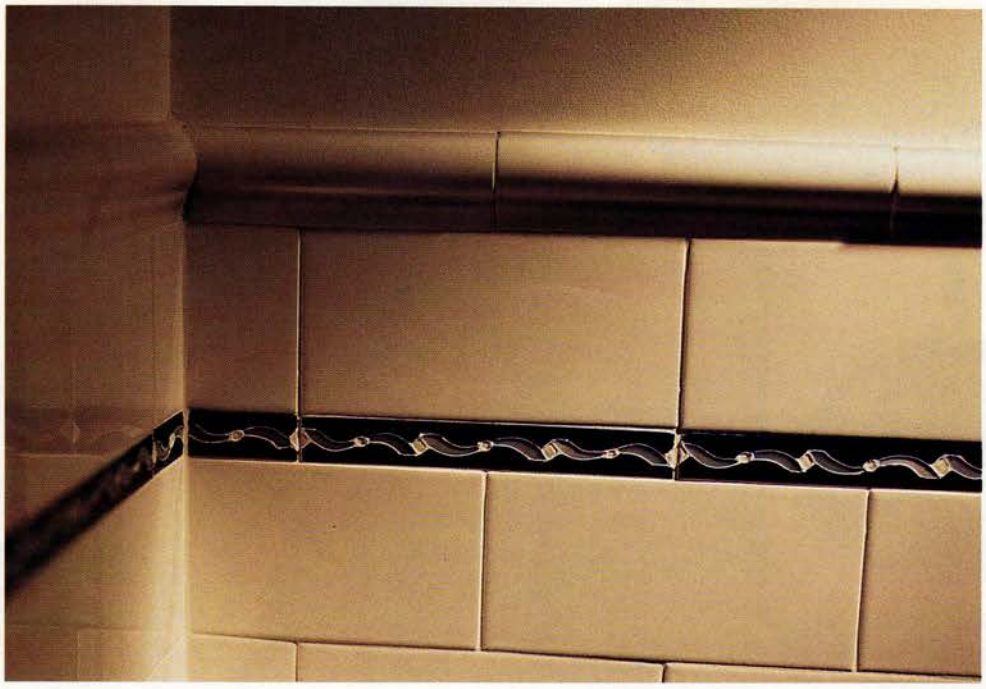
David Goodman began by pressing sheets of one-inch hexagonal floor tile—white and a scattering of black—into thin-set mortar on cement backer board. After grouting the floor and giving it 24 hours to set, he struck a level line on the walls and slathered mastic for the wainscot. "Tiling up from a tile floor makes for a tighter joint than running floor tile up to a tiled wall," he says.

The walls have four types of 6-inch tile: 3-by-6 "subway" tiles (so-called because they resemble those used in

Undermount sinks give no lip to countertop grime. This cobalt-glazed model is secured to the underside of the solid-surface counter with four clips and adhesive caulk.

No, it's not a pump. The polished brass faucet looks Victorian but uses modern single-lever valving.

subway stations), 6-by-6 base molding, 1-by-6 blue liners and 1½-by-6-inch bullnose on top. Together they created a clean, crisp unity. Goodman laid the base molding first, then the subways, with staggered joints. For cutting difficult joints, he used his favorite new toy, a diamond-bladed band saw, which he says can cut tile into jigsaw puzzles.



Symmetrical, mirror-image tile work is the hallmark of a meticulous tile-setter. Goodman used his diamond-bladed bandsaw to miter the bullnose tiles capping the wainscot.

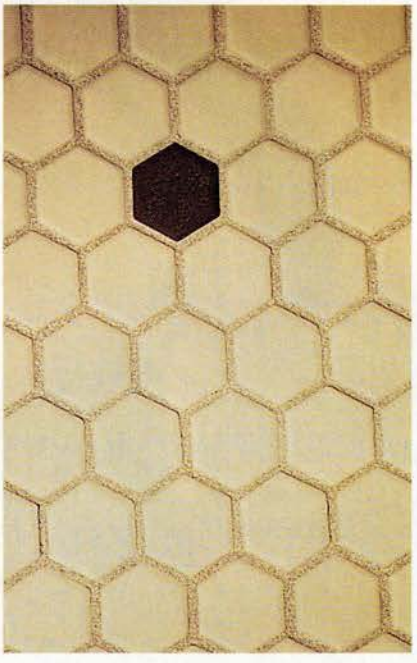
Goodman followed two handy rules. First, like any good tiler, he worked from a centerline to achieve symmetry. By making sure the cut pieces at either end of a course were the same size (ideally more than half a tile long) and matched to the cut pieces on the adjoining wall, he eliminated uneven grout lines and a patched-together look.

Goodman uses a float and plenty of arm power to make the grout flow under the wall tiles and fill any voids. He holds the trowel at 45 degrees to the grout line to avoid pulling grout out of the joints.

Second, he tiled as much of the room as possible before the cabinet was installed. "The job goes faster because there's less cutting," Goodman says, "and any future owner has the option of replacing the vanity with a pedestal sink."

With the tiling done, in went the vanity: a simple cabinet with a door, two drawers and a solid polyester counter precut for the undermount sink. When clipped and caulked into place, the sink brought a splash of deep-water blue to the little white room.

Plumber Chris Fox took charge of installing the toilet. He seated the bowl to the closet flange on the floor, mounted the tank and sweated a chrome shutoff valve to the supply. To prevent a recurrence of the condensation on tank and bowl that rotted the floor of the original downstairs bath, the supply has a check valve that mixes a small amount of hot water with the cold that fills the tank.



Unglazed 1-inch hexagonal tiles armor the floor, just as they often did in Victorian bathrooms. Goodman recommends cleaning such tile with a neutral, oil-based soap, which helps seal out stains.

The four-panel pine door, one of few surviving elements at 3 Milk St., gives the room its privacy. Kathy spent six hours stripping and refinishing the wood herself. Even so, it cost about $450—including hardware, jambs and labor—to hang it. Buying a prehung replacement would have cost half as much, according to Killen, but both he and the Bentleys were gratified to know that part of the old Victorian remained.

(See Directory, page 113, for details and sources)

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For Sale by Owner

The odds are against you, but the payoff is sweet

BY PATRICIA E. BERRY

Sharon Livesey was determined to sell her century-old Victorian without a broker. The house was in great shape, and even though it was next to a day-care center, its Brookline, Massachusetts, neighborhood was desirable. A few months after it went on the market, the place sold for a tidy $554,500, and Livesey netted nearly $28,000 more than she would have if a broker had taken the 5-percent commission.

It's no wonder some sellers are drawn to the for-sale-by-owner (FSBO or "fizzbo" in real-estate jargon) option. Who wouldn't want to keep thousands, even tens of thousands, more from the proceeds of a sale? And for what? Getting the word out? Showing the place? Cutting the deal? Hard work, yes, but doable.

"If people can do their own taxes and repair their own cars, they can sell their own houses," says Kelly Yarbrough, a former broker and the author of a book about real-estate agents. She cautions, however, that owner-selling isn't for everyone. Those uncomfortable with paperwork, showing their house and brass-tacks negotiating should probably go with an agency. When a quick sale is paramount, an agency will reach more potential buyers sooner. Also, statistics confirm that owner-selling isn't easy: In 1995, 23 percent of all sellers tried to do it themselves, according to the United Homeowners Association (UHA), a Washington, D.C.-based consumer group. Only 15 percent of them were successful.

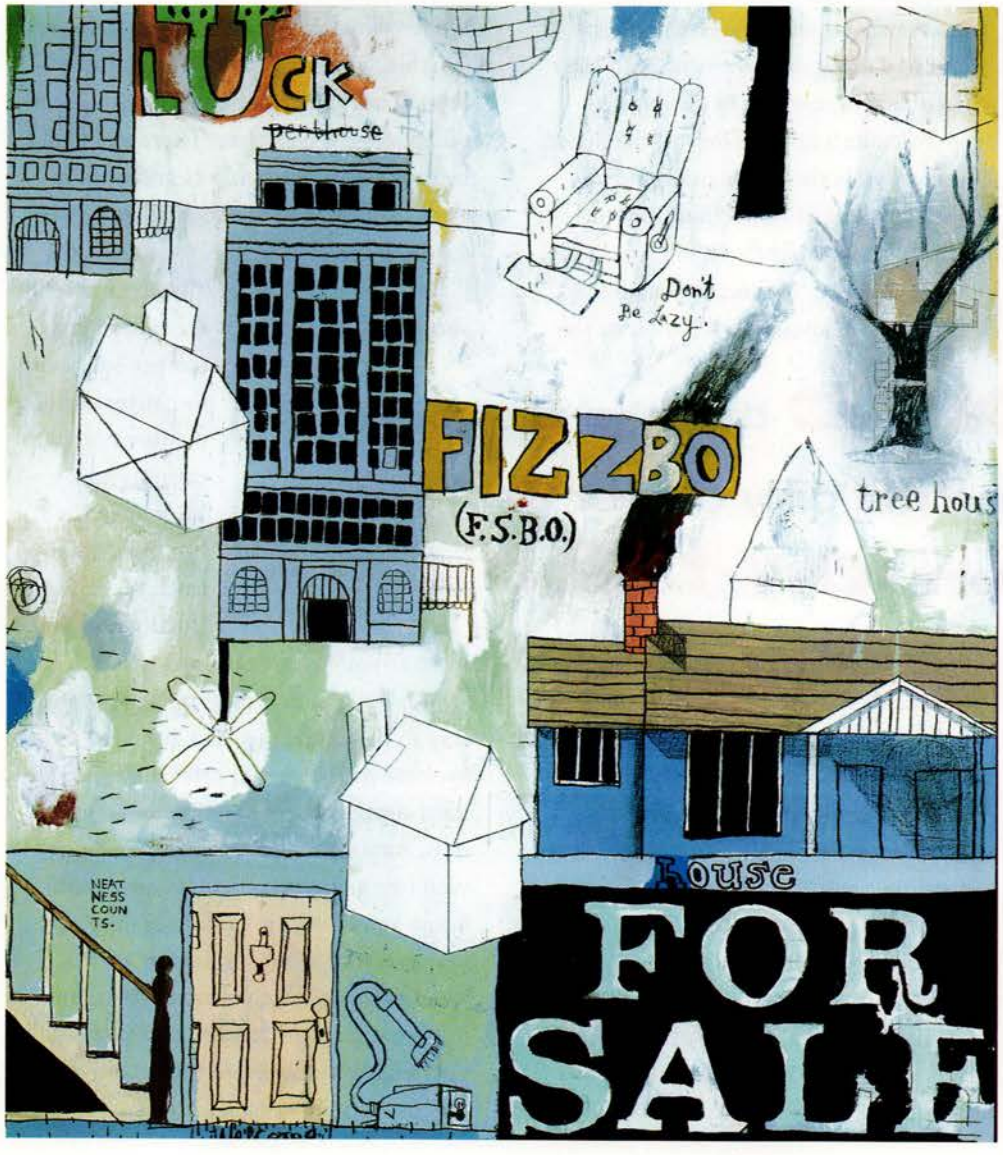


ILLUSTRATION BY MARK TODD

If you're not deterred by those long odds, there are, says Yarbrough, four keys to success: good timing, picking the right asking price, attracting lots of lookers and making the house a great place to show. Spring and fall, in that order, are traditionally the best times for house sales, but don't wait till then: Get ahead of the curve by starting in early March or September.

Setting an asking price is the most important part of selling a home, but arriving at the right number can be difficult. An objective source for pricing information is comparables—also known as comps—which are reports on sales of similar houses in the area and include initial asking and selling prices and how long a house took to

sell. Comps are available from real-estate agencies, where you can also talk with brokers about how they would price and market your property. Selling prices, taxes, lot sizes and house descriptions are also available from town-hall real-estate records. Another source is UHA's Home Price Line, which has statistics on 25 million homes that sold over the last five years (800-842-6644; $5.95 per call for the listings in your area).

In setting the price, decide first on the lowest number you'll accept, and raise that figure by some percentage to reach the asking price. The best guide may be in the comps you collected, from which you can average the differences between several selling and asking prices. It may be tempting to aim high, but a house priced too high for the neighborhood will draw less traffic and stay on the market longer, contributing to the perception that something is wrong with it.

The next step is advertising. There are no hard and fast rules about what an ad should contain. Livesey found that of the three ads she placed in newspapers, the one that generated the most calls was the least informative. It ran with only a few essential details and the invitation to "Come see this Victorian honey."

Ad costs can mount quickly, so try to economize on words while getting across key points: location, price, special features and phone number. In the first few weeks, consider holding an open house. It's a great traffic builder that agents use all the time (advertise it both the day before and the day of the event).

Other outlets include corporate in-house newsletters, relocation offices and local bulletin boards. In some areas, collections of owner listings are available for free in supermarkets and other stores. Some multiple-listing services include owner listings along with agency listings.

There should, of course, be a "For Sale By Owner" sign out front, but not one of those ready-made, write-in-your-phone-number versions. It should be sizable, legible and professional-looking. To get the look, invest in a sign painter. Under the sale notice, include the number to call for an appointment.

When people call, be sure to get a phone number and address. At some point, they should be called back, not only to confirm the appointment but also to verify that they are who they say they are. Use the call to gather intelligence about what they're looking for, when they want to move, if they have to sell in order to buy and anything else that will fill in the picture of a potential buyer. This is also the time to hire a real-estate lawyer. An offer can come at any moment, and your lawyer should be ready to draw up documents and steer both parties toward the closing.

To make a good showing, the house and grounds should be in top form. Shirley Baker of Kennebunk Beach, Maine, who's sold five homes, says the house must be "perfect inside and out." The exterior should look flawless, the lawn trimmed and the landscaping neat. Inside, all systems and fixtures should be in working order, and all rooms tidy and clean. Nothing must appear in need of repair. Sparkling windows and an absence of clutter go a long way toward creating a positive impression, as does the aroma of fresh-baked bread or cookies or a table set with fine china.

Don't panic that the first offer will be the only one or get riled at the bidder's low-ball moxie.

Visitors should receive a fact sheet with tax information, average utility costs, lot size, room dimensions, the owner's name and phone number and information on schools and other aspects of the town and neighborhood. And during the walk-through, they should be able to wander at their own pace, with the seller tagging along only to answer questions.

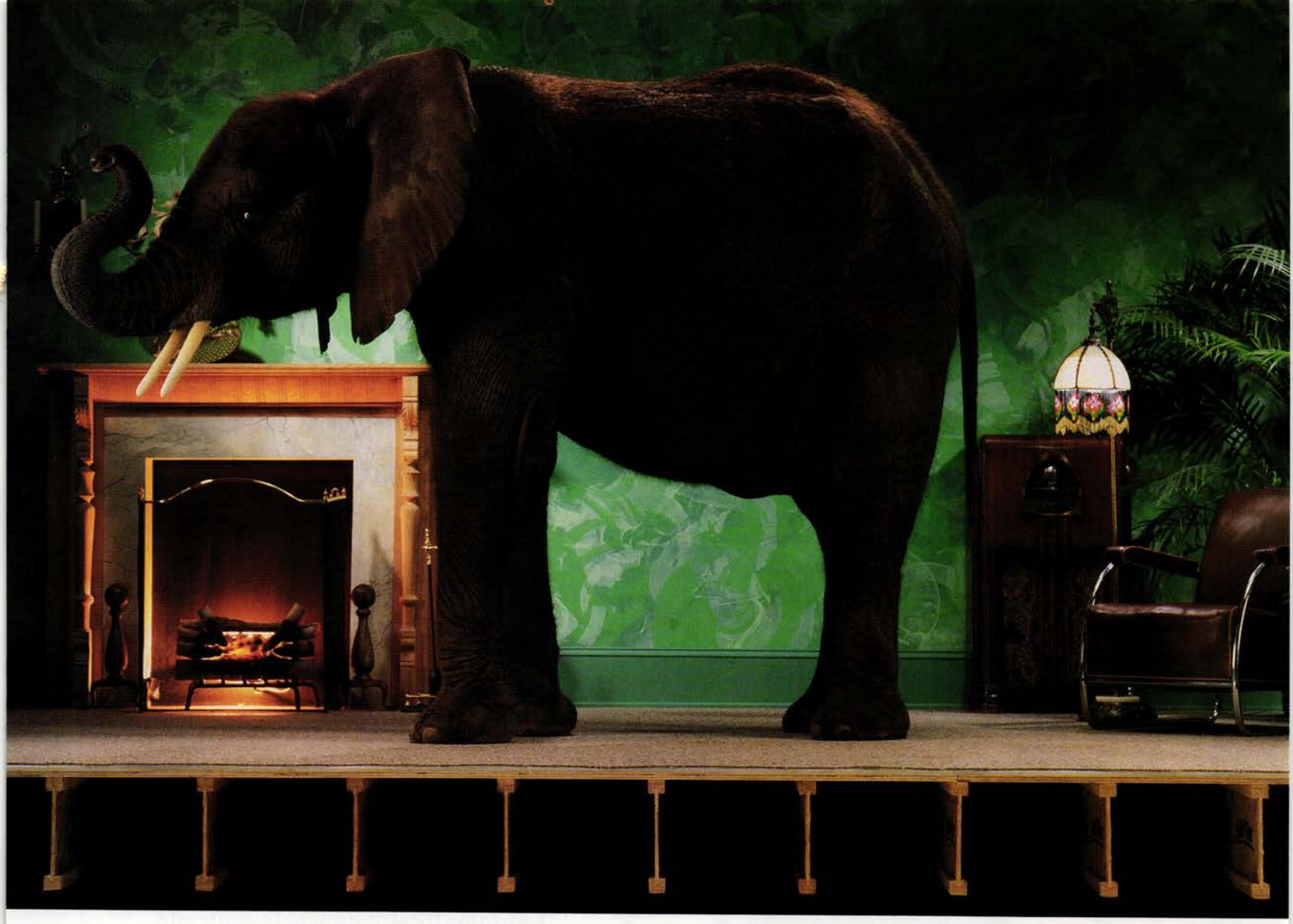
When an offer comes in, take steps to verify that the buyer will qualify for a mortgage. You don't want to go through a negotiation only to learn that the other party isn't financially capable. If the buyers don't already have a mortgage broker or lender lined up, put them in touch with one so they can fill out a simple prequalification worksheet to find out whether or not they will have a problem securing a loan.

Buyers may bid lower than you expect because they think you're saving on the commission. Don't panic that the first offer will be the only one or get riled at a bidder's low-ball moxie. If the offer is reasonable, counter with a higher number—though not your final one—to indicate a willingness to negotiate. There will likely be rounds of counteroffers and negotiations over other terms such as the closing date and repairs the buyer wants made.

When a deal is struck, buyer and seller should fill out and sign a standard contract of sale, with the buyer plunking down $1,000 earnest money. Your attorney can draft a contract, or you can usually find the form at your local stationery store.

If no sale materializes and you want to stay in the game, consider reaching out to brokers with a special offer: half the standard commission—say, 3 percent instead of 6. An agent who brings in the buyer won't be getting any less because most house sales result in commission splits between the listing and selling agents. You, in effect, are the listing agent, and in exchange for that half commission, you will likely get more traffic and a better chance of making the sale.

(See Directory, page 113, for details and sources)



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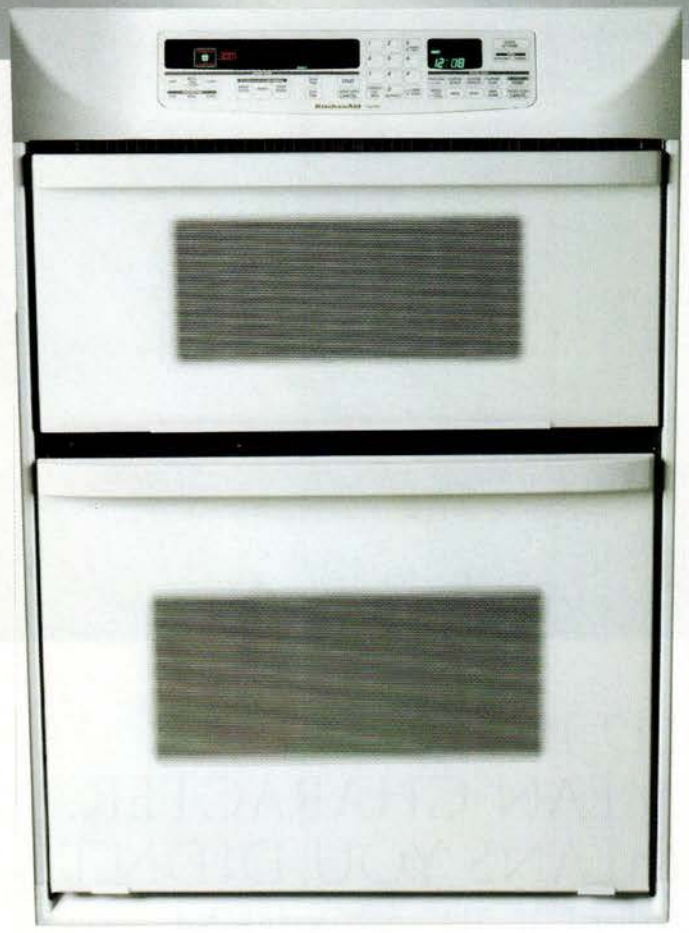

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A Letter From This Old House™

The hope of finding a lost treasure within the walls of an old house—Spanish doubloons, gold nuggets, even an old bottle of cognac—has lurked in the heart of anyone who's ever renovated one. All we've found so far in *This Old House* projects has been some historic newspapers, old toys and lots of junk.

But buried in your attic may be a Nantucket treasure far more valuable than dusty souvenirs. In 1901, John Hathaway, founder of what is today the A&P supermarket chain, gave away small plots of land to anyone who opened an account at his Great Atlantic and Pacific Tea Co. The lots were among the 1,800 he owned in an area of the island called Miacomet Park, about three miles from Nantucket Town, bordered by the Atlantic on one side and a freshwater pond on the other. The setting was beautiful, but the lots were unbuildable. They had no public access and, at 25 by 60 feet, were too small to support a septic system. Most deed holders forgot about their property.

As a result, Miacomet Park is still unbuilt, extraordinary on an island where land can sell for millions an acre. Not surprisingly, the tract caught the attention of real-estate developers—but not before it was placed under eminent domain by the Nantucket Land Bank, a program created by Nantucket's voters to help preserve the island's open spaces.

KOLIN SMITH

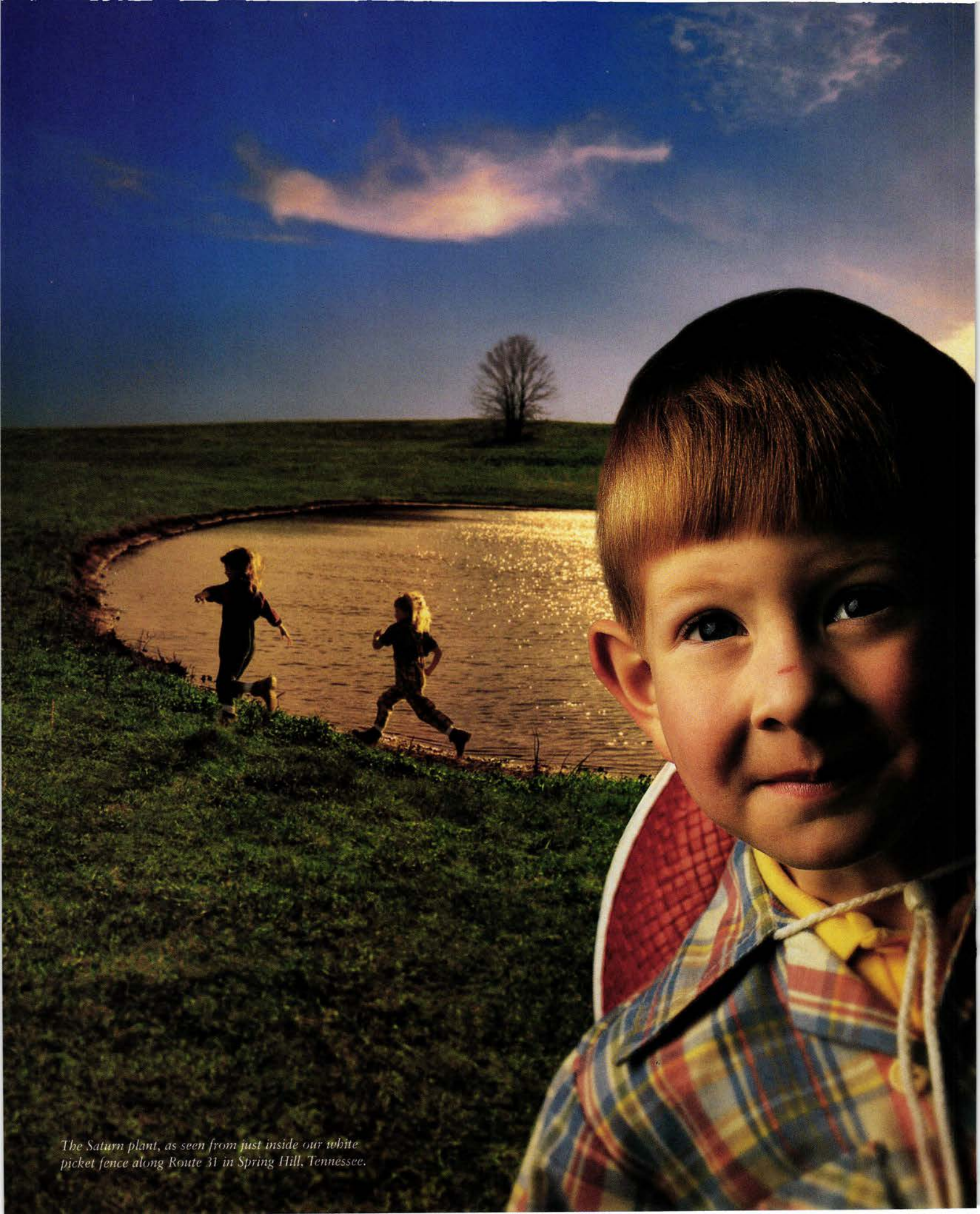
Steve at Nantucket's 73-acre Miacomet Park, the site of an unusual treasure hunt.

Although a small percentage of the tract is in the Land Bank's possession, hundreds of lots are still unaccounted for. Two years ago, the Land Bank hired Pinkerton detectives to track down the owners and buy their holdings. Of the deed holders they found, most cooperated, selling their lots for between $500 and $5,700. One person tried to dodge the Land Bank and obtain a building permit, only to have his land purchased under the right of eminent domain.

So as you enjoy the final episodes of our Nantucket project, go through your grandparents' old papers. You may find that you own a piece of the Gray Lady of the Sea. And if you do, be a good sport and donate your newfound treasure to the Land Bank, which will see that Miacomet Park is preserved for all to use.

Perhaps you'll be able to keep the deed itself. You can frame it and hang it in a prominent place in your home, giving you a rightful claim to roots on Nantucket Island.

Steve Thomas



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NANTUCKET

finale

A once dowdy Victorian shows a new face as she takes her bow

By Brad Lemley

Photographs by Kolin Smith

CAPTAIN JOHN CONWAY, WHO TOOK up residence at 3 Milk Street on Nantucket a century ago, would have approved. With much the same kind of dauntless industry Conway showed sailing around Cape Horn 33 times, *This Old House*'s hardy construction crew pounded away until the captain's tattered old Victorian became a snazzy showplace.

"What was here was drab, forlorn and bleak," says the show's director, Russ Morash, waving an arm at the riot of doghouse dormers, diamond-patterned roof shingles and jigsawed rake boards. "Now we have something splendid. It's an elegant example of Victorian ornament and detail."

This happy result seemed unlikely at times because major renovation—often a perilous voyage in which client, architect and builder both give and take orders—had even more potential to founder in this case. *This Old House* had a rigid TV shooting schedule, and the building site is 28 miles offshore, so homeowners Craig and Kathy McGraw Bentley had to make countless ferry trips to the island from their primary residence near Boston. Costs unexpectedly soared. Perhaps most challenging, almost every exterior detail had to be okayed by the Historic District Commission (HDC), the zealous protector of Nantucket's 19th-century character.

If you're building or revamping one of the island's typical, plain gray-shingled homes, the HDC's yoke is light. But the Bentleys' house, built in 1887, is one of just 72 Victorians sprinkled among the island's thousands of Federal, Quaker and Colonial-style houses.

With an all-new, zestfully detailed exterior, the project house at 3 Milk Street has become the Victorian it always wanted to be. "It's distinctive, but fits in the neighborhood," says designer Jock Gifford.

In the front parlor, workers install prefinished oak-veneer flooring. The glued-together pieces aren't fastened to the subfloor; they float on a ⅛-inch foam pad. "That lets the floor expand and contract with the changes in humidity," Norm Abram says.

Plasterers Steve Kissell, left, and Howie Nair take five days to patch plaster in the front parlor, concentrating on the crown molding.

"With their tart and ginger, Victorians stand out in the Nantucket landscape like overdressed character actors," says Russ. That 3 Milk now both fits in and stands out is a testament to the HDC's diligence and the vision of designer Jock Gifford. "Jock did a fabulous job," says host Steve Thomas. "He recaptured the original charm of the house."

Bringing out that charm was an arduous process. When contractor Bruce Killen's workers discovered the house was dangerously understructured, they didn't so much renovate as eviscerate, filling a dozen 15-cubic-yard dumpsters with debris. You can tick off what was left behind on the fingers of two hands: the wall studs and sheathing, the interior doors, the plaster crown molding and ceiling in the front parlor, the stairway, the upstairs joists and floorboards, the roof rafters, the roof sheathing and the old bricks from the chimneys (painstakingly reassembled into a new fireplace). Killen estimates all of that would have fit in just three more dumpsters.

Yet what Killen's crew put back is even more impressive. They added a combination dining/family room on the first floor, with a master bedroom suite above. To relieve a long, boring south wall, they created a 4-by-16-foot protrusion, called a bump-out, that mirrored an existing one on the north side. Inside, they snaked state-of-the-art electrical, plumbing and climate-control systems through the walls. And they spent eight labor-intensive weeks festooning the exterior with a playful array of Victorian trim. "This was a tough, tough house to detail," Steve says.

Accompanied by the whine of chop saws and the *thok* of pneumatic nailers adding finishing touches, Steve and Norm Abram begin a tour by admiring the facade from the far side of Milk Street. The front was once the oddest aspect of this house. Covered with shingles, while the home's sides were clapboarded, it was counter to Nantucket tradition. Matters have been put right, with claps in front

and unpainted white-cedar shingles on the sides, which will weather to light silver-gray by next spring.

The facade sports a dramatic "new" feature: the original double doors, found in the cellar and renovated. They are flanked by fancy brackets that Norm made, using a circa-1917 photo of the house as a guide. John Sydney Conway, Captain John's grandson and a member of the clan that owned the house for 100 years, says the doors and the original bracket-overhang structure were torn off years ago because they leaked. Careful reconstruction and flashing should prevent a recurrence.

Although the house is a true Victorian, it's quite restrained. The 184-page *Building with Nantucket in Mind*, published by the HDC, lists just four "standard" colors—white, light gray, pale yellow and cream—for clapboards on the island; cream was chosen for this house. Several of the Bentleys' desires, such as decorative facade shingling, were shot down by the commission. But, on the whole, says producer Bruce Irving, "the HDC was honorable and useful. They approved things in a consistent and sensible way."

Trudging across the damp, sandy yard, Steve and Norm take in the house's long south face. It reminds Steve of the old Victorian lifesaving stations that dot the island's beaches. "This is my favorite view," he says, putting his hand up to shade his eyes. "It has a tremendous amount of texture."

Indeed, this vantage point reveals the home's true nature. It's a hybrid—a Nantucket Victorian. It's pure Nantucket in the unpainted shingles and the muted colors of its trim and pure Victorian in its effervescent details. It's a Quaker on a spree, and it seems to work.

The original yard on the south side sloped toward the house, dumping rain runoff right into the cellar. To solve the

The kitchen, under construction and complete with granite countertops.
TOP: The glory of the design is in the details, from the "tin" ceiling made of pressed steel to the precise dimensions of the turned posts that support the countertop.
ABOVE: Welsh quarry tile at the side entry will make a dramatic surface on which to stomp off mud and sand.

The children's space on the second floor features a cathedral ceiling and a kid-size mezzanine level (rails were added after this photo was taken) that hugs the south wall. "This is an example of why working within an existing form is more fun than new construction," says contractor Bruce Killen. "You look at the existing space, scratch your head and come up with something really great."

problem, landscapers leveled the yard by bringing in enough sand-loam fill to raise the low spots two feet. They also created a sunken rear yard, bordered with dry-laid stone walls. When landscaped, it will be a protected, serene outdoor space with shade-loving plants—plantain and day lilies, hostas, pink-beauty hydrangeas and radial-leafed japonica compactas.

Steve and Norm slog back through the mire (a relentless nor'easter had soaked the island the night before), heed the carpenter-scrawled admonition to "WIPE YOUR FEET!" and enter through the front double doors.

The fanciest room in the house was the front parlor. Plasterer Howie Nair and his crew have saved the room's built-up plaster crown molding through diligent patching. Nair also preserved the cracked, peeling ceiling by covering it with fiberglass insect screen before applying a final coat of fast-setting drywall compound. "Old paint often has calcimine in it," says Nair, who adds that such a glue-zinc-water mixture will keep new plaster from sticking. The screen gives the drywall compound a textured surface to which it can adhere. "That's a new one on me," observes Norm.

The flooring in this room, and throughout the first level, is a factory-made, five-ply, tongue-and-groove product that simulates traditional red-oak strips. Flooring contractor Chuck Davis and his crew applied glue to the tongues of the 8-foot-long, 7-inch-wide prefinished strips and tapped each strip snug to the next.

Jeff Hosking, a floor refinisher who has worked on several *This Old House* projects, says the floor's ⅛-inch top layer might be sandable two times versus seven times for a solid oak floor. "It's a good product," he says, "but you're probably talking about a 35-year life as opposed to 100 years with a traditional floor."

The next room back from the street is outfitted as a study, but it also houses a flip-down wall bed and will serve as a guest bedroom. "It's a great room," says Irving. "When your buddies show up from New York—whing, bang, boom, you're ready for them."

The most unique aesthetic statement made by the renovated house is its kitchen. Dressed out in factory-built cabinets (both frames and doors are built to customer specs by the manufacturer) of antique-white bead board, it aims for a turn-of-the-century look.

Above is a tin ceiling, which is actually made of pressed sheet steel. "You do it basically like a tile job: Find the center, do the middle field, then put long strips around the border," says carpenter Joseph Topham. Asked for details, Topham sheepishly hands over a blood-spattered set of instructions that came with the panels. Whose blood? "Mine," he says. After cutting the stuff with tin shears, "the edges can be pretty sharp. It took some getting used to."

The first floor's back room, a combination dining and family room, promises to be the heart of the home. The north wall features a fireplace built from the bricks cannibalized from two former chimneys. Craig had worried that the room's canary-yellow walls might be too bright, but they seem appropriate for the cheery space. Dappled sunlight pours through the south windows and the French doors to the west.

Overall, the downstairs spaces mesh comfortably. "I love how the rooms flow," says Kathy.

The French doors open to the deck, which didn't need to be historically accurate. "The commission's jurisdiction only extends to elements visible from a publicly traveled way," says HDC administrator Patricia Butler. "So you can walk through backyards and see all kinds of things." Here, there are planks of a tropical hardwood known as Brazilian black walnut or ipe (EE-pay). "This stuff is incredibly dense. You have to predrill every nail hole," says Norm. That density, says the distributor, means it will last 40 years.

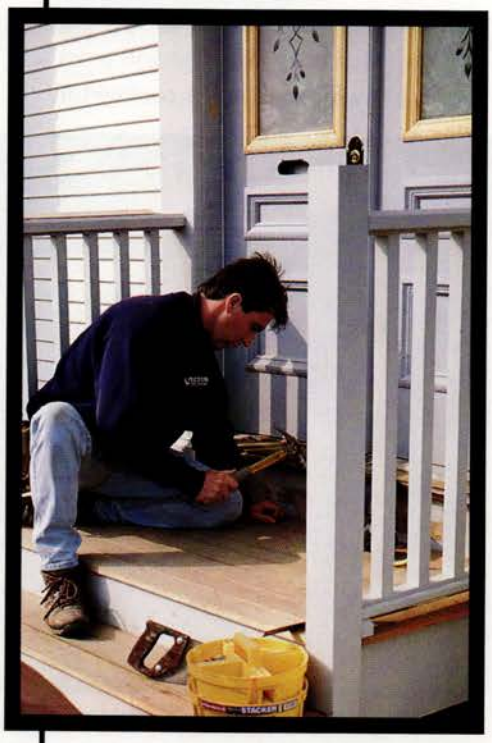
Upstairs, the first stop is the front bedroom. Every joist elsewhere in the house was either replaced or beefed up, but doing so below this room would have disturbed the crown molding and the ceiling downstairs. As a result, this unreinforced floor is "a trampoline," says Killen, who's joined Steve and Norm upstairs. To demonstrate, he leaps high and clomps down in the room's center; it does indeed shake like a pro-wrestling ring. "This will be a kid's bedroom, so the daily load shouldn't be any problem," he says.

The next room is by far the most spectacular in the house. Once called the upstairs parlor, it's now the "children's space." More reminiscent of an urban loft than a Victorian sitting room, it's a soaring intersection of two cathedral ceilings at right angles. With a steep ship's ladder stairway installed for access to an upper level, this will undoubtedly become the venue for impromptu starship and pirate dramas.

A small bedroom and the master suite radiate from the playroom. This upstairs level—which soldiered along for 109 years with no bathroom—now has two, both tiled and elegant. The master bedroom, at the rear of the second floor and raised above the surrounding elms, is even brighter than the family room below.

Finally, the group makes its way to the cellar, which requires hoisting five heavy panels out of the deck. "Access to the cellar remains a serious problem," grumbles Russ. "Moving all those trapdoors is not a good solution."

The Irish Connection



Over the roar of construction, the lilting banter of nine Irish carpenters falls gently on the ear at 3 Milk Street. The men are part of a cadre of some 200 Irish construction workers who've settled on Nantucket in the last decade.

Contractor Bruce Killen says he inadvertently started the migration in 1986 when he hired a couple of Irish roofers, paid them well and kept them busy. "They wrote back to their brothers and friends and said, 'This Killen guy is great to work with, come on over.'" Killen has since employed as many as 14 Irishmen at a time. "The work ethic is alive and well in Ireland," he says. "These guys grow up on farms, they know what an honest day's work is and they don't complain." Killen also believes "their skill level is much higher" than that of American-born workers.

Mike Lynch, above, carpentry foreman of the Milk Street job and a native of Tralee in County Kerry, says carpenters in Ireland go through a four-year training program, which is "pretty intense. It's not just building, it's drafting, engineering, calculating concrete spans. You work in the field four days and go to college one day. If you fall out of work, the government gives you a job on its own projects."

For these green-card-carrying Irishmen, Nantucket's main draw is the good pay, about 25 percent higher than they could get back home. Still, the profligate American remodeling process is a continuing amazement to these sons of wood-poor Ireland. Reaching into a heaping dumpster, Lynch pulls out a six-foot-long scrap of oak molding. "In Ireland, you'd be fired for throwing this stuff away."

The star attraction down here is the ground source heat pump. Carl Orio, president of Water & Energy Systems Corp., estimates the system will provide heat, hot water and house cooling for $1,515 a year, compared with $2,325 annually for a more conventional system of oil heat, electric hot water and electric air-conditioning. The $810 annual savings will pay for the extra $6,000 in installation costs in about seven years.

In the cellar, the cube-shaped unit is the ground source heat pump. It takes 51-degree water from a backyard well and extracts warmth from it to heat the house. In summer, the process is reversed to provide air-conditioning.

The Bentleys will appreciate those savings, especially considering their dismay at the cost of the finished house. The math, roughly: The Bentleys paid $481,000 to buy the home and, when it is finished, will have spent another $310,000 to renovate it. *This Old House* drummed up $125,000 worth of donated materials from manufacturers, but that will be taxed as income to the Bentleys, costing them another $31,000 or so. The owners' approximate out-of-pocket total: $822,000. "It's much more than we expected," says Kathy.

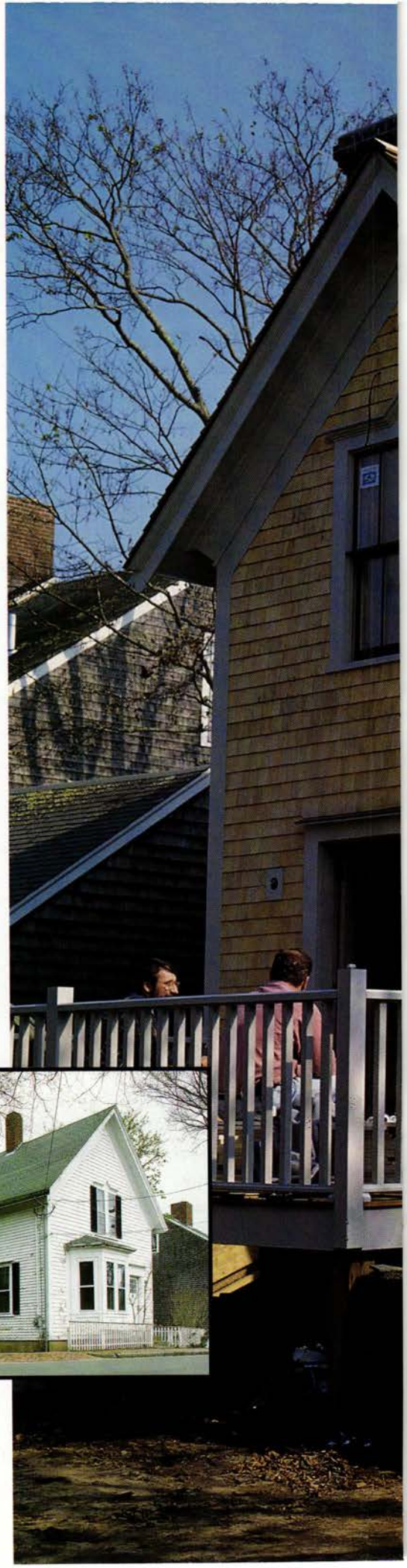
"But it also ended up being a lot more house than we anticipated," adds Craig.

Killen contends the Bentleys shouldn't be surprised by the price tag. There never was a contracted budget figure, and, he says, "They went for a lot of expensive options. You'd say, 'Your choices are $600 for a plastered ceiling and $2,600 for the metal,' and they'd go for the metal."

Although the Bentleys' out-of-pocket remodeling expenses average about $125 a square foot for the 2,671 square-foot home, Norm argues they made out pretty well. "You've got tiled bathrooms, hardwood floors, really complex exterior work," he says. "Given the fact that they picked some high-ticket items, that's not bad at all."

The Bentleys originally wanted to use the home solely as a family summer retreat. However, the high cost of the project has forced them to change their plans. Now, Kathy says, they feel compelled to "rent it, rent it, rent it." According to real-estate agent Roberta White, the house—properly outfitted with antiques, linens and china—could easily bring $6,500 a week in July and August, less in the spring and fall.

Although the Bentleys were sometimes frustrated with the mounting expenses, Norm would like them to come away from the experience with some perspective. "I hope everyone appreciates what Bruce and his crews have been able to do," he says. "The Bentleys could have paid the same price and gotten some really crummy work. This could have been a real horror show. To get work of this quality, at that price, that's a bargain."



Compared with the original structure (inset), the view from the southwest reveals how dramatically the home has been revamped. "I love the way the house looks," says Steve. "It's dolled up in an appropriate Victorian way without going over the top."

See Directory, on page 113, for details and sources

The scarred east wall of Penn Big Bed quarry offers a glimpse into geologic history and is a monument to the men who've been harvesting slate there since 1934.

rock *from* a Hard Place

Wrestling slate out of Penn Big Bed

BY ROGER YEPSEN

PHOTOGRAPHS BY MICHAEL GRIMM

THE SLATE PIT AT PENN BIG BED QUARRY, IN SLATEDALE, PENNSYLVANIA, IS A VALLEY of stone 280 feet deep, carved by hard, fearless men. Day after day, quarriers armed with dynamite and sledgehammers wrench slate slabs weighing as much as eight tons each from this black hole, which has claimed two lives in recent years and left many others with mangled limbs. In summer, the quarry becomes a heat sink, with temperatures soaring well over 100 degrees, and in winter carpets blanket the bottom of the pit because freshly exposed slate is as sensitive to freezing as the men who work there. Curiously, once the slate has been violently torn from the clutches of Mother Earth, it must be babied; if handled too roughly, it will crack and be ruined. When asked why anyone would choose to descend into the pit each day to act as midwife in the delivery of such an unwieldy yet delicate stone, Pete Papay, a third-generation quarryman, pauses a moment and replies, "There's the texture."

Slate lacks the luster of marble or the glint of granite. But there is an alluring, primitive quality to the fine-grained rock, which was conceived in the primordial ooze on ocean bottoms between 2 billion and 500 million years ago. That clayey muck became shale, and, in regions where the earth's crust crumpled and folded into mountains, intense heat and pressure hardened the shale into slate. The metamorphosis also neatly aligned the minerals—chiefly silica and metallic oxides—that give slate one of its most useful qualities as a building material: It can be cleaved into large, flat sheets.

For centuries, quarrymen broke off slices of slate for uses in which inertness and durability were prized. Large blocks yielded slabs for billiard tables, gravestones, kitchen sinks, even burial vaults. Most slate in this country ended up on roofs, from mansions and churches to hay barns. In the 19th century, many cities mandated slate roofs as protection against fire. But over time, asphalt shingles gradually replaced slate as a roofing material, largely because of cost. Quarrying is wasteful (only about 50 percent of the slate dug up is salable) and labor intensive. Slate is also difficult to install and weighs 2½ times as much as asphalt, boosting shipping costs and rafter size.

The slate-producing regions of the Northeast are mostly sleepy back-

BELOW LEFT: With a tap of the splitting chisel, called a piram, worker Miles Hunsicker cleaves a massive stone in two. BELOW RIGHT: Once freed from the pit, these 120-pound blocks must be kept wet or they won't split.

waters, with hundreds of abandoned quarries such as Welshman's, Blue Diamond and Peach Bottom serving as swimming holes or dumps. Only the names of the towns—Slatington, Slateville, Slateford—suggest what lies below. Still, a few quarries, including Penn Big Bed, service builders and homeowners who are willing to pay a premium for

A chunk of raw slate rides to the quarry lip on a 2-inch-thick steel hoist cable towed by a turn-of-the-century crane. The crane operator can't see into the pit; he depends on signals from a bell ringer in the quarry.

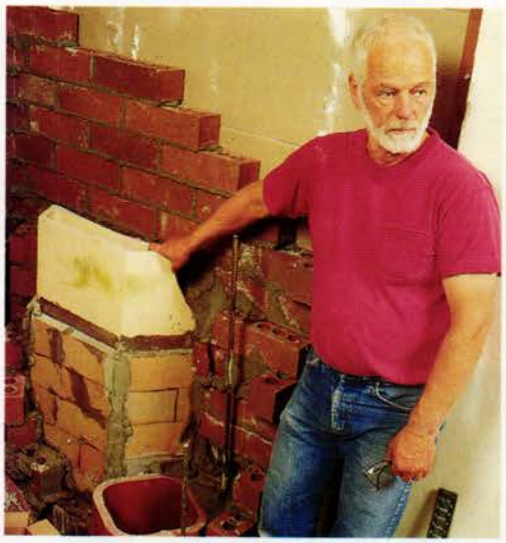
slate floors, fireplace surrounds, windowsills, countertops and roofs.

Restoration contractor Hank Groff capped the roof of his house in New Tripoli, Pennsylvania, with slate tiles that outlasted an old barn. He installed kitchen countertops made of slate blackboards salvaged from the schoolhouse his father attended. Recently Groff roofed an old farmhouse for a customer who asked for slate because he hopes the property will stay in the family for generations to come. Says Groff, "The slate was his gift to his kids and grandkids."

Wielding a 4-pound hammer and a chisel, Jeff Dimmig cuts a block of slate into ¾-inch-thick flagging. All the chisels at Penn Big Bed are custom-forged by a Vermont blacksmith, who gives them tempered edges and shanks that flex with each blow.

ce

THE MOMENT OF REVELATION for Jim Buckley occurred when a friend who collects rare books gave him a treatise on fireplace design written in 1796 by an eccentric inventor named Count Rumford. "With the assistance of the following plain and simple directions," Rumford wrote, "the chimneys will never fail to answer, I will venture to say, even beyond expectation. The room will be heated much more equally and more pleasantly with less than half the fuel used before: the fire will be more cheerful and agreeable, and the general appearance of the fireplace more neat and elegant; and the chimney will never smoke."



Jim Buckley, the country's leading proponent of Rumford fireplaces, devised a one-piece fireclay throat with a curved breast to facilitate the flow of air over the fire and up the flue.

Intrigued, Buckley followed Rumford's detailed instructions for building a fireplace. Only 12 inches deep, it was shallow compared to a modern fireplace and had side walls angled at 135 degrees to help radiate heat directly into the room. "I held my breath when I first lit it," Buckley says, "but it drew beautifully. We invited the neighbors in, and everyone stood around and watched in amazement."

That fireplace Buckley built nearly 20 years ago not only helped make his drafty Queen Anne house in Columbus, Ohio, more comfortable; it marked a turning point in his life. He quit his administrative job with the state, began building Rumfords for others and eventually formed a partnership with Superior Clay Corp. of Uhrichsville, Ohio, to create a Buckley-Rumford fireplace kit for builders and renovators. The kit includes a one-piece curved clay throat, a clay flue tile liner, a smoke chamber, a stainless-steel damper and optional glass doors.

Some 500 Buckley-built Rumfords and 6,000 kits later, the count's invention is no longer a quaint curiosity—it may be the fireplace of the future. A Rumford radiates heat two to three times more efficiently than a conventional fireplace. It exhausts less than half of the room air. And it is the only masonry fireplace design that meets increasingly stringent pollution standards. Seven Western states (Colorado, Washington and parts of Arizona, California, Nevada, New Mexico and Utah) limit the use of fireplaces or wood-burning appliances with high emissions. Such regulations may become more widespread if concerns about wood smoke continue to grow. But a Buckley-Rumford

Trailblazer

Count Rumford (the target of a caricaturist in 1800), was a tinker, scientific thinker, soldier and spy. Born in Woburn, Massachusetts, in 1753 and christened Benjamin Thompson, he successfully predicted an eclipse, nearly killed himself while mixing gunpowder to make rockets, married a well-to-do widow, fathered a child, was run out of town as a Loyalist secret agent and abandoned his family—all before the age of 23. After fighting briefly as a Redcoat during the Revolutionary War, he moved to England and founded the Royal Institution, a prestigious science association. In 1784 he talked his way into the employ of the Elector Palatine, reigning duke of Bavaria, as an adviser on military affairs, and was given the title of count. (He took the name Rumford from his wife's hometown.) He never sought a patent or money for his fireplace, which he touted as a solution to the problem of "smoking chimneys in London." Years later, Henry David Thoreau described it as one of the "improvements of centuries."

ILLUSTRATION COURTESY CORBIS-BETTMANN

fireplace, despite its brick-and-mortar design, burns cleanly enough, with doors open or closed, to meet 1990 Environmental Protection Agency standards for woodstoves.

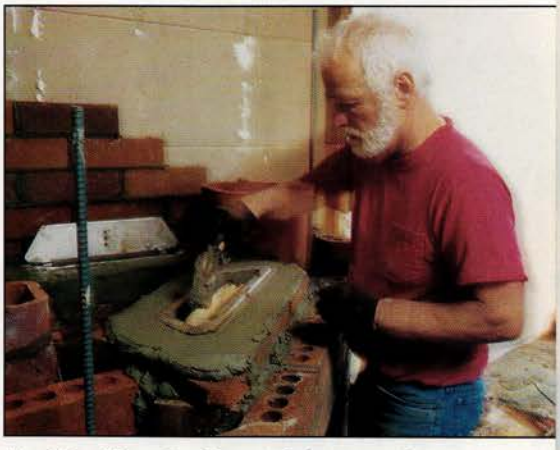
Paul Tiegs of Omni Environmental Services Inc. in Beaverton, Oregon, a nationally recognized authority on emissions-control systems, tested Buckley's fireplace. "A lot of times we see various wood-burning appliances that inventors hope will pass, and I hate giving them the bad news," he says, "but the tests turned out quite well for him and for the fireplace." Tiegs admits he was taken aback by the results. "For Rumford to design a fireplace that minimizes heat loss and emissions while at the same time radiating heat to the room is quite surprising," he says. "I think it was mostly serendipity, or perhaps 'intuition' is a more appropriate word." Jamie Craighill, woodsmoke coordinator for Washington's Department of Ecology, agrees: "Our engineer says it's not very fancy, but it's sturdy and effective. It's a case where something old is being brought back because it works."

Taylor helps Buckley mortar up back-to-back Rumford fireplaces in his Pacific Northwest house. Both fireplaces feature the style's trademark curved throat. Three adjacent flues, from basement heating sources, share an oversize triangular chimney with the Rumfords.

The fireplace was the outcome of a fundamental discovery Rumford made about the nature of heat. Conventional wisdom of his era was that a fireplace worked because it warmed surrounding air. To the contrary, Rumford proved that radiant heat moves through a room regardless of the air temperature and is absorbed directly by walls, floors, furnishings and people. Moreover, it only moves in a straight line: It doesn't go around corners. That's why he set about changing deep, square-box fireplaces to shallow-angled boxes that get the fire closer to the occupants of a room. A typical Rumford was one third as deep as it was wide, with a straight fireback about as wide as the fireplace was deep.

Rumford's design was also based on his careful observations of air flow. He understood that all air heated in the fire was mixed up with smoke and lost up the chimney. He didn't want to waste heated room air needlessly, but in his view, it was desirable for some room air to be moved into the mouth of the firebox and up the chimney, aiding ventilation and the exhaust of "putrid" air. But if a fireplace was too shallow or drew improperly, any turbulence—even the quick pass of a lady's dress—could send roils of smoke puffing into the room. Rumford concluded that the fireplace breast "is a matter of very great importance...The worst form it can have is that of a vertical plane, or upright flat...The current of air, which, passing under the mantle, gets into the chimney, should be made gradually to bend its course upwards, by which means it will unite quietly with the ascending current of smoke, and will be less likely to check it, or force it back into the room."

Washington state codes require that fireplaces have doors to prevent the loss of heat from a room. "I've designed a door frame to be buried in mud and brick," Buckley says, setting one in place. "Only its edge will show."



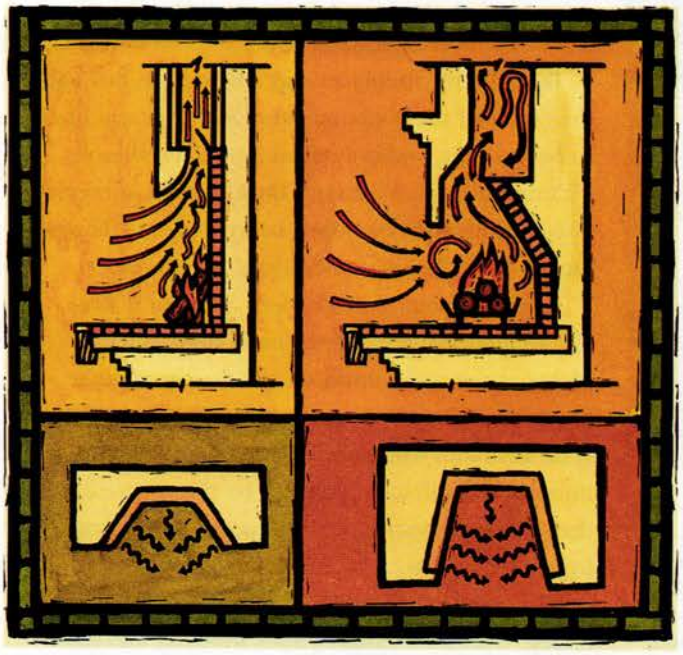
Next Buckley attaches stainless-steel dampers that have been custom-made to fit the narrow opening of a Rumford's throat. A wide mortar-and-brick bed encases the throat.

"You see what he's deduced?" asks Buckley, waving his hands like semaphores. "Long before carburetors and spray guns, Rumford had described a nozzle. The rounded breast of Rumford's fireplace is like an airplane wing, and the throat works like a carburetor. It's amazingly effective at shooting smoke and hot gases straight up into the smoke chamber.

"The room air coming in over the fire doesn't mix with the hot products of combustion," Buckley adds. "It's a sheet of clean, cooler air that acts like an invisible door to keep the smoke trapped behind it as it goes up the throat."

Among the first to adopt the count's design was Thomas Jefferson, who Rumfordized all his fireplaces at Monticello. But, Buckley laments, "even Jefferson, who wrote letters suggesting modifications for American use and was a lot smarter than most people, didn't understand the importance of a streamlined throat." Nor was Jefferson alone. Almost immediately after the count wrote his original essay, one Thomas Danforth was in print suggesting that the design worked because of a smoke shelf, which somehow threw cold air that had traveled down the back of the chimney into the rising hot-air stream. "Totally wrong," says Buckley. "Rumford's 'smoke shelf' was merely the inadvertent result of building a shallow

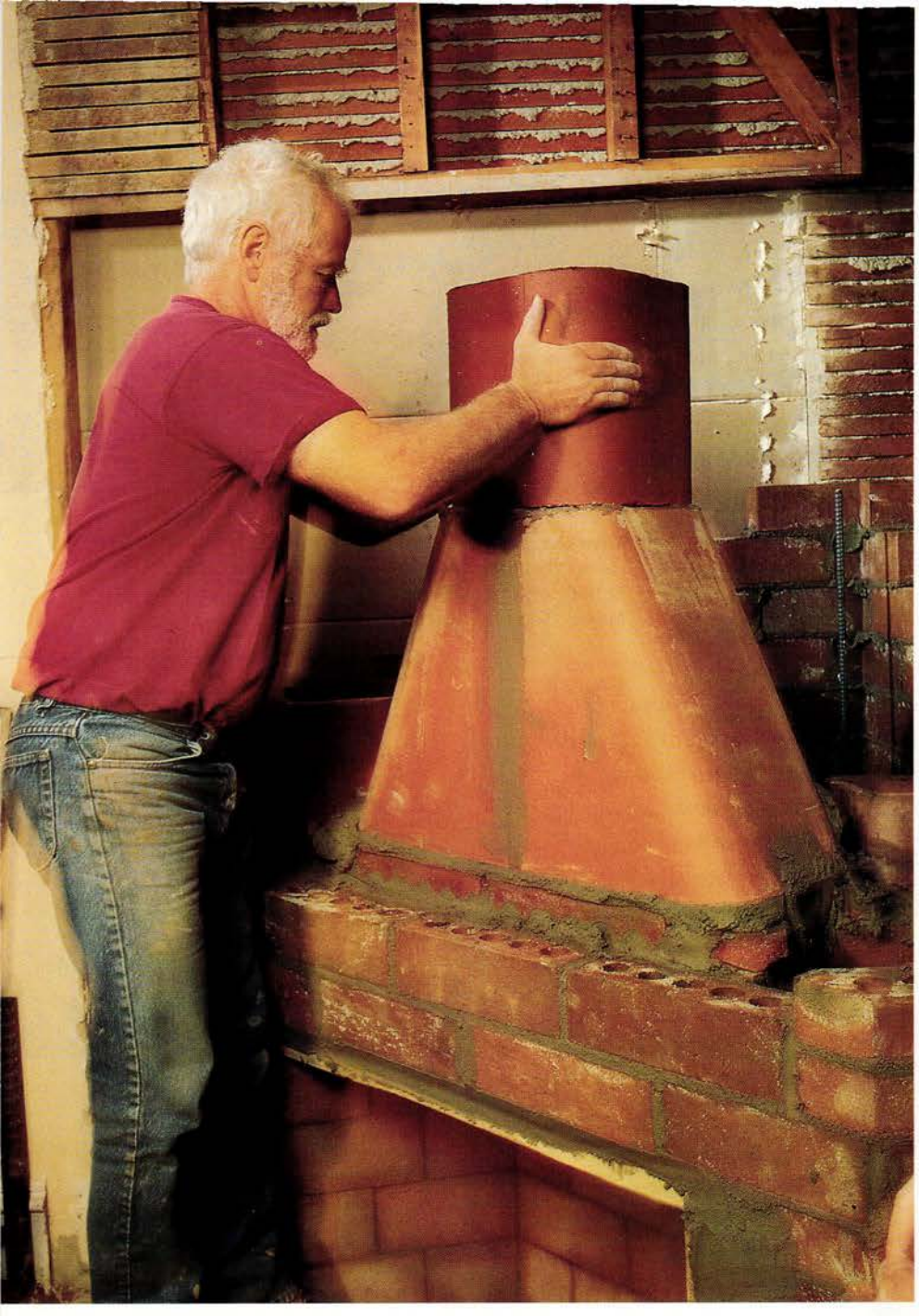
It's All in the Design



RUMFORD **CONVENTIONAL**

Three design secrets give the Rumford greater efficiency. First, angled side walls reflect more radiant heat into the room. Second, the narrower depth of the firebox brings the source of the heat closer to a room's occupants. Third, a curved leading edge—the breast—helps room air enter the firebox smoothly. It also narrows the throat so that smoke and hot gases shoot straight up the chimney without obstruction. In a more conventional fireplace, the forward-leaning back and smoke shelf only serve to create unwanted turbulence.

ILLUSTRATION BY JOSE ORTEGA



ABOVE: Buckley sets a clay flue liner in place above a two-piece triangular clay smoke chamber that rests atop the throat. LEFT: The finished fireplace awaits its inaugural blaze. The thin black metal band surrounding the firebox opening is a door frame, shown here without glass doors. Buckley likes to set his logs tepee-style against the fireback to take advantage of the tall fireplace. A taller fire also enhances efficiency and emission.

reflecting firebox within an existing deeper firebox. If anything, Rumford advocated avoiding all shelves or obstructions of any kind." Many other modifications followed, and soon fireplaces that were called Rumfords weren't. By the mid-19th century, the increased popularity of "airtight" stoves and central heating assured a quiet slide into obscurity for the Rumford. Modern devices caught Americans' imagination, and eventually an open fire became an antiquated tradition.

For Buckley, reviving that grand tradition is an obsession. After recently moving to Port Townsend, Washington, he and his wife, Bonnie, drafted Seattle mason Todd Taylor and his assistant Andy McConnell to help coax a massive chimney up through the floor, ceiling and eventually the roof of their 1890 Victorian farmhouse in order to install fireplaces. Sharing the same triangular chimney walls in the basement are separate flues for a conventional furnace, a Rumford to warm Buckley's basement workshop and a wood-burning bread oven. On the main floor, there are flues leading from two more Rumfords.

Bringing the fireplaces and chimney up through the center of the house meant plenty of warm brick to heat rooms, and it avoided a remodeled look. "It's difficult but worth it," Buckley says, surveying a scene that looks like open-heart surgery. "These are the first Washington-certified Rumfords."

As the column of brick, flues, structural steel and fill material reaches the main floor, Buckley plots out the two Rumfords and their triangular footprints. First, wetting the freshly poured concrete slab with water and a sponge, he smears a thin layer of refractory cement on the concrete, then sets a firebrick floor and metal door frame for each fireplace.

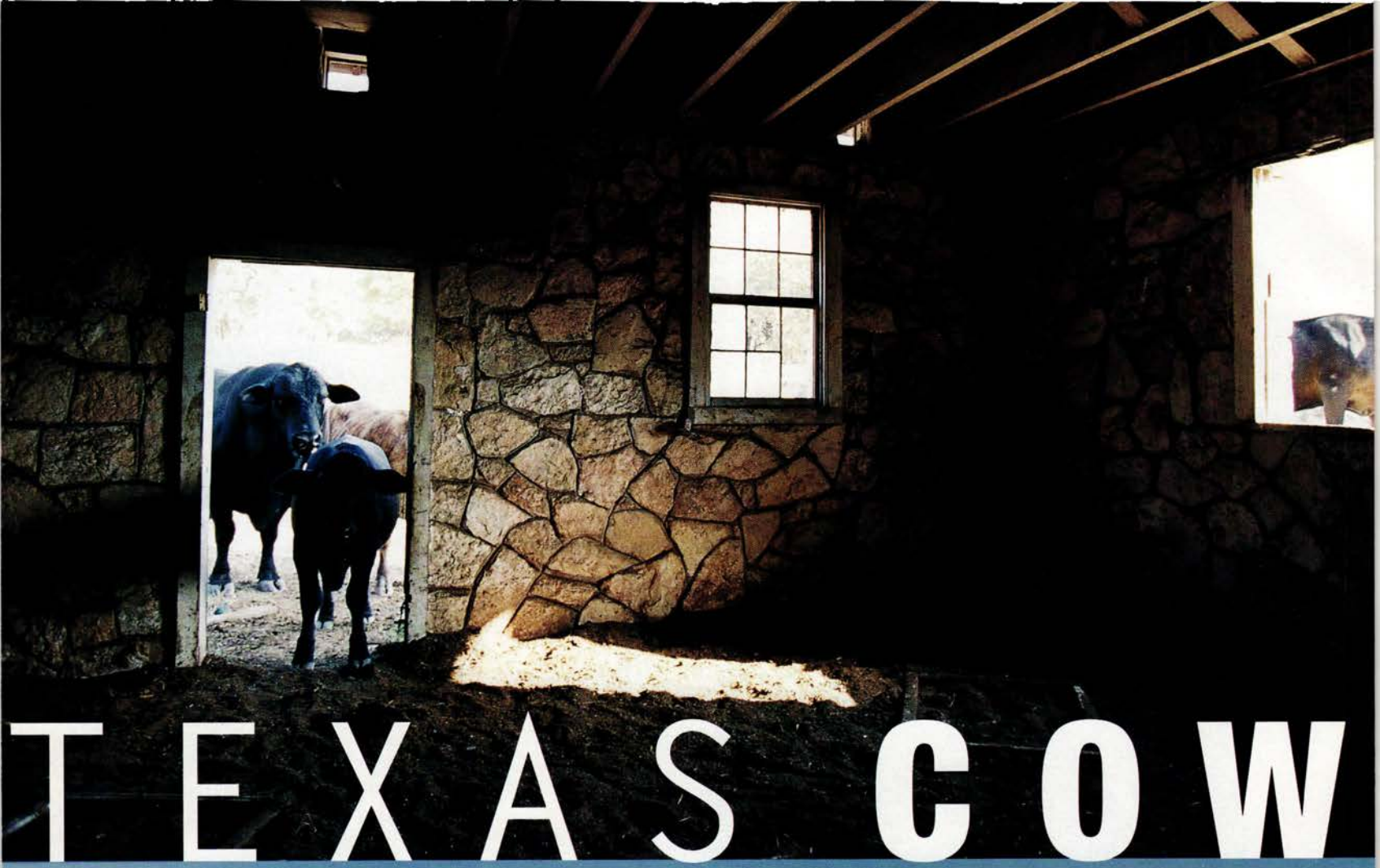
When the fireplaces are finally ready for christening, Buckley arranges paper, kindling and small logs tepee-style and tilted against the back wall. Flame finds its way through the pile like a needle darning paper, and soon the fire is roaring up the back wall. One can almost sense the flow of air in and over the inside edge of the new one-piece throat and its perfect Rumford curve.

"All I've done is read those essays carefully and lay some bricks," says Buckley, as the warmth seeps through his jeans. "The design is Rumford's. He was a genius."

The Rumford in Norm Abram's family room was a lifesaver when he was building his home three years ago. "It provided a warm place to eat lunch when it was 10 degrees outside and I was still finishing the house," he says. The fireplace has a 42-by-42-inch opening (compared with 34-by-34 openings for three smaller units in the house) and is large enough to accommodate a conventional grate. "Whether you use a grate or a tepee woodpile, the whole idea is to get the air to flow," Norm says. In either case, the fireplace puts out ample heat. "It gets used in my house all winter long."

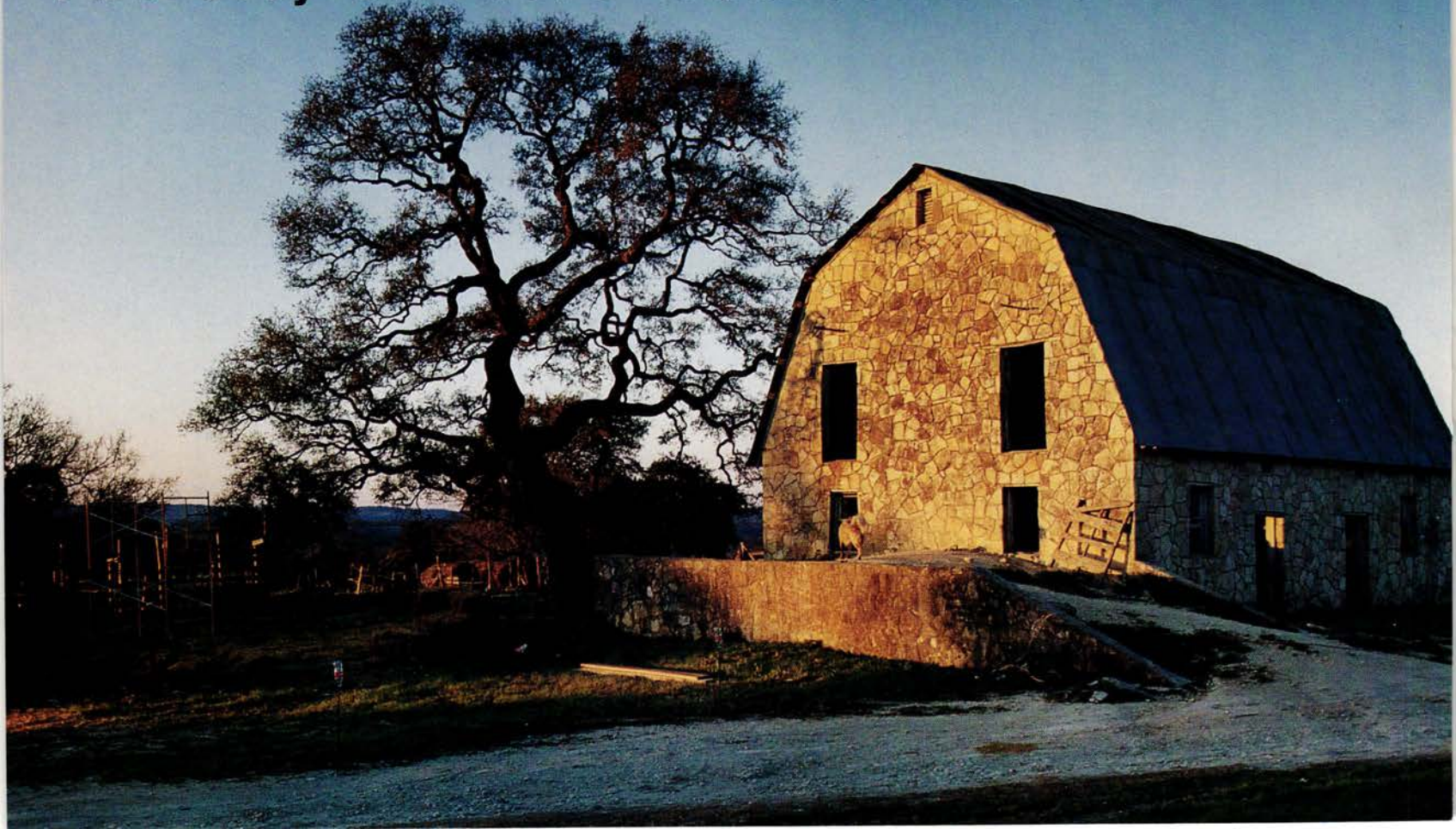
PHOTOGRAPH BY DAVID BARRY

◆ *See Directory,* on page 113, *for details and sources*



TEXAS COW

Two city slickers transform a stone barn



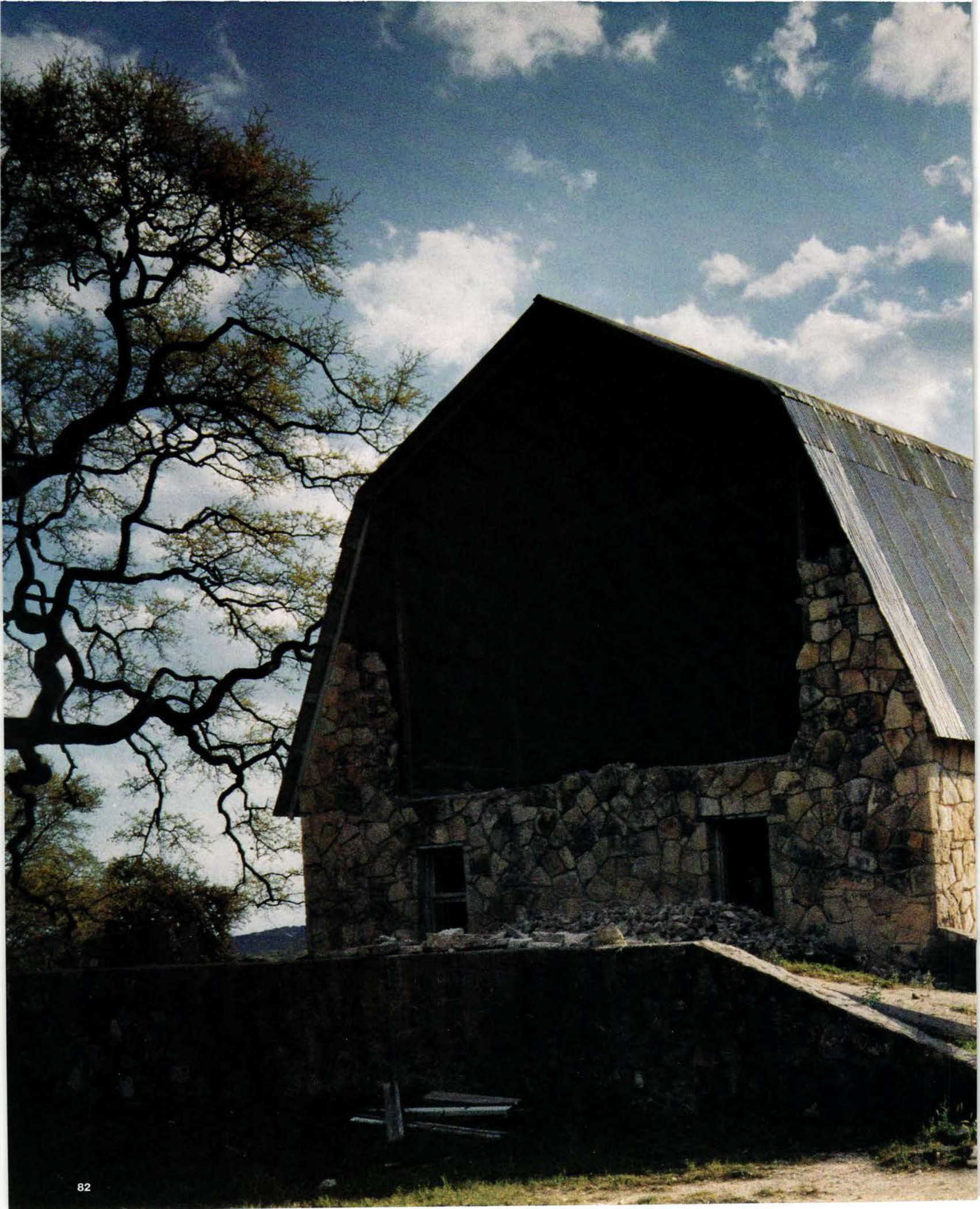
PALACE

hardly fit for rattlesnakes

The ad in the local newspaper was unassuming: "200 Acres, Hill Country, Seasonal Creek and Stone Barn." My husband is a typical Texan who wants space, space and more space. He'd long been itching for us to move from Austin to the country. Neither of us knew what kind of place we were looking for; we just figured we'd know when we found it. Sure enough, after a 45-mile drive west to see the barn, we looked at each other and said, "Aha."

I was immediately taken with the tin gambrel roof, which reminded me of barns I had seen and loved in the Northeast, and the intricate mosaic pattern of the two-story stone walls. There are plenty of stone buildings in Texas, but I'd never seen one so beautiful or imposing. We

BY JEANNIE RALSTON **PHOTOGRAPHS BY ROBB KENDRICK**



BELOW: The first step of construction was deconstruction. A wall came down to make way for folding glass doors that would eventually look out onto a screened porch. RIGHT: The view from the new doorway revealed the framed-out office and garage, set at an angle from the barn to avoid giving the complex a boxed-in feeling.

walked up a 14-foot-wide ramp and discovered a massive hayloft we later christened the "cow cathedral." It was an open space, 30 by 40 feet, overhung by the tin roof 17 feet up. "We'd have to make this the living-dining-kitchen area," I said as I waltzed around. "We can't have any walls breaking up this space. And downstairs would have to be the bedrooms."

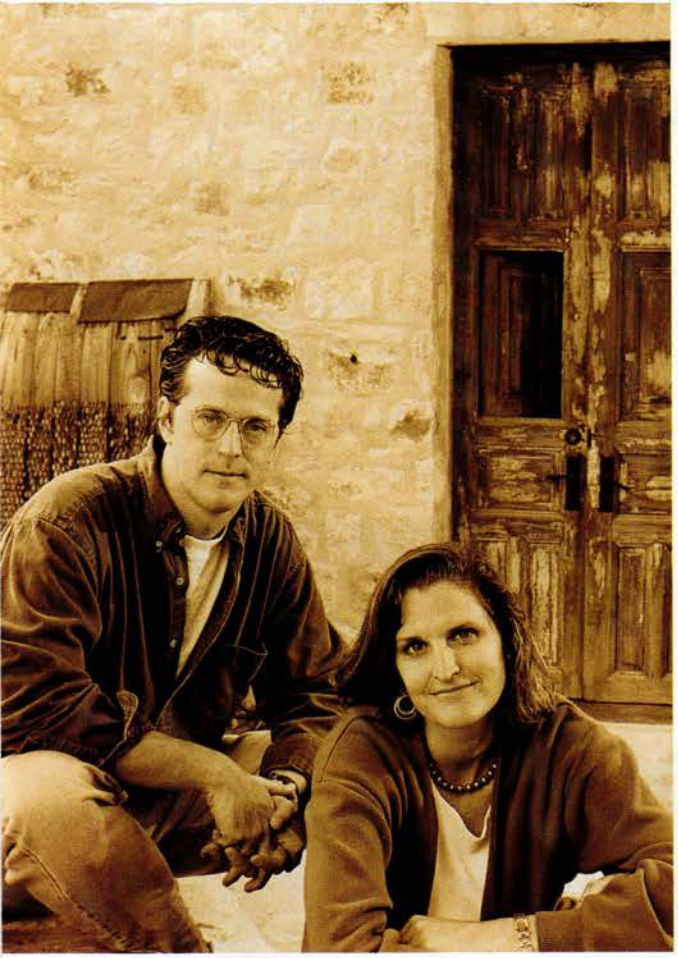
Admittedly, the notion of converting this musty and smelly old barn—cows still had free run of the place—into a modern home was pretty crazy. I even spotted a rattlesnake skin on the floor and thought, Whoa! But the barn looked like it was going to be there a long, long time, and I had little doubt we could transform it.

So we took on the daunting task of molding this skeleton into a home. We set

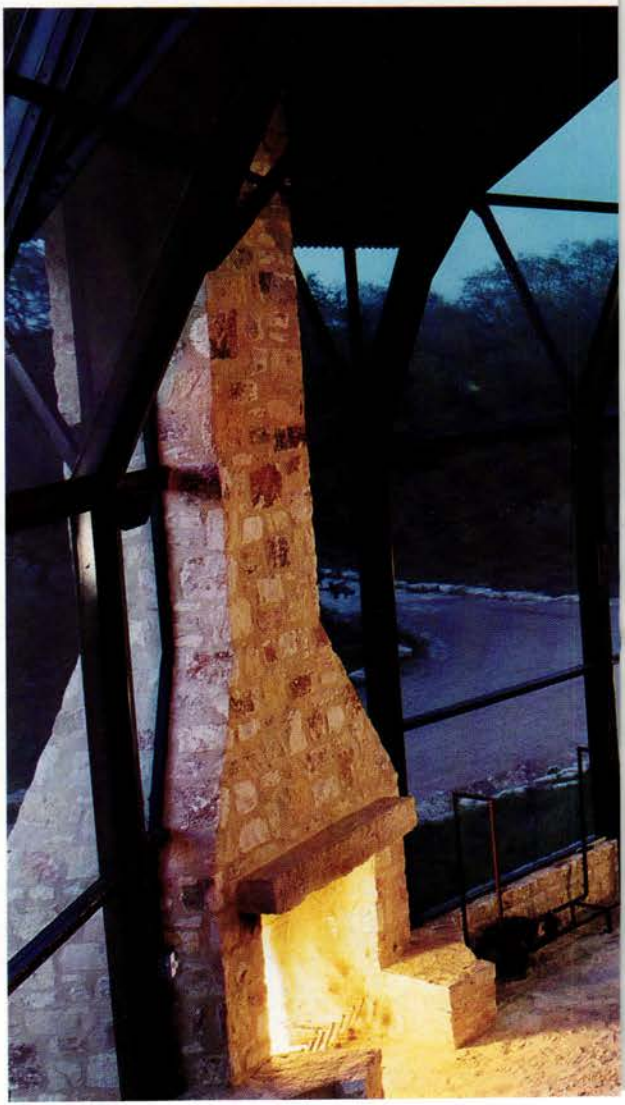
out to work with the basic elements—tin, stone and wood—that gave the barn its charm. Because I wanted an airy office for my work as a magazine writer, and my husband, Robb, a photojournalist, needed a darkroom and space to house his equipment, we made plans to build another stone building adjacent to the barn and link them with a huge porch.

That link was the key to the whole design developed by Austin architect Robert Jackson. A few years earlier we'd seen a house with a mammoth screened-in porch and decided that living outside as much as possible was the best way to take advantage of Texas's mild weather. Jackson proposed wrapping the screened porch around a magnificent sprawling oak beside the barn. It was growing at an angle, like a paper parasol stuck in a piña colada. A stone fireplace in the middle of the porch would allow us to hang out even when there was a nip in the air. Above, a catwalk would skim along the branches of the old oak and connect the loft area of the barn to the second floor of the office building, where the tall ceilings and trusses would mimic those in the barn. If the oak had grown straight up, or even at a lesser angle, the plan wouldn't have worked.

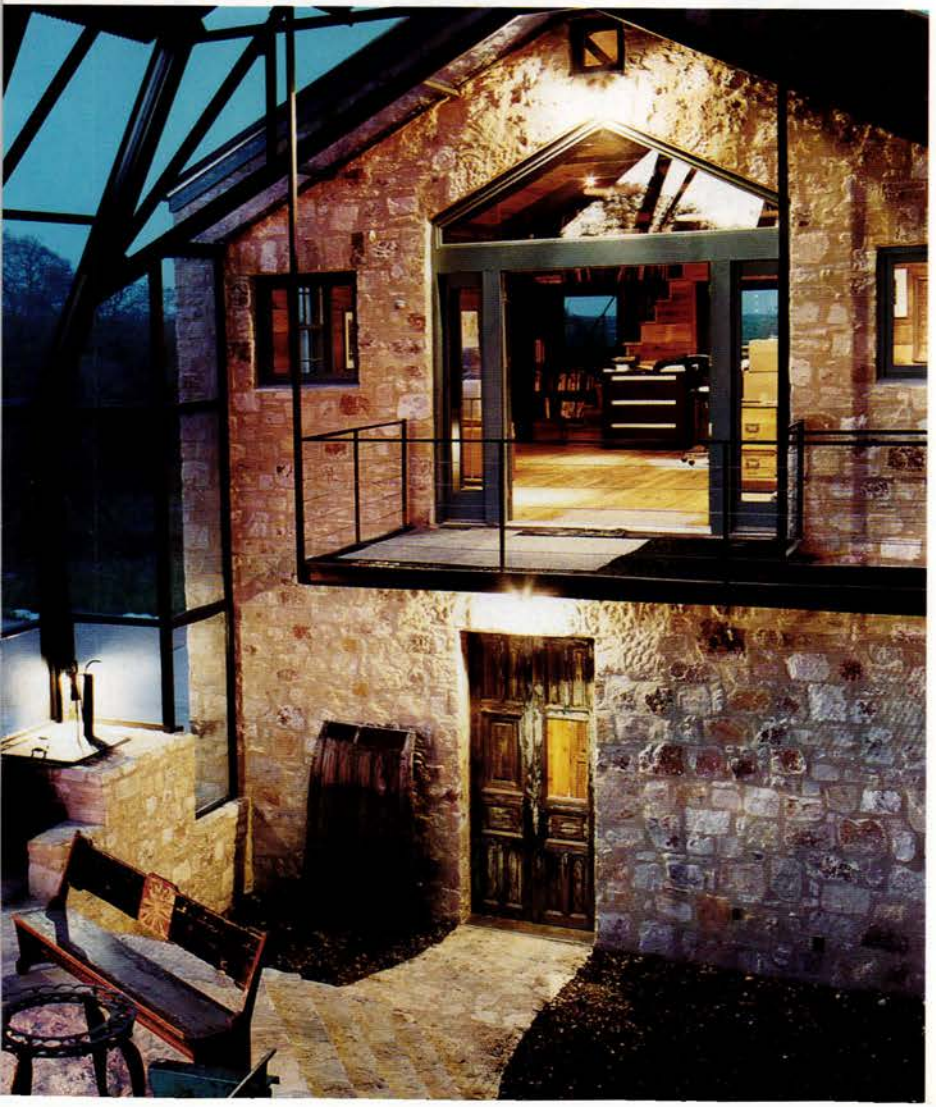
Before long we had launched an extensive hunt for materials and fixtures. We hoped to avoid anything that smacked of country cliché. The barn already had a rustic feel, and we didn't want to dress it up with details that would be the architectural equivalent of calico and gingham. From an old flour mill that was being torn



DAN COHEN



CLOCKWISE FROM TOP LEFT: Owners Robb Kendrick and Jeannie Ralston on their new porch. A view from the rafters of the office toward the barn, midway through construction, showed the new second-floor wall with its framed doorway. The family dog, Katy, took only a yawning interest in the architect's model for the project. The vista from the upstairs of the barn included the office and the screened porch, anchored by a stone fireplace. Welders pieced together the intricate steelwork for the porch.



down in a small town outside Fort Worth, we collected a treasure trove of 100-year-old long-leaf pine 2x12s for flooring in the barn loft and office. A corner bar from a south Texas saloon made a perfect kitchen island. Our favorite discovery: some old worn mesquite and sabino wood doors a shop in El Paso had rescued from Mexican haciendas.

Lee Roy Behrends, an old-school contractor who takes on one project at a time and wields a hammer alongside his crew, started the construction work in March 1995. Behrends was used to working on more conventional projects, but nothing seemed to faze him. Even if he went home at night and said to his wife, "God, these folks are nuts," as we suspected, he never complained. He just got the job done. But his chief carpenter, Lester Petsch, grumbled that every door was a different size and framing the interior was a nightmare. "This is the craziest place I've ever seen," he'd say, shaking his head.

One hot July afternoon, while the crew was using a stone saw to cut a small hole for a window in the downstairs guest bathroom, the barn offered up a buried treasure. In a hollow of rubble between the outside and inside walls, the crew found a slim bottle with a note inside. Written by Melbalene Moore, the daughter of a ranch hand, the note told the story of Maud and Bawl, two mules used to haul stones quarried on the property to the building site. "The year 1941," Moore wrote, "was the starting year of the new grainery on Charlie Whitworth's place. World War No. 2 was going on in Europe. With Italy and Germany on one side, England and Russia on the other side. The United States almost at the point of war."

By August 1995, the original downstairs floor was getting a face-lift. Because wiring and plumbing couldn't be run through the stone walls and we wanted to keep the original ceiling of 2x12 rafters and crossbracing exposed, conduits had to be run on the ground and buried under a new slab of concrete. We planned to stain the concrete mossy green, an earthy color to complement the wood and stone in the barn. We had 13 small window boxes installed around the existing floor vents to create a natural light source at ground level. Inside the window boxes we placed small plaques with the names of people who had either helped with the construction of the barn in 1941

BELOW: After construction was completed, the complex projected a warm glow at dusk, with the renovated barn at right, the screened porch in the middle and the new stone office building at left. Insulation and a new tin roof were added on top of the old roof, and dormer windows were put in to bring in more light upstairs. LEFT: The complex wraps around a leaning oak tree, which was a focal point of the entire renovation project.

or were part of our renovation crew.

We had been optimistic that the construction would go quickly and smoothly, so we signed a contract to sell our house in Austin. By the time the closing date rolled around, there was still a lot of work to be done, including the kitchen and bathrooms. Things were farther along in the office, where the plumbers finally connected pipes in the bathroom the day before Thanksgiving. That evening we set up house—a camping stove, a microwave oven and a small refrigerator—and gave thanks for our working toilet. A month later, we were still roughing it. I told Behrends all I wanted for Christmas was a kitchen sink. He fulfilled his role as Santa, and we invited relatives over for a small barbecue on Christmas day. I was elated not to have to wash dishes in the small pedestal sink in our office bathroom.

The day I thought would never come arrived several weeks later. We took possession of the master bedroom. I was delighted when I woke up the next morning and saw shadows on exposed beams and a large patch of sun splashed on the rock wall.

In April last year, four days after the final subcontractor packed up his truck, more than 130 people descended on the barn for a joint housewarming party and the wedding reception we'd never had four years earlier. We told guests we were celebrating the completion of the renovation and, maybe more amazingly, the continuation of our marriage despite the Sturm und Drang of remodeling. Finally, we could stand back and appreciate this metamorphosis—a melding of modern and rustic that never forgets its humble origins.

Now we are moving on to another, more daunting project. In April we are expecting the birth of our first child. He or she will be one of the few children in the world who will be able to say, when castigated, "Why, yes, I *was* raised in a barn."

♦ *See Directory,* on page 113, *for details and sources*

an **american** craftsman

teddbenson

The timber frame guru, humbled by his art

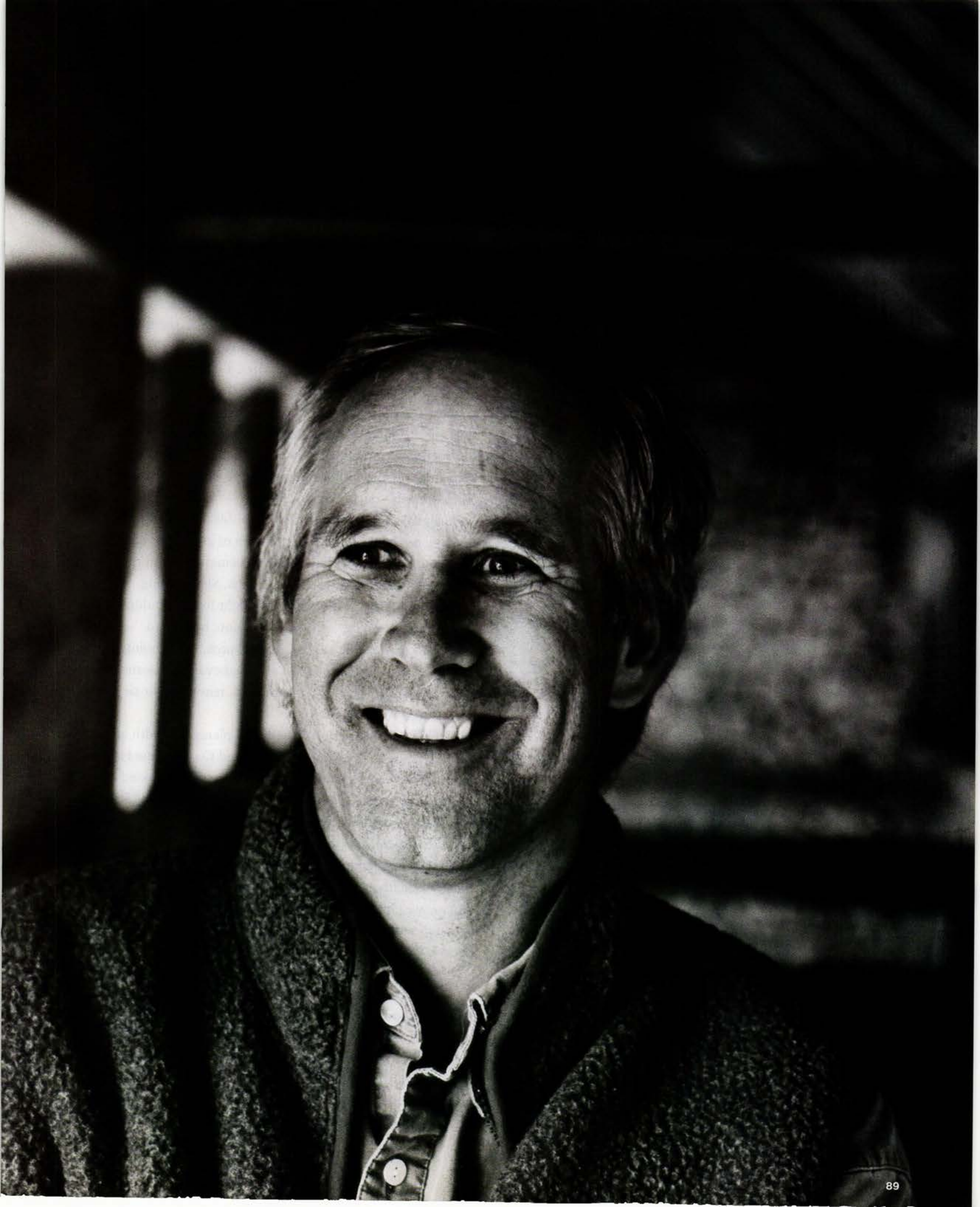
BY WALT HARRINGTON

The leaden clunk-clunk of work boots on the long pier carries farther than Tedd Benson can see this morning, just after dawn, in the thick fog off the coast of Mystic, Connecticut. Accompanied by his friend and coworker Andrew Dey, he drops his tool belt into a white skiff, climbs in, steadies himself and releases the mooring lines. Soon, the boat is churning blindly through the silence and dead-calm water on its way to Dodge Island, where still another of Benson's famous timber frame houses will rise in skeletal elegance this morning.

It has been 23 years since Benson erected his first timber frame—giant wooden posts and beams interlocked with joints and wooden pegs and braces—and sparked the revival of a 2,000-year-old tradition that had been nearly lost in the United States. Benson's 1980 book, **Building the Timber Frame House,** ***made him a cult figure thanks to its almost religious respect for a craft that created ancient Greek and Japanese temples, Scandinavian stave churches, Colonial meeting houses and other buildings that have survived the ages. Benson's company has added 300 timber frame houses to the legacy, but he's still wistful about the one that started it all.***

"When my first timber frame went up," Benson says, "the feeling I had must have been what a cathedral builder felt standing beneath his magnificent structure. You're humbled by your own creation, this building that will stand for 500 years. You feel small and big at once—big for having accomplished it, small in relation to it. And that feeling is what keeps me and

PHOTOGRAPHS BY ALDO ROSSI



all craftsmen doing it every day. There's nothing romantic about sweating over these grungy, dirty old timbers. But seeing that building go up, well, it can make you cry."

Dey, the manager of the Dodge Island project, is steering the skiff this morning. "The timbers look great," he says. "We had a lot of cleaning up to do after getting 'em off the barge."

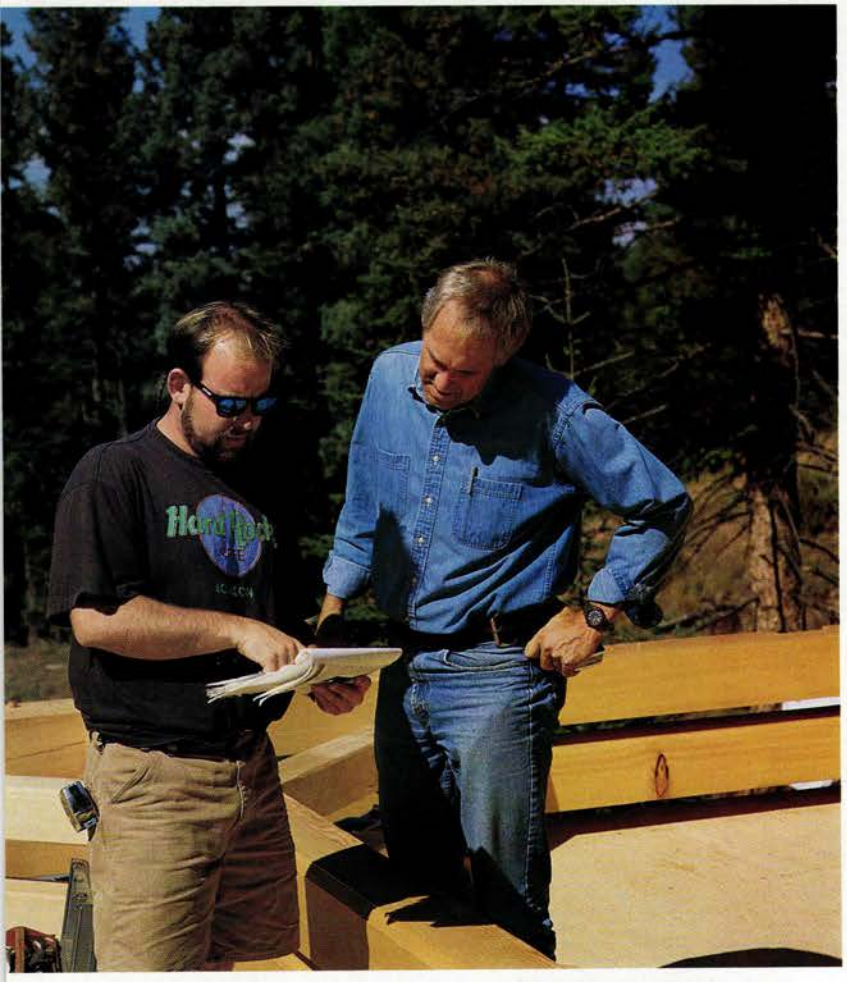
"How's your leg?" Benson asks. He looks toward the bandage that covers a deep gash in Dey's left calf.

"It's fine."

"Take care of it."

Dey nods but doesn't answer.

These days Dey and the 31 other men and women of Benson Woodworking know they can get along fine without the boss's



Standing beside the assembled walls, Benson and project manager Mark Roentsch look over the plan for raising them by crane at the Harris house in Woodland Park, Colorado.

advice. And that's exactly the way Benson wants it, because his mission now is to create a working environment where others can also get the feeling. For years, Benson has pondered whatever ineffable thing it is that moves men and women to do their best work, to blend obsessive attention to detail with creativity, to make people love what they do despite tedious, repetitive labor. He has concluded that skill alone doesn't make excellence, not in its highest form, anyway. No, excellence is a state of mind. "It's a way of thinking," Benson says. "A way of being."

Dodge Island is tiny, really a stone's throw wide. But on this speck of land that is like a head held hopefully just above the water is a clearing where the $1.1 million, 4,200-square-foot house of David Elliman and Andrea Branch will stand. Its rear windows will face Mystic, its front windows will face a distant lighthouse and, beyond, the Atlantic.

At 7:58 a.m., with fog still shrouding the shoreline, the smell of brackish water mingles with that of citrus oil freshly spread on timbers. Saws and drills, clamps and tool chests are scattered helter-skelter, and a crane huffs and puffs like a snorting bull.

The frame of the house is stacked in four huge skeletal walls lying atop one another on the foundation in the order in which they will be raised by the crane. The top beams—the plates—of two walls are 72 feet long and 12 by 14 inches thick. The walls were pieced together and pegged on-site in a build-by-number system: Vertical timber posts were lettered A, B, C and on through the alphabet from the front to the back of the house; the horizontal girt, summer and joist beams were marked by their first- or second-floor numbers; the sides of all timbers were labeled north, south, east and west.

The elaborate joinery, which resembles furniture-making done by a race of giants, is a triumph of geometric couplings named not in the vocabulary of mathematics but in the plain language of poetry, history or, perhaps, Shaker song: Simple mortise and tenon joints to carry a light load, shouldered joints to bear great weight, anchor-beam joints borrowed from the barns of the Pennsylvania Dutch, spline joints from the Japanese, scarf joints from the medieval Europeans, plus dovetail, rafter feet bird's-mouth, tusk tenon, collar-tie and tongue-and-fork joints.

The timbers were cut to length and planed to width at Benson's shop in the woods near Alstead Center, New Hampshire. Joints were sketched on the timbers and, in a kind of woodworker's hieroglyphics, directions were scrawled for those who will saw and bore the hundreds of housings and couplings.

"Clean the pockets!"

On Dodge Island, raising foreman Mark Roentsch yells out the order as the first wall hangs from the crane and sways gently, looking weightless a few inches above the foundation deck mortises into which its vertical posts will slide. Hand-guided into the pockets by seven men and seated, the wall is plumbed and braced.

"Home!" Roentsch hollers, and it's up.

Benson stands to the side of the foundation, obscured by the huge gray boulders that litter the island, a tourist among workmen rushing to install diagonal knee braces where wall timbers meet at right angles. Forty-eight years old, tall, with blond-to-gray hair and an athletic build, Benson looks calm, but he's itching to grab a beetle—a 15-pound wooden mallet for tapping joints together—and put in a few swings, use the old muscles, rub

the old emotions. Instead, he stands arms akimbo, watching.

"One day about six years ago, I was inside the shop in the morning and a couple of men came shuffling in late. It hit me like a rock: Here are these men I have worked with for years, who I care for, and they don't want to be here. This craft we had committed our lives to wasn't enough, not for them. That day, I looked around and noticed others doing the same—just not giving 100 percent. The next day, I said, 'I'm leaving. Something's not right about our workplace. I'm assuming it's me.'"

For two months, Benson stayed home and read books on management. And, indeed, he decided he was the problem: After 18 years in business, he had become a control freak. "I was the aperture through which everything had to pass." It slowed projects to a crawl and left workers twiddling their thumbs waiting for Tedd, who was working 17-hour days, flying to construction sites, taking late-night calls. Clearly, he

The first wall of the Harris house goes up as Benson (far left), Roentsch, Tyler Davis, architect Randall Walter and Bob Kerr prepare to guide it into the deck pockets.

needed to delegate. But Benson saw that as a surface problem, a wave atop the ocean. Sure, he could create a new layer of managers—several new apertures through which every decision would pass. That would unclog the system. But it didn't seem right, not for the work he and his team did.

Instead, Benson thought back to when he was a young, smart, counterculture college dropout from Colorado who'd worked on house-framing crews, banging 16-penny nails into 2x4 studs, expected by his bosses to rip through the work, putting nothing of himself into it—bored. He moved to New England in 1970 and met Oliver Chase, a sixth-generation banger of nails, Harvard educated, a man who built houses not to make a living but because he loved it. "Oliver would say, 'Our civilization is defined by what we make. It's a privilege to be a part of that tradition.' He looked for the challenges—understanding how a framing square works. It's an old layout tool that's just a right angle, but with it you can lay out rafters and stairs, octagons and polygons. I'd never worked with anybody who used a square other than to draw a line on a board."

"Home!" Roentsch suddenly hollers again.

And at 8:27, the second wall is up.

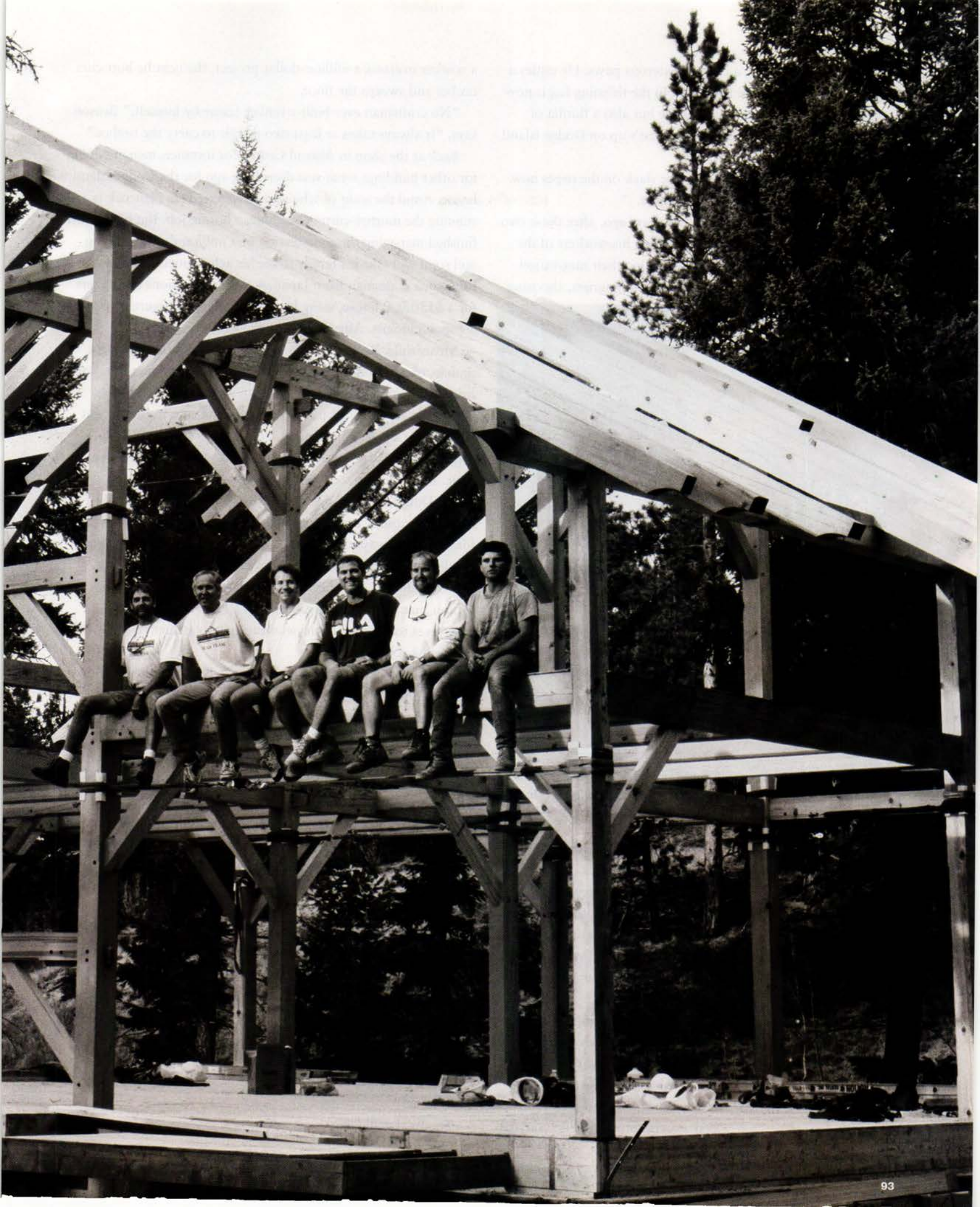
During his self-imposed leave of absence, Benson thought back to the early timber frame houses he'd built, thought back to that feeling—his excitement at locking a giant dovetail joint for the first time, seeing the last purlin go into a roof. "It was so exciting that it seems as if it happened in a dream." In those days, Benson worked for the thrill of it, the chance to stand within the finished cathedral and feel that amazing, purifying wash of pride and humility. That was the juice, the heart of his craft.

"Push on three!" Roentsch yells. "One, two, three..."

At 9:06, the crane growls, the third wall dangles lightly in the air and the yellow and purple ropes that hold it are now bright in the first rays of the sun burning through the mist.

"Home!" Roentsch cries. Benson decides he can't wait on the sidelines forever. When the crane's cable jams, he grabs a giant sledge and swings with a force that clang-clangs like a ship's bell. When the cable is free, he stretches, rolls his shoulders, looks energized. Soon, he's up a ladder

The crew takes a break after the timber frame is up. They've attached a small evergreen tree to the front peak of the house in an ancient timber framers' tradition that pays homage to the forest for giving up its own for the construction of a human dwelling. From left, Bob Kerr, Benson, Randall Walter, Tyler Davis, Mark Roentsch and Tom Hancock.

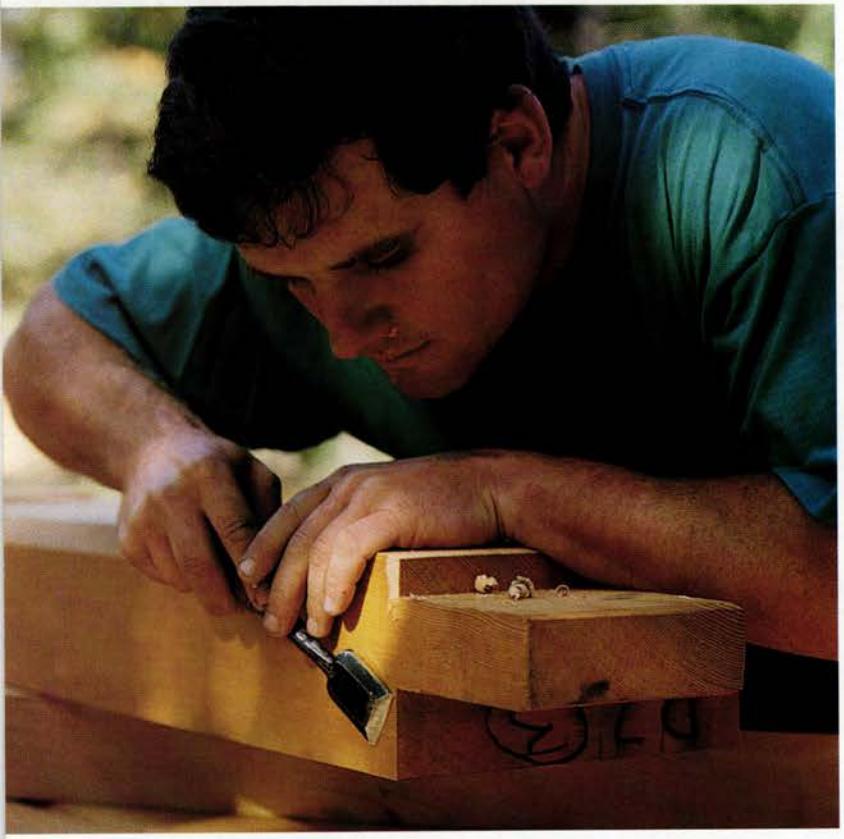


atop a 72-foot-long plate, a cat on dexterous paws. He unties a rope, lets it fall, sits astride the beam. In the thinning fog is now revealed not only the distant lighthouse but also a flotilla of small boats presumably investigating what's up on Dodge Island.

"Ready!" Roentsch hollers.

At 11:15, the crane begins to lift the slack on the ropes now attached to the last wall. "One, two, three..."

When Benson returned to work six years ago, after those two months off, he had decided he was robbing his workers of the juice, sapping the joy in their work, draining their motivation. He was holding the hands of architects and designers, choosing



Tom Hancock pares the end of a girt (any horizontal beam that connects vertical post to post) with a Japanese chisel to ease the girt's entry into a mortise and housing.

what joints to use where, orchestrating raisings—getting the rush and taking the praise of clients. So he stepped back. Although Benson Woodworking usually has three or four crews out working on houses at any given time, Benson stopped visiting sites regularly. He even chose not to attend most raisings. "I had become a hog for that feeling," he says. "Maybe I was a junkie. I was robbing the people who worked for me. They needed that feeling, too."

Benson told his workers they must run the company. He'd concentrate on the big picture, where Benson Woodworking would go in the future. They set up committees to review hiring and pay raises. Everyone found out what everyone else in the company was making. Each employee shared in annual profits. Jobs, from best to worst, rotated among shop workers: One day a worker oversees a million-dollar project, the next he butt-cuts timber and sweeps the floor.

"No craftsman ever built a timber frame by himself," Benson says. "It always takes at least two people to carry the timber."

Back at the shop in Alstead Center, for instance, men are doing for other buildings what was done long ago for the Dodge Island house. Amid the scent of white-pine timbers, Tom Hancock is running the mortise-cutting machine, a boring job. But he has just finished managing the construction of a million-dollar building and soon will take his family to see his achievement. Ryosei Kaneko, a craftsman from Japan, is jotting directions on timbers for a $150,000 house, using his trig calculator to figure its compound joints. Afterward, he will sweep the floor.

Meanwhile, Robert Polcari is hand-routing mortises on the timbers of a $300,000 house's roof, which, according to the calculations he makes on his framing square, will rise 10 inches diagonally for every 12 inches of horizontal run. In the ancient language of the framing square, Polcari calls the roof's 39.8-degree tilt "a 10/12 pitch"—just as Oliver Chase would have done. Later, Polcari, too, will sweep the floor.

On Dodge Island, others are also carrying the timber. Paul Boa, a quiet, meticulous master woodworker, is a stickler for process, always making sure each step is taken in sequence. Mark Roentsch hates too much process. "Enough," he'll say. "Let's go do it." And there's Andrew Dey, the boat-driving project manager with the gashed leg, a Harvard graduate, who loves to bang nails but who can talk to affluent clients with reassuring sophistication.

"Making a crew is like a recipe," says Benson, who has now climbed down from the heights and stepped back among the boulders, anticipating the reaction of the home's owners, who have arrived. "It's the craft of making craftsmanship."

There's still much more to do. The perpendicular beams that link the raised walls must be installed, the roof trusses lifted and locked, the purlins that connect them beetled into their dovetails, the siding, insulation, wiring, plumbing, heating and flooring, all of which present unique problems in timber frames, must be installed—at least another nine months' work.

But these details are part of the the mechanics of craftsmanship, the grungy, dirty work it took to get to this place, the big one. In a few moments, Benson knows the juice will flow, as the awestruck owners will praise the craftsmen, who will be standing beneath their creation feeling that affirming wash of pride and humility. Off among the boulders, Benson doesn't want to be with them. This cathedral he did not build. Of the feeling, he says, "I miss it a lot."

At 11:27, Roentsch cries, "Cable down!"

"Clean the pockets!"

"Home!"

The final wall is up.

♦ *See Directory,* on page 113, *for details and sources*

Benson sweeps up a small storm of dust as he performs the lowest of tasks on the Harris jobsite, as do all his workers at one time or another.

What to look for—and avoid—when searching for replacement windows good enough to pass on to your children

worrisome windows

BY PAUL ENGSTROM AND JEANNE HUBER

FOR MANY WINTERS, RAW WINDS WHIPPED through a pair of tall casement windows into the cavernous second-floor ballroom of Chris and Joan Hagger's home in Wayland, Massachusetts. Then, six years ago, their classic Colonial Revival became *This Old House*'s fall TV project and contractor Tom Silva came to their rescue. He replaced the windows, which had been installed in 1888, with modern aluminum-over-wood copies. The drafts disappeared and the Haggers were delighted.

Chris and Joan Hagger's new windows, left, look like the ones they replaced. But the new ones are less likely to be damaged by moisture because they open out instead of in and close more securely.

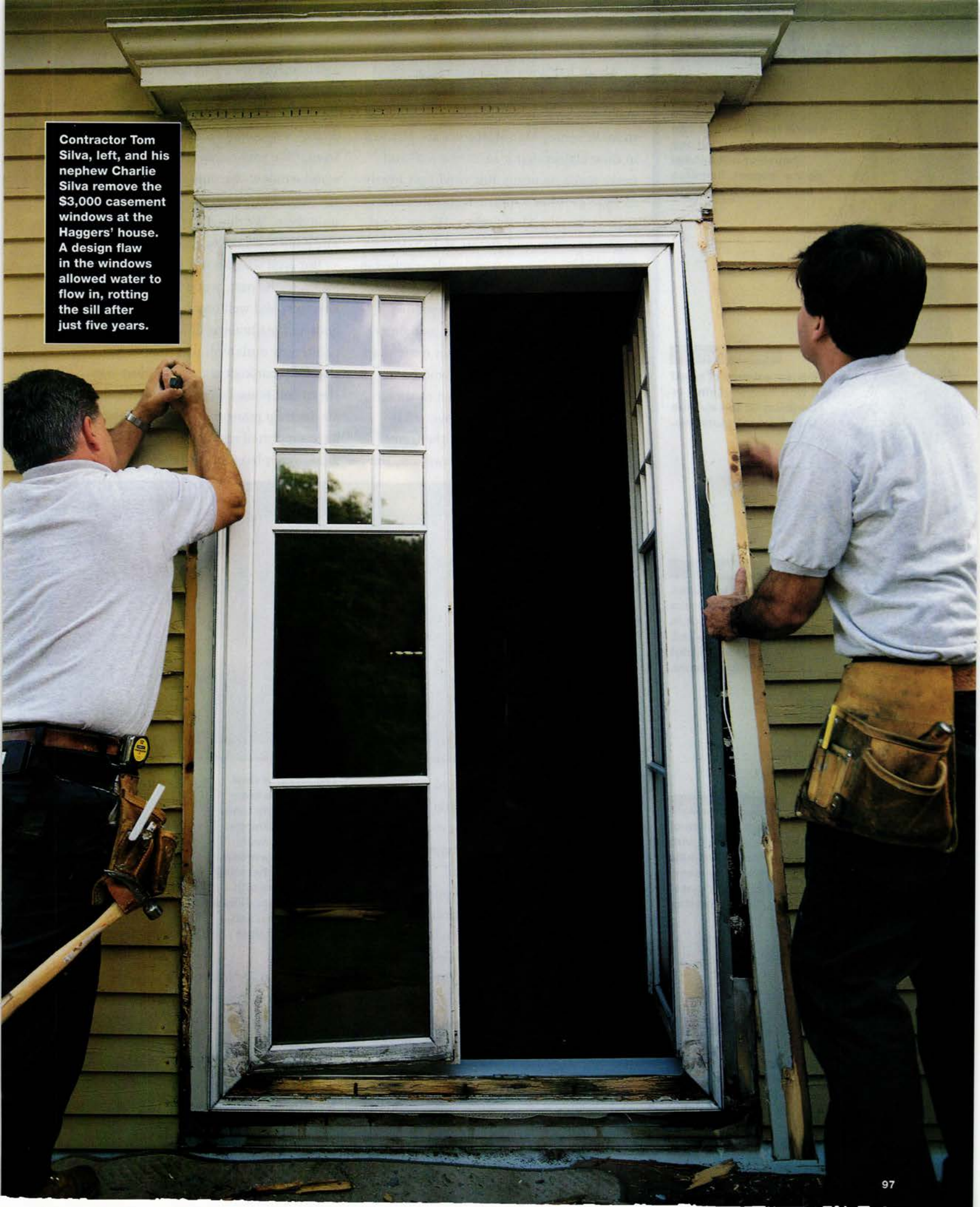
Their joy was short-lived. Within a year, the inside sills were wet. Worse, water seeped down through the ballroom's ceiling to the first floor, dribbling onto antique wallpaper and damaging trim around the front door. The Haggers called the window manufacturer's local dealer, who sent repairmen out several times. They tried everything—caulk, weatherstripping, even duct tape—to no avail. As the Haggers' frustration grew, they remembered that Tom had raised doubts about the design of the windows, with weep holes facing up instead of down, before he installed them. Finally, the dealer agreed to replace the replacement windows. When Tom arrived last September to do the work, he could only say, "Everything that could go wrong went wrong here."

Like many people, the Haggers thought that once they had installed new windows, they would never have to worry about them again. Even the cheapest replacement windows slide smoothly, latch securely and don't rattle in the wind. There's no putty to repair, no flaking lead paint to worry about and no hassle with storm windows. Consumers are inundated with advertisements from regional window companies that promise miracles. One brochure mailed to residents in upstate New York announces inexpensive "maintenance free" windows made of "sturdy vinyl, scientifically assembled to stay perfectly intact." Follow-up salesmen assure buyers their new windows "will not pit, rust or wear out."

Such claims have helped make replacement windows a $3 billion business. Last year, more than 22 million were sold in the United States. That's a million more windows than went into new houses. But many of those windows are built so poorly they will not last as long as the ones they replaced. There are fewer than 10 major window manufacturers in the United States, but there are more than 3,000 companies making windows. "If you and I wanted to make insulated glass...we could do it in our garage," says Bill Lingnell, a window-industry consultant in Texas.

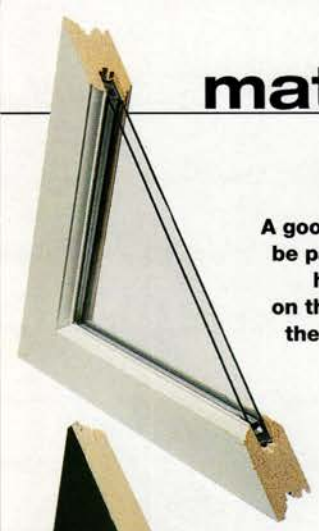
PHOTOGRAPHS BY KELLER & KELLER

STILL LIFES BY DARRIN HADDAD



Contractor Tom Silva, left, and his nephew Charlie Silva remove the $3,000 casement windows at the Haggers' house. A design flaw in the windows allowed water to flow in, rotting the sill after just five years.

materials



WOOD

A good insulator that can be painted to match any house or left natural on the interior. Requires the most maintenance.

CLAD WOOD

All the advantages of wood but with a layer of vinyl or aluminum on the outside to reduce maintenance.

VINYL

A good insulator. Maintenance-free. Shrinks in cold and expands in heat, so seals may fail. Look for fused, not screwed, corners.

FIBERGLASS

Exterior made of glass fibers mixed with polyester resin. Expands at the same rate as glass, minimizing leaks. Good insulator.

COMPOSITE

Exterior made of wood fibers and vinyl. More temperature-stable than vinyl alone. Good insulator.

About half the residential replacement windows sold in the United States are made of vinyl. At first glance, vinyl seems to make sense. Manufacturers are justified in their claims that it insulates well and never needs painting. But vinyl isn't nearly as rigid as other window-frame materials, such as wood and fiberglass. Worse, vinyl begins to soften and distort at 165 degrees Fahrenheit, a temperature easily reached in the space between a window and drapes on a sunny day. Although all window materials expand and contract as temperature rises and falls, vinyl moves more than twice as much as aluminum, wood and fiberglass. Vinyl expands seven times farther than glass with each degree. That action can pop seals between the frame and the glass. Andersen Corporation, the world's largest manufacturer of windows, has never made an all-vinyl window for sale in the United States. "Vinyl simply is not suitable for use on its own as a window material," says Mike Compeau, a spokesman for the company.

Last year, *Environmental Building News*, a newsletter for contractors and architects, evaluated all the framing options used in windows and advised readers to "avoid 100 percent vinyl window frames" because of their "durability problems."

Vinyl windows have been on the market for only 15 or 20 years. According to Hakim Elmahdy, the chief window expert for the Canadian government's Institute for Research in Construction, "There is not enough data or track record for these windows to say, yes, they will last 50 years."

Yet the demand for vinyl windows has doubled since 1989. They're inexpensive; as little as $78 will buy a 2-by-3-foot window, and families with terrible windows and not much money can easily conclude that the replacements are a good deal even if they don't last a decade.

"We won't spec a house with vinyl windows," says noted architect Robert A.M. Stern. "We won't even use a vinyl-over-wood window. We only use windows that are framed in wood. And we paint them or stain them. We don't leave a natural finish. The paint seals the windows."

But even wood is not without drawbacks. In the past, wood windows may have survived well because houses were built and maintained differently. Lead paint, now outlawed, was a flexible cladding that kept water out. Heat was cheap and houses were drafty—circulating air dried up moisture that might otherwise have supported rot funguses in wood. Radiators were placed under windows, helping to bake frames and sills dry.

The larger a vinyl window, the more it expands as temperatures change. That's why seals on this big window failed, but the small windows are still fog-free. Tom Silva's rule: No vinyl windows wider than 26 inches.

New materials, such as fiberglass and composites made of wood fibers and vinyl, seem promising. But their track record is short too. If there's one lesson to be learned about replacement windows, it's that new and promising doesn't always work out.

WITH SO MANY WORRISOME REPLACEMENT windows for sale, homeowners who hunt for bargain-basement deals may be setting themselves up for an expensive lesson. The

crew of *This Old House* has learned from experience that quality products are more economical in the long run. To sort your way through the maze of window options, consider following these steps:

First, find out if you can save your old windows at a reasonable cost. In Boston, David Liberty makes his living promoting the notion that it may be best to repair what you've got. "Some of these windows have lasted for a hundred years. If they're replaced, the replacements might wear out in just eight or ten years. I can fix the existing windows so they last another hundred years." For about $175, Liberty says he can often get a drafty, stubborn wood window to work smoothly again.

Think about doing the work yourself. Freeing a stuck window is sometimes as simple as cutting through paint layers with a utility knife. Replacing broken cords or sash weights is easier than it might seem, especially after doing it the first time. A neighbor who has already tackled this job might be a good coach. If you don't want to repair your own loose putty, Liberty suggests calling a painter.

Don't think of window replacement as a way to save a lot of money on heating or cooling costs. Research shows that old windows can be made virtually as energy efficient as new ones for less money. A Vermont state study last year funded by the National Park Service analyzed eight ways of upgrading windows, from adding metal weatherstripping and storm windows to putting in vinyl replacements. All achieved similar energy savings, but sticking with old windows proved to be as much as seven times cheaper.

window options

REPLACEMENT SASH

Gives an old window frame new movable parts. Suitable only if the frame is sound and square. Foam-backed sash liners block drafts and allow windows to tilt for cleaning.

INSULATED-GLASS INSERT

Fits into the existing sash after a bigger groove is cut in the wood. If multipane windows have muntins too thin for this groove, imitation spacers can be fitted in.

SECONDARY FRAME

With a new sash, fits into the space where the old sash used to be, so glass size is smaller. Appropriate when the existing frame is sound but not necessarily square.

COMPLETE REPLACEMENT

Like a new-house window. Unit is nailed to house framing, so existing trim must be removed. The only good option if existing window frame is decayed.

Second, decide if the entire window needs to be replaced. All that may be needed is new sash, the part that frames the glass and slides up and down in a double-hung window. Or you might need new sash combined with a secondary frame that fits inside the old window frame. This option works only if the existing window frame is sound, something a replacement company may fail to mention. "You can't put new windows into a frame that's rotted, or the rot will continue to grow and get into the structure of the house," Tom says.

Secondary frames with new sash are popular because they can be installed without prying up all the trim. A homeowner can do the job in less than an hour. But secondary frames may reduce overall glass area—sometimes by 15 percent. From the outside, the windows can look clunky, especially if older windows are nearby for comparison. And the loss of light may be noticeable if glass area is significantly reduced. "The space becomes duller and darker, not lighter," says Bill Rose, a researcher at the University of Illinois School of Architecture.

A partial window rebuild does not stop what may be the most significant source of drafts—air that sneaks in through gaps between the window and the rough opening in the house's framing. A 1995 study by the American Society for Testing and Materials found that such gaps account for up to 40 percent of a house's air leaks. To plug them, all the window trim must be removed. Then the spaces can be filled with low-expansion polyurethane foam or covered with casing tape (used to tape joints between sheets of insulated sheathing).

H_2O test **If joints aren't sealed, moisture can rot a wood window. To check for leakage, Tom taped a dam across the Haggers' new window and poured in water. It leaked, so he caulked the joint.**

Third, turn to a nationally known window manufacturer and compare warranties. A big company has a reputation to protect. Quality manufacturers tend to offer warranties for their windows, and they put their name on their products where it is visible even after installation. Because a typical house changes hands every seven or eight years, some manufacturers of low-quality windows offer warranties that seem too good to be true. Because the homeowner is likely to move before the windows fail, "you can offer a 20-, 30-, 50-year warranty if it's nontransferable," says Eric Jackson, a marketing manager for Tremco, a manufacturer of insulated-glass components. Labor to replace the window, often more costly than the window itself, may not be included.

Fourth, ask questions about insulated glass. About 90 percent of all replacement windows sold incorporate insulated glass, one of the most vulnerable parts of a modern window. Often called twin-pane or triple-pane, insulated glass consists of two or three panes held apart by desiccant-filled spacers and sealed on the outside with butyl rubber or silicone. All insulated glass will eventually fail because

no sealant stops all moisture. When the desiccant has absorbed all it can, the windows become cloudy. The Sealed Insulating Glass Manufacturers Association tracked 2,000 windows in a 15-year study. About 11 percent of the lowest-quality windows and 4 percent of the top-rated windows failed. The cause of nearly every problem was moisture next to the sealant.

Relatively simple manufacturing steps—supporting the glass on rubber blocks, drilling weep holes and sealing the inside edge so condensation can't flow into the glass pocket—minimize problems, but most of these measures can't be seen once the window is assembled. A buyer's best clue is a sticker indicating that a window meets the standards of the sealed glass association (less than a fourth of all insulated-glass makers are members). A new study tracking 17,000 windows with these labels has found only four failures in three years. Labels from the American Architectural Manufacturers Association and the American Society for Testing and Materials also indicate windows that should last. And think about buying single-pane glass windows with storm units: They are often equal in energy savings to windows that use insulated glass, and the storm unit will go a long way toward protecting the primary window.

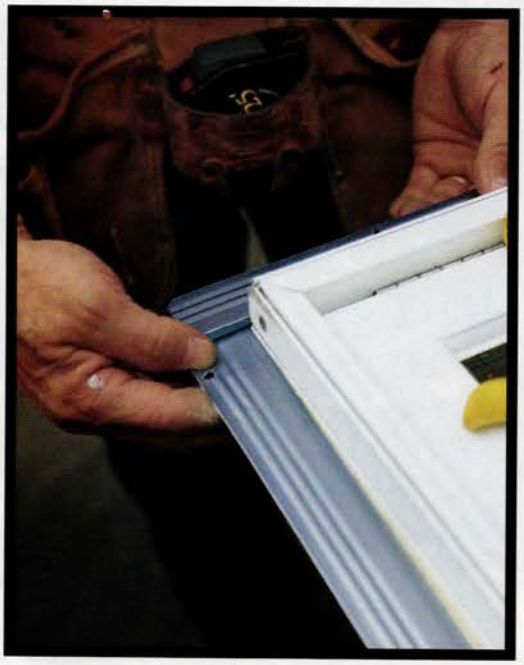
Fifth, keep a vigilant eye on your new windows. Homeowners should check regularly to see whether joints are opening up or the surface is bulging or becoming stained. If problems develop, the value of buying from a company that stands behind its products will be evident.

Tom Silva's father, Phil, was out of luck when wood rot got to a window in his eight-year-old house. Tom tried to track down the manufacturer for a replacement only to discover that the window came from a cut-rate lumberyard that used dozens of suppliers, usually the cheapest. No one knew who made the window.

The Haggers got their pair of new windows from a major manufacturer even though the one-year warranty had long expired. "It wasn't easy," Chris Hagger says; it might have been less trouble if he had called the manufacturer directly rather than the local dealer.

Hope Sage, who lives on an island in Maine, has nothing but praise for how another major manufacturer reacted when she noticed black powdery mildew on most of the 48 wood windows she and her husband bought for their retirement home 10 years ago. The company sent two people to investigate the problem and concluded the culprit was a tin-based preservative used for four years in the late 1980s. The preservative "just didn't do what we expected it to," says Gary Daniels, the manufacturer's director of corporate research. The company has since switched to an iodine-based product, but it is replacing windows for Sage and all other customers who complain about windows bought during that period, even though the one-year warranty expired long ago.

"Think wisely before choosing the brand," Tom says. "A company that sells windows should be able to point out the differences and discuss them. If one person is offering to put in the exact same windows but for a far lower price, ask why. What are they leaving out? You need to know, without waiting a year or two to see what problems develop down the line."



Install it right

A window won't last if it's surrounded by wet wood. Caulk on outside joints doesn't provide enough protection—it will eventually crack. So before he closes up a wall, Tom makes sure any water that gets in has an escape route.
ABOVE: Tom shields the wall under the Haggers' sill with a self-stick waterproofing that is usually used to prevent leaks on roofs.
LEFT: He aligns nailing flanges—strips of aluminum that connect the window to the wall—so that the top piece overlaps the side pieces.
BELOW: Tom plugs gaps around the window frame with low-expansion polyurethane foam, but goes easy on the trigger because too much foam could warp the window.

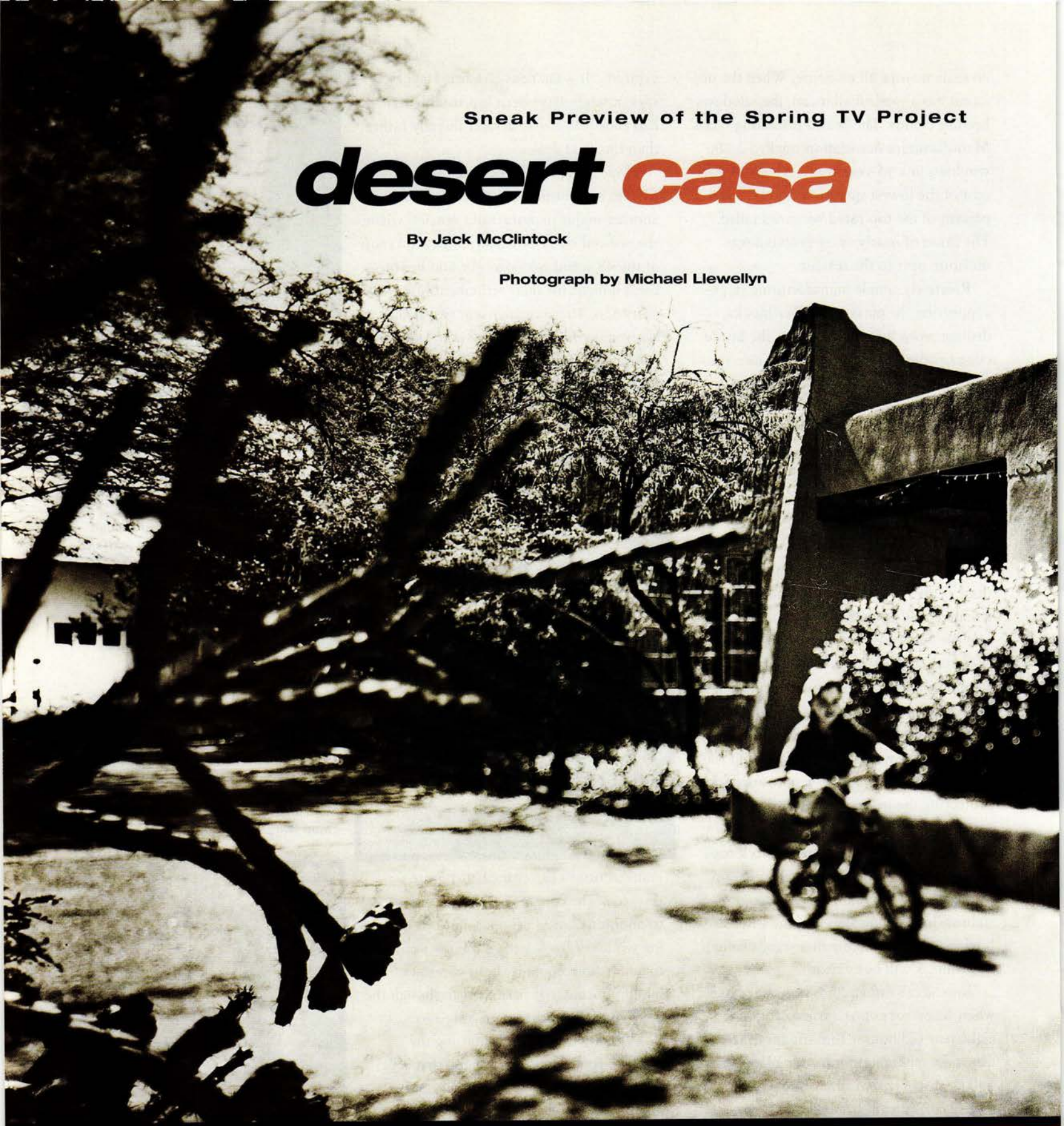
♦ *See Directory,* on page 113, *for details and sources*

Sneak Preview of the Spring TV Project

desert casa

By Jack McClintock

Photograph by Michael Llewellyn



TUCSON, ARIZONA, IS IN THE SONORAN DESERT—120,000 SQUARE MILES OF sand, stone and spiky gray-green vegetation. But the desert is in Tucson too. Under the hot sun, every yard is a cactus garden, with saguaro, yucca and ocotillo throwing sharp black shadows across the sand.

When *This Old House* moves its TV cameras from Nantucket to Tucson for the winter project, the change in atmosphere will be conspicuous—a leap from the often refined beauty of the East to the wild yet usually more subtle beauty of the West. The saguaro will supplant the cranberry. The green-corn tamale will replace broiled scrod.

Just 60 miles north of the Mexican border, Tucson is one of the oldest continuously inhabited settlements in the New World. From the chilies hanging in kitchens to the stucco on the adobe walls of houses, Indian,

Spanish and Mexican influences are everywhere. That's true of the house where Colleen and James Meigs have lived for 18 years. Built in 1930 in the Colonia Solana neighborhood, five minutes from downtown Tucson, it is charmingly eclectic, with the thick walls, rounded corners, compact rooms and terra-cotta patios that add up to Sonoran Pueblo Revival.

The lot is large enough—more than an acre—and the house so densely ringed by mature desert vegetation that Jim Meigs says it makes the city of 600,000 feel like a small town. The sun beats down 350 days a year, but humidity is low, evenings are cool, and house renovations, such as the one envisioned by the Meigses, often embrace plans for an outdoor kitchen. When the project is finished, the Meigses will invite friends to dine on a grand new patio and bask in desert air so clear it sparkles.

the hole story

It takes a lot of work to make a little bit

Drill bits look like simple creations of mass production, but behind every one is a complex process that turns raw steel into a precision instrument. Here's how an auger like the one at left is made.

The path from billet to bit begins with clean steel, free of contaminants such as sulphur that weaken the cutting edge. "Good steel," says Anthony Hinch, general manager of Fisch Precision Tools in Clayville, Pennsylvania, "comes from Europe, Scandinavia, America and Japan."

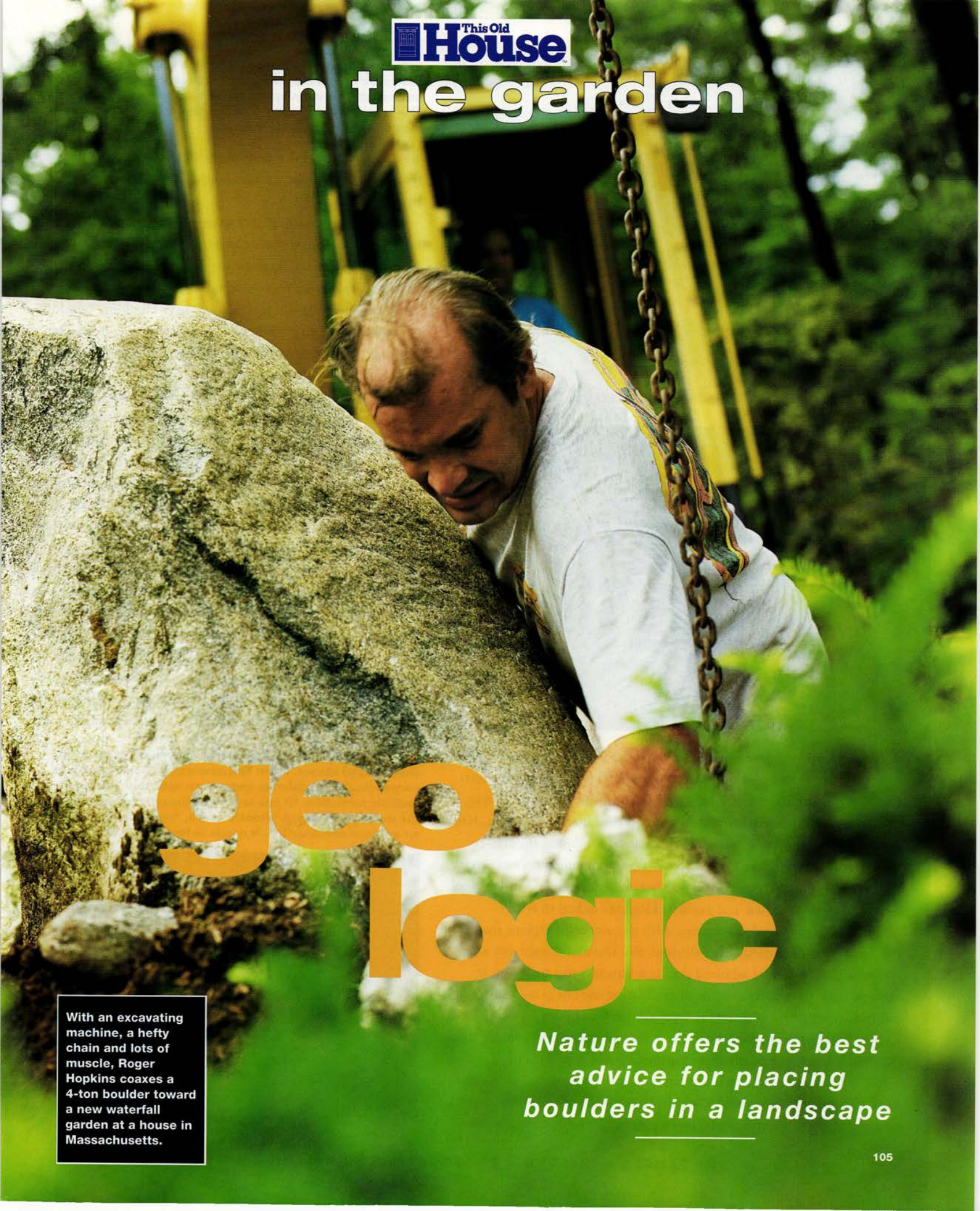
Recipes for bit steel vary with the end use: Woodworking rarely needs anything harder than chrome-vanadium steel. Metal boring requires high-speed steel, which has more chromium and molybdenum so the tip won't lose its temper in the high heat of drilling. Oddly, that recipe can be defeated by plastic and particleboard. They require steel with tungsten carbide, which hardens it an additional 30 percent.

At the factory, bits are forged from bars of steel in the hell of the hammer shop. There, after a short piece is heated to a state of elasticity at 1,700 degrees Fahrenheit and sandwiched between forging dies, huge trip-hammers pound the dies together to form the basic shape. The alternative to forging is investment casting, in which a mold is built up around a wax bit. When molten metal is poured in, the wax melts and is completely replaced by steel.

After forging or casting, rough-formed bits must cool, though not too quickly or the steel becomes brittle. Then, after a quick tumble in silica or another abrasive to remove flakes of metal and oxides, computers take over. They control mills and lathes that refine the basic shape into a high-tolerance piece. To pass muster at the Fisch factory, says Hinch, the concentricity (roundness) of a 1-inch bit must be within .0002-inch of a perfect circle.

More heat-treating follows to control the metal's hardness. Then, for some bits, people take over for a task that computers haven't mastered, using grinders to hone the cutting edges to near razor sharpness. For the trip to the store, the bits are protected in plastic pouches and wooden cases. In the hands of their new owners, they still need that protection. "The worst thing you can possibly do," Hinch says, "is just throw them in a drawer."

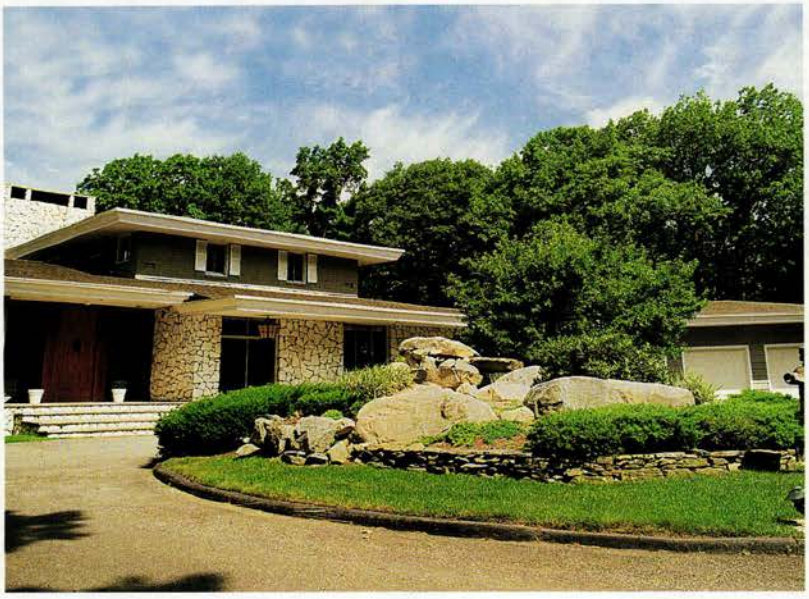
PHOTOGRAPH BY MARK WEISS

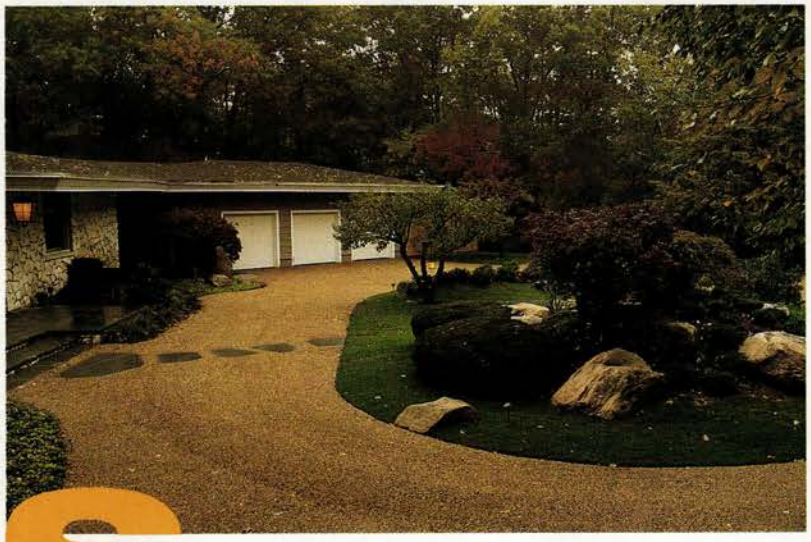


geo logic

Nature offers the best advice for placing boulders in a landscape

With an excavating machine, a hefty chain and lots of muscle, Roger Hopkins coaxes a 4-ton boulder toward a new waterfall garden at a house in Massachusetts.





LEFT: The Duvalls' old landscape design was in sync with neither the house nor its surroundings. LOWER LEFT: The new Japanese-inspired design plays up the house's setting on a rocky hilltop. The scheme is in keeping with the prairie-style structure, which includes many Japanese features.

Someone must have loved the waterfall in front of Bill and Joyce Duvall's house in Sudbury, Massachusetts. But Roger Hopkins, the familiar stonemason from *This Old House*, winced each time he drove his son there to visit the Duvalls' son. Nothing about the landscape made geologic sense. A mammoth, platter-shaped stone was perched precariously on top of smaller rocks, and water that seemed to come from nowhere cascaded over it into a pool surrounded by flat lawn and asphalt. Hopkins itched to fix it.

One afternoon, while socializing with the owners, Hopkins made his bid. In the brainstorming that followed, Bill Duvall brought out a picture of a garden he had admired during a business trip to Japan. It showed huge stones rising from an undulating oval of grass and spilling out onto a sea of raked gravel in front of the Adachi Art Museum in Kyoto. Without being too literal, the scene mimicked what nature might do. And it suggested possibilities for the Duvalls' own oval of grass.

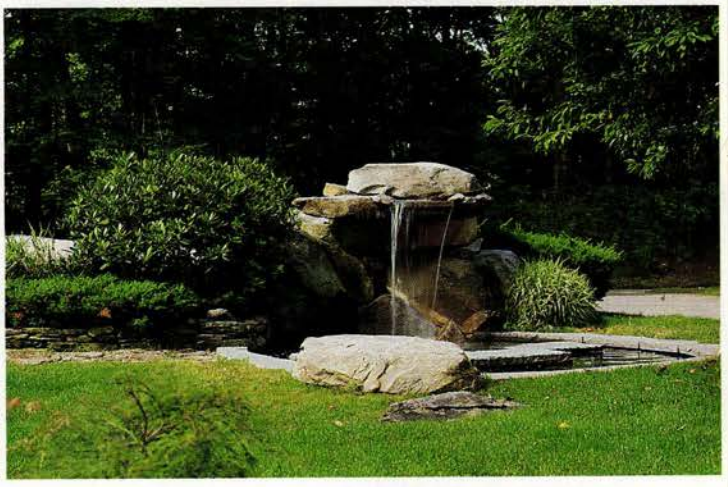
"The Japanese follow two principles in their approach," Hopkins says. "First, they use stone as the primary element of landscape, with everything else—water and plants—wrapping around it. Second, they create gardens by taking the elements of nature and arranging them into simplified, abstract landscapes. Not fussy or decorative, but scenic."

Gardens filled with plants alone are common, but vistas built with water and stone can be awesome. Placing stone so it serves as the basis of a landscape is neither easy nor cheap. "To get that idea across, even reduced to a small-scale garden, the stone has to be big—at least a ton," says Hopkins. "And it's got to be placed right. It has to look rooted, like it has seen the centuries pass by. It can't look like your 16-year-old put it down at the edge of the driveway."

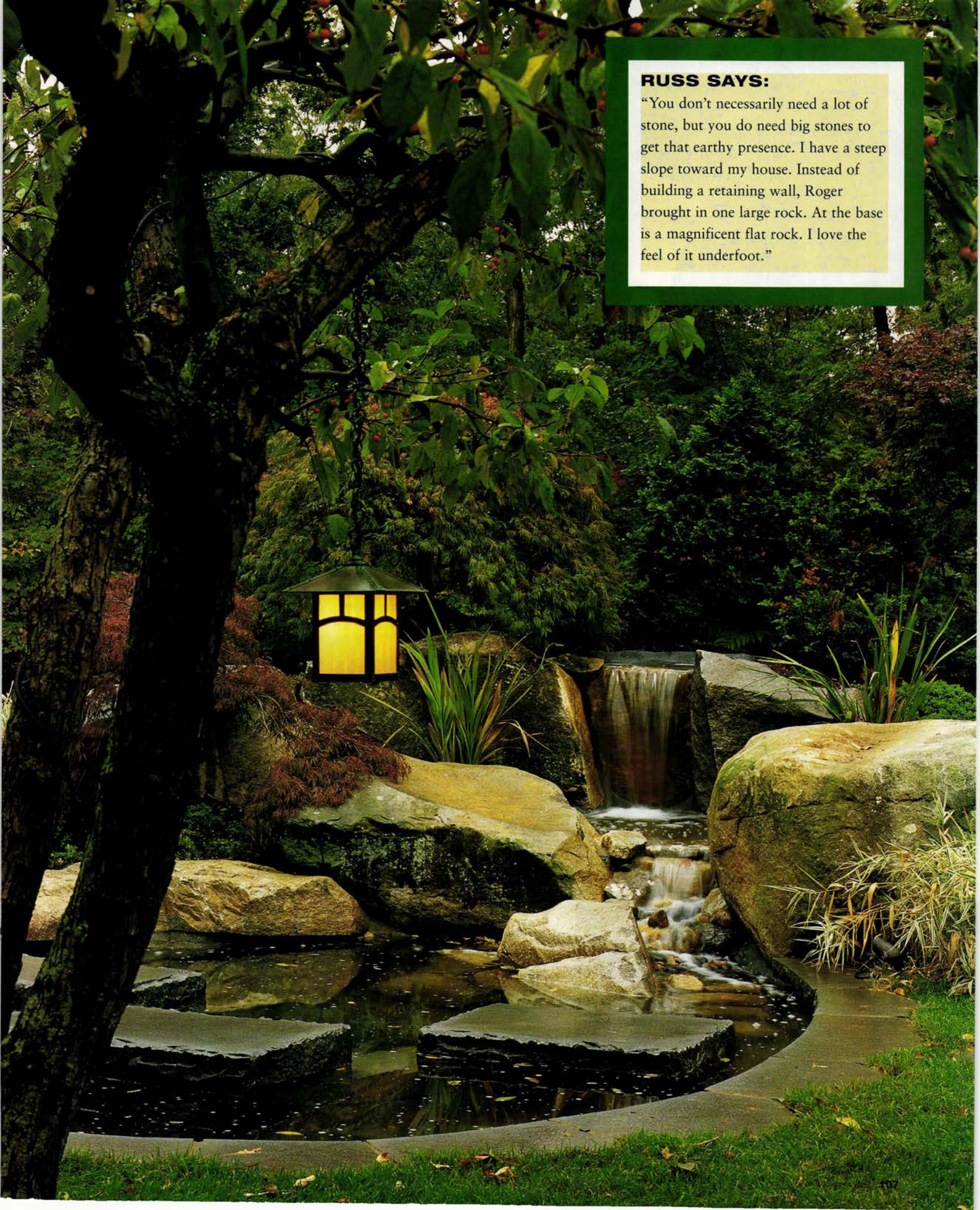
The Duvalls' property had plenty of boulders unearthed when the house was built. But even after being out in the weather for 40 years, they looked too fresh to suggest anything but rugged mountaintops. The couple wanted rocks that looked peaceful and contemplative, as if they had been there 10,000 years. Hopkins prospected in the Duvalls' woods, pausing at every boulder. "I think about how it should read—horizontal, vertical? Where's its center of gravity? I don't make any final decisions until I've seen many. It costs a lot to retrieve beautiful stone in the wild, so I give high marks to any I find lying near a road." A stonemason with a mini-dozer may charge $750 to $1,000 a day. Add an excavator with an operator to run it, and the fee goes up by $850. The stones themselves can cost several hundred dollars apiece at a stone yard.

On this job, Hopkins picked out a few stones in the woods, found others along the drive and recycled some from the old

BELOW: The old waterfall flowed over an unnatural stack of sharp-edged stones. RIGHT: The new waterfall uses matched perpendicular headstones and a worn spill stone in a more realistic formation. "It has to look as though the water had done the work on the stone," Hopkins says, "even though we know it's an artificial construction. It needs to look totally convincing."



BY PAMELA HARTFORD PHOTOGRAPHS BY KELLER & KELLER



RUSS SAYS:

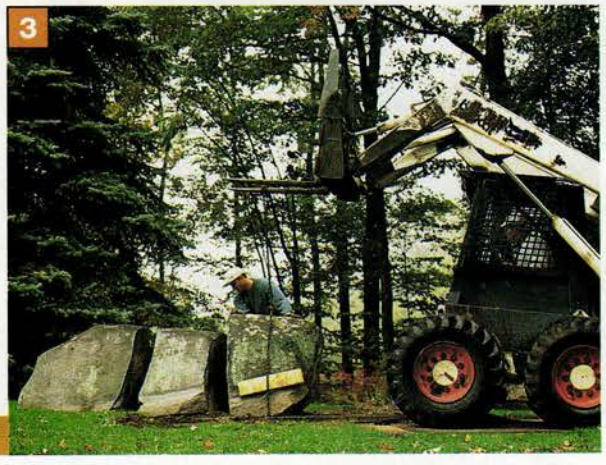
"You don't necessarily need a lot of stone, but you do need big stones to get that earthy presence. I have a steep slope toward my house. Instead of building a retaining wall, Roger brought in one large rock. At the base is a magnificent flat rock. I love the feel of it underfoot."

READING A ROCK Hopkins studies rocks for clues about how they should be placed. ABOVE: When he retrieves a lichen-covered boulder from a pile on the Duvalls' property, he learns that "the glacial striations indicate the rock was laying horizontally, and that's how it needs to be reset. The dark line of the soil showed me how deeply I wanted to set it. I wanted only the top of the rock to show—like a skullcap, with the rest buried. Even if you can't see the entire stone, you want to give the impresssion of a great mass of stone underground, like the tip of an iceberg. It gives a very settled feeling." BELOW: The rock that he took off the top of the old waterfall had been set wrong side up—its aged side down. Flipped the right way, it looks like the back of a large tortoise, its round surface mimicking the curve of the ground around it. The chipped layers told Hopkins it was metamorphosed sedimentary rock, which is formed in horizontal bands. "Neither of these rocks would work if they were set vertically," he says.

SWINGING STONE

1. "Now this is gorgeous!" Hopkins says when he sees a three-part boulder in the woods. A glacier had sheared it from its base and shoved a little stone underneath. Then the top piece split under its own weight. Hopkins envisions the pieces reassembled in front of the Duvalls' house.

2. His dozer can lift only 2½-ton rocks, and the largest of these pieces weighs about 4 tons. So Hopkins calls in an excavator driven by his friend Herb Brockert. With plywood laid down to protect the lawn, Brockert positions the machine as close as he can get, but it's still 12 feet and a lilac hedge away. One piece at a time, Hopkins and Brockert hook a simple chain sling around the stone, then attach the other end of the chain to the excavator's bucket. Lifting a boulder in a single wrap of chain requires finding its center of balance. "It's like picking up an odd-shaped object with two fingers," says Hopkins. Handling the extended bucket like a fly-fishing rod, Brockert lifts each stone up the hillside and over the hedge. Hopkins stays safely away. "A four-ton boulder will crush you like a gnat. Never, never position yourself between a rock and a hard place. Always have an open exit, preferably uphill."



3. Because the pieces are nearly flat on the bottom, their new bed needs little preparation. After a few ups and downs, the stones are aligned almost as they began.

landscape. He positioned several near the front of the lawn and bermed up the earth behind them, making the three-bay attached garage seem to disappear. The waterfall was rebuilt to look as if the water had actually cut through the granite stones. Hopkins restyled the pond and laid stepping stones across it to create a path to the far side of the driveway. Above the waterfall, he placed two mature Japanese cutleaf maples; their gnarly trunks look as though they've aged with the rocks. His final adjustment was to hide the asphalt driveway under a layer of ⅜-inch pea gravel. Suddenly, the land looked like what it once was: a rocky hilltop. But with quite a lot of style.

♦ *See Directory,* on page 113, *for details and sources*

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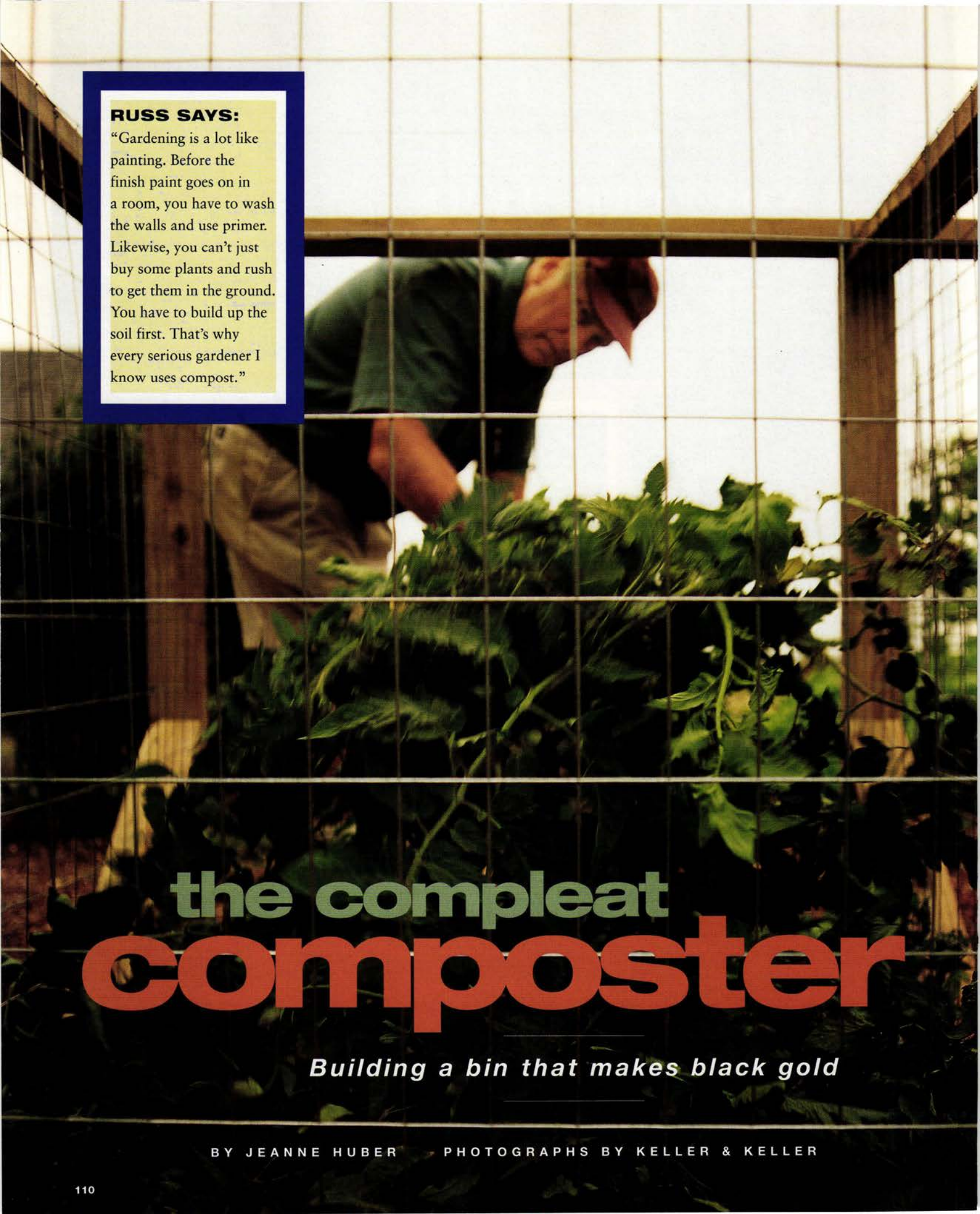


RUSS SAYS:
"Gardening is a lot like painting. Before the finish paint goes on in a room, you have to wash the walls and use primer. Likewise, you can't just buy some plants and rush to get them in the ground. You have to build up the soil first. That's why every serious gardener I know uses compost."

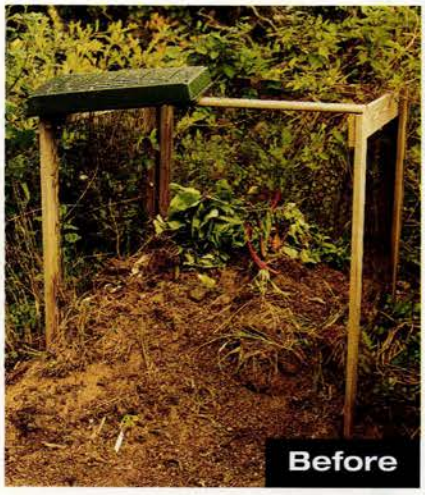
the compleat composter

Building a bin that makes black gold

BY JEANNE HUBER PHOTOGRAPHS BY KELLER & KELLER

Compost shouldn't be a heap of trouble. "Some gardening experts insist you have to go through a lot of time-consuming steps—turn, add fertilizers, water," Russ Morash says. "To me, that's only adding unnecessary chores to an already labor-intensive hobby." Experience has taught Russ that making the crumbly black organic matter he uses to nourish plants and help keep soil moist and loose is really quite simple. Just stack up the garden and kitchen scraps, be patient and voilà.

For years, Russ made do with a single-pile compost bin at his summer home on Nantucket. Each spring, he would set the top layers of the pile aside, shovel out the compost and then put back the top material. But he found it difficult to harvest compost throughout the season. And the pile was ugly.


Before

So when master carpenter Norm Abram offered to make him a new compost bin, Russ was delighted. Norm designed and built one with twin compartments, similar to the setup Russ has at his home on the Massachusetts mainland. Each bin is a generous four feet deep and wide. The wire mesh sides of the compartments let in plenty of air so the piles won't smell, and the front top braces swing aside when it's time to shovel out the riches. Best of all, the bin is quick and easy to make with only a few tools: a circular saw, a drill, a hammer, a square and a tape measure.


After

Now Russ can sit back and let nature do most of the work. "You just have this year's pile and last year's pile," he says. One pile gets all the weary petunia plants, frost-killed tomato vines and windfall apples his yard can produce. After a year, Russ lifts off the top layers and uses them to start a new pile. Then he digs deep into the old pile, where plant parts are no longer identifiable, and begins to harvest his ore, sifting out undigested material with a coarse-mesh screen before carefully parceling the compost over his flower beds. Smoothed out in the springtime, just after he sets out new seedlings, the rich humus makes the beds look freshly tilled. Russ saves some for houseplants that need a boost. "One of my gardening secrets is to repot using half compost, half potting soil. The plant will think it's in the finest four-star restaurant."

♦ *See Directory,* on page 113, *for details and sources*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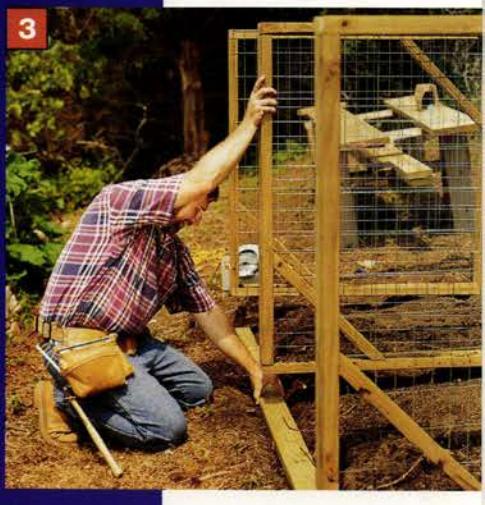
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4

DOUBLING UP

1. The key structural element of Norm's twin-compartment compost bin is a back frame of pressure-treated pine. Top and bottom pieces are 96 inches long; the three uprights are each 45 inches long. Norm secures them with 3-inch galvanized deck screws and braces the opposing corners with 2x4s cut at a 45-degree angle. The braces measure 22⅝ inches, long point to long point. Before installing the final screws in the braces, he checks to see that the diagonal distances are equal, ensuring the frame is square. 2. Three smaller frames comprise the ends and middle; tops and bottoms are 48 inches long. Norm staples welded wire fencing to the insides of the back and sides, then screws these sections together. To make room for his drill, he doesn't attach wire to both sides of the middle section until it's screwed to the back. 3. Norm eases in the 96-inch-long front bottom rail and screws it in place. 4. With the front top rail cut in half at an angle that allows both pieces to rest on the middle post, Norm slips carriage bolts into oversize holes. The bolts slide out when it's time to pivot open the rails and harvest the compost.

pay dirt

Politically Proper Poaching

Dedicated gardeners cringe when they hear about yards decorated with wildflowers dug from forests. Poachers have just about wiped out some varieties of lady's slipper orchids and other prized plants. But when bulldozers are about to scrape a site clean for development, harvesting what's growing becomes a wildflower rescue mission. In Milwaukee, Wisconsin, a group called Wild Ones Natural Landscapers went into a woods where 11 homes will be built and came out with joe-pye weed, bottle gentian and lots more. Wild One Judy Connelly dug a treasure of 20 red-twig and gray dogwoods. "Last year I bought four at a nursery and it came to more than $100," she says. Winter is a good time to organize a rescue for early spring, when plants will be dormant and likely to survive a move. "We're always careful to get permission first," says Connelly.

Bend a Tree

Bentwood—as in rockers—is just that: wood bent into position. *How to Make Romantic Bentwood Garden Trellises*, by herbalist Jim Long, is a charming booklet full of plans for wiring saplings and branches into trellises and other garden trimmings. Find materials by pruning fruit trees—in warm climates, this is the season. No orchard? Make friends with a tree trimmer or haunt a local nursery.

Good Spuds

A wicked winter day is the perfect time to sit by the fire and peruse seed catalogs. Russ Morash suggests looking for Red Gold potatoes, a red-skinned variety with melon-colored flesh. "I get hungry just thinking about it," he says. He also recommends Charlotte, a standard potato that's especially sweet.

Secret garden

Snow, sleet and dark of night no longer need keep gardeners from their favorite pursuit. Through the wonders of the Internet, anyone can direct a robotic arm to plant and water seeds in a six-foot plot of dirt in Linz, Austria. First-time visitors to the garden's Web site get a password that allows them to water a section of the plot. After racking up 100 hits, they get to plant a radish, marigold, phlox or other seed from a list that changes each month. And although there's no strolling with early-morning coffee to check for new shoots, visitors can view snapshots of the plants as they flourish, thanks to a constant 68 degrees and 15 hours of light each day. The garden started at the University of Southern California, where engineers designed it as a project in Internet robotics. So far, a virtual community of 3,000 has taken good care of all the seeds planted, with no over or underwatering. Overgrowth is inevitable, however, and the soil is turned about twice a year, says codirector Ken Goldberg. You can visit the Net nursery at http://www.usc.edu/dept/garden/.

See Like a Pro

These new shades let novice gardeners tell at a glance which plants are thriving and which are sick. The lenses block green, so chlorophyll-rich healthy plants appear black while bugs and rot are pretty in pink—or other bright colors. One thing's certain: Mildew and whiteflies look better in neon.

◆ *See Directory,* on page 113, *for details and sources*

WILDFLOWERS BY DAN MORRILL; GARDEN GLASSES BY KELLER & KELLER; VIRTUAL GARDEN BY ROBERT WEDEMEYER

Directory

A resource guide for the home and garden

EXTRAS *pp. 22-29*

p. 22—**Tape:** Scotchmate hook and loop fastening system, 1" x 4.9 yds; in bulk only; *3M Construction & Home Improvement Markets Div., 3M Center, Building 223-4S-01, St. Paul, MN 55144; 800-480-0611;* polyethylene tape, #NPT28, 2" x 36 yds; $10; *A. M. Leonard, Inc., 241 Fox Dr., Piqua, OH 45356-0816; 800-543-8955;* Scotch metal duct tape: 1½" x 10 yds; $7; Scotch double-sided foam mounting tape, 1" x 50" and ½" x 75"; $2; Scotch self-bonding linerless rubber splicing tape, ¾" x 5 yds, available in bulk only; Scotch professional indoor/ outdoor carpet-seaming tape, 2½ " x 5 yds; $5-$6;*3M Construction & Home Improvement Markets Div.;* industrial-grade cloth duct tape, #6B-28802, 2" x 60 yds; in 7 colors; $7; *Lab Safety Supply Inc., Box 1368, Janesville, WI 53546; 800-356-0783;* red sheathing siding tape, #585CW2, 1⅞" x 72 yds, $8; *Venture Tape, 30 Commerce Rd., Box 384, Rockland, MA 02370; 800-343-1076;* Duo-Stick double-sided painter's tape, 1½" x 36 yds; $8; *Daubert Coated Products, Inc., 1 Westbrook Center, Westchester, IL 60154; 708-409-5100;* Scotch vinyl electrical tape, ¾" x 22 yds; $3; Scotch patch & repair tape, discontinued; Scotch reinforced outdoor carpet tape, 1⅞ " x 13 yds; $6-7; *3M Construction & Home Improvement Markets Div.*

p. 23—**Bridges:** Francois Chouteau and Havana bridges, Harrington & Cortelyou, Inc., consulting engineers, *127 W. 10th St., Kansas City, MO. 64105; 816-421-8386.*

p. 24—**Faux baseboard:** Wiremold, Access 5000, $8 per lineal ft., *The Wiremold Co., 60 Woodlawn St., Box 332500, W. Hartford, CT 06133-2500; 800-621-0049.* **Levolution:** basic system, $249; 12-in. section, $43; T-square, 14-in. wide, $23; *Levolution LLC, 810 S. Main St., Hailey, ID 83333; 888-475-3835.*

p. 25—**Shutoff valves:** stop valve, $5.50; *NIBCO Inc., 1516 Middlebury St., Elkhart, IN 46516; 800-234-0227;* ball valve, Apollo #7010301 ½-in. threaded, $7; *Conbraco Industries, Inc., Box 247, Matthews, NC 28105; 704-841-6000;* gate valve, $8; *NIBCO.* **Motor City Blight Busters:** *Box 19654, Detroit, MI 48219; 313-255-4355.*

p. 28—**Left-handed circular saw:** #743, $135; *Porter-Cable, 4825 Highway 45 N., Box 2468, Jackson, TN 38302; 800-321-9443.* ***The Architecture of Frank Lloyd Wright:*** by Neil Levine, 1996, 544 pp., $85; *Princeton University Press, 41 Williams St., Princeton, NJ 08540; 800-777-4726.*

p. 29—**Storefront Conversions:** *Converting Storefronts to Housing: An Illustrated Guide*, 1996, 90 pp., $5; *Chicago Dept. of Planning and Development, 121 N. LaSalle St., Room 1000, Chicago, IL* 60202; *312-744-4190.* **Graffiti: Further reading:** "Graffiti Removal by Laser," *Science & Technology Review,* April 1996, reprint, and "Technical information appendix for laser-based coating removal," available free, *ICF Technology Development Program, Lawrence Livermore National Laboratory, Livermore, CA; 510-422-5360.* **Pitch hood:** $16, *Designs by Katherine, 21 Autumn Lane, Reading, MA 01867; 617-396-5667* *(continued)*

TRAVIS RUSE

Directory

SNOWBLOWERS *pp. 30-34*

Two-stage snowblower: #828-D, $1,549; *John Deere & Co., Commercial and Consumer Equipment Div., 4401 Bland Rd., Raleigh, NC 27626; 800-537-8233.* **Single-stage snowblower:** #ST521, $500 (also available with electric start, ST52IE, $580); *Husqvarna Forest & Garden Co., 9006 Perimeter Woods Dr., Charlotte, NC 28216; 800-487-5962.* **Lawn-Boy SnowStick:** #120R, $190; **PowerShovel:** #38310, $105; *The Toro Co., Consumer Div., 8111 Lyndale Ave. S., Bloomington, MN 55420; 800 237-2654.*

Our thanks to: Chris Geryk, *Chris & Ed's Small Engine, 1 Depot St., Florence, MA 01060; 413 584-1278.*

CHISELS *pp. 36-40*

Swiss-Made bench chisel: #05T22, 1", $24; *Woodcraft, 210 Wood County Industrial Park, Box 1686, Parkersburg, WV 26102; 800-225-1153.* **Marples mortise chisel:** #10S11.03, ⅛", $21; *Garrett Wade Co., 161 Ave. of the Americas, New York, NY 10013; 800-221-2942.* **Mokume cabinetmaker's chisel:** #02.307.30, 1¼", $120; *The Japan Woodworker, 1731 Clement Ave., Alameda, CA 94501; 800-537-7820.* **Marples Blue Chip chisel:** #10S02.04, ¼", $12; *Garrett Wade Co.* **Straight double-bevel chisel:** #05A06, 25 mm, $33.50; *Woodcraft.* **Cabinetmaker's short-bladed crank-necked chisel:** #95S01.03, ¼", $36; *Garrett Wade Co.*

TIN CEILING *pp. 43-45*

Filler: #201, tin-plated sheet steel, 2 x 4 ft., $20; **Metal ceilings:** #213, tin-plated sheet steel, 12-in. multiple plate, 2 x 4 ft., $21; *W.F. Norman Corp., Box 323, Nevada, MO 64772; 800-641-4038;* #2410, tin-plated sheet steel, 12-in. multiple plate, 2 x 4 ft., $16; #1209, brass, 12-in. multiple plate, 2 x 4 ft., $40; *Chelsea Decorative Metal Co., 9603 Moonlight Dr., Houston, TX 77096; 713-721-9200;* #503, copper, 24-in. multiple plate, 2 x 4 ft., $30; #321, prepainted white, 12-in. multiple plate, 2 x 4 ft., $28; *AA-Abbingdon Affiliates Inc., 2149-51 Utica Ave., Brooklyn, NY 11234; 718-258-8333;* #162, tin-plated sheet steel, 24-in. multiple plate, 2 x 2 ft., $14; *W. F. Norman Corp.* **Cornices:** #160, tin-plated sheet steel, 4 ft., $12; #167, tin-plated sheet steel, 4 ft., $10.50; #254, tin-plated sheet steel, 4 ft., $10; *W. F. Norman Corp.* #802, steel, 4 ft., $9; *AA-Abbingdon Affiliates Inc.*

Our thanks to: Ric Emery and Joseph Topham, *Death and Resurrection Co., Nantucket, MA; 508-228-0551.*

GLOVES *pp. 47-49*

Heat resistant: ZetexPlus, #6B-1915-2ZP, silica fabric, one size, $48; **Ultra cold and heat resistant:** Cryo-Gloves (mid-arm length), #6B-5932, $94; **Heat, cut and liquid resistant:** Golden Needles Armordillo gloves, #6B-7715, Kevlar aramid fiber, $15; **Cut resistant:** Mesh protective glove with cuff, #6B-9843, $103; **Flame, heat and puncture resistant:** Backdraft firefighter's gloves, #6B-30235, $70; **WhiZard Merlin urethane-coated cut-resistant under-gloves:** #6B-28944, $22; **Ansell Edmont Oil Tuf terry cloth/nitrile gloves with safety cuff:** #6B-31173, $7; *Lab Safety Supply, Box 1368, Janesville, WI 53547; 800-356-0783.* **Shoulder clute gloves:** #2020, leather palm with fabric back, $15 per dozen; **Therma-Tek with 3-in. safety cuff:** #2260, $57 per dozen; *Smith of Galeton Gloves Inc., 66 Sherman St., Box 215, Galeton, PA 16922; 800-221-0570.* **Unlined work gloves:** #310, suede pigskin, $21.50 for women's; $22.50 for men's; *Womanswork, Box 543, York, ME 03909; 800-639-2709.* **Wells Lamont Grips puncture- and cut-resistant gloves:** #6B-24826, size large only, $25; *Lab Safety Supply.*

POWDER ROOM *pp. 50-52*

Floor tile: One-inch unglazed white hex mosaic tile, #A13, $4.50 per sq. ft.; *American Olean Tile Co. (a division of DAL Tile Int'l), National Order Center, 1000 Cannon Ave., Lansdale, PA 19446; 215-393-2898.* **Wall tile:** Bright White subway tile, $10 per sq. ft.; **Decorative tile strip:** Countryside ribbon strip, $9 per six-inch-long strip; **Decorative tile trim:** Albion, $5 per six-inch-long strip; imported from England exclusively by *Shep Brown Assoc. Inc., 24 Cummings Park, Woburn, MA 01801; 617-935-8080.* **Countertop:** Arctic White Surell, cut to order, prices vary; *Formica Corp., 10155 Reading Rd., Cincinnati, OH 45241; 800-367-6422.* **Undermount sink:** Provincial #K14194, $802; **Toilet:** Revival Lite #K3455, $426; **Faucet:** Antique single control, #K139, polished brass, $427; *Kohler Co., 444 Highland Drive, Kohler, WI 53044; 414-457-4441.* **Vanity:** Brandywine recessed, Nordic white finish on maple, $1,109; *Wood-Mode, 1 Second St., Kreamer, PA 17833; 717-374-2711.*

Our thanks to: David Goodman, *D. Goodman Ceramic Tile, Nantucket, MA 02554; 508-228-4325.*

FOR SALE BY OWNER *pp. 55-56*

For more information: United Homeowners Association, *1511 K St., NW, Suite 326, Washington, DC 20005; 888-373-3842; E-mail: UHAHQ@aol.com; Web site: http://www.UHA.org*

Further reading: *Real Estate Agents and Their Dirty Little Tricks,* by Kelly Yarbrough, 167 pp., 1995, $5.95; *Great Quotations Inc., 1967 Quincy Ct., Glendale Heights, IL 60139; 800-354-4889. The For Sale By Owner Kit,* by Robert Irwin, 199 pp., 1995, $15.95; *Dearborn Financial Publishing, Inc., 155 N. Wacker Dr., Chicago, IL; 800-621-9621.*

NANTUCKET FINALE *pp. 62-69*

Heat pump: Climate Master Geo-Thermal Heat Pumps, *Box 25788, Oklahoma City, OK 73125; 800-477-8656.* **Well drilling:** J.M. Ramos, Inc., *81 Orange St., Nantucket, MA 02554; 508-228-3542.* **Windows:** Kolbe & Kolbe Millwork Co., Inc., *1323 S. 11th Ave., Wausau, WI 54401; 800-299-9747.* **Red-cedar roof shingles:** Liberty Cedar, *535 Liberty Lane, W. Kingston, RI 02892; 800-882-3327.* **White-cedar sidewall shingles:** Maibec Industries Inc., *660 Rue Lenoir, Ste.-Foy, Quebec, Canada G1X 3W3; 418-653-5280.* **Ipe Brazilian hardwood decking:** New England Wholesale Hardwoods, *Box 534, Pine Plains, NY 12567; 800-343-6394.* **Kitchen, bath, study and family-room cabinetry:** Wood-Mode Custom Cabinetry, *1 Second St., Kreamer, PA 17833; 717-374-2711* **Granite countertops:** Terra Nova Marble & Granite, Inc., *171 Clay Pond Rd., Bourne, MA 02532; 508-759-1526.* **Welsh quarry tiles:** Dist. by Shep Brown Assoc. Inc., *24 Cummings Park, Woburn, MA 01801; 617-935-8080.* **Wall-bed unit:** Sico North America Inc., *7525 Cahill Rd., Box 1169, Minneapolis, MN 55440; 800-328-6138.* **Engineered wood flooring:** Harris-Tarkett Inc., *Box 300, 2225 Eddie Williams Rd., Johnson City, TN 37605-0300; 800-842-7816.*

SLATE *pp. 70-73*

Our thanks to: Hank Groff, *Henry Groff Builder Inc., 6820 Donats Peak Rd., New Tripoli, PA 18066; 610-756-6596.* Peter J. Papay, president, *Penn Big Bed Slate Co., 8450 Brown St., Slatedale, PA 18080; 610-767-4601.*

PRICES SHOWN ARE MANUFACTURERS' SUGGESTED RETAIL PRICES AT PRESS TIME OR THE AMOUNT *THIS OLD HOUSE* ACTUALLY PAID AT RETAIL. PRICES, PRODUCT NUMBERS AND AVAILABILITY MAY CHANGE AT ANY TIME.

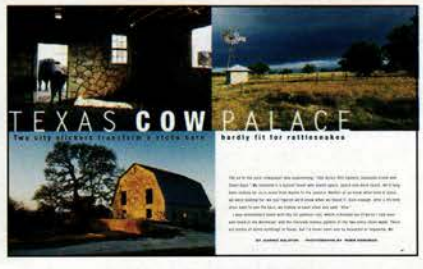
Directory

RUMFORD *pp. 74-79*


back to the future
fireplace

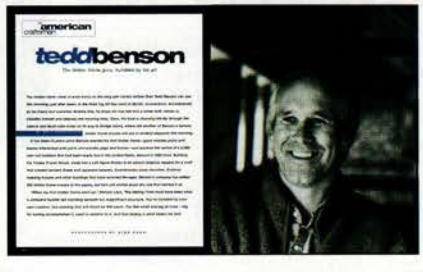
Rumford-style components: about $1,000 per set (price varies with size and freight costs); *Superior Clay Corp., Box 352, Uhrichsville, OH 44683; 800-848-6166.* Washington distributor: *Mutual Materials, 605 119th Ave. NE, Bellevue, WA 98005; 800-477-3008.* **Dampers:** $48 to $90 for standard fireplace openings; *K & W Mfg. Co., 23107 Temescal Canyon Rd., Corona, CA 91719; 909-277-3300.* **Glass doors and combustion air systems:** Lopez Quarries Masonry Heaters, *111 Barbara Lane, Everitt, WA 98203; 206-353-8963.* **Mantel:** The "Buckley," $550, plus crating and shipping; *The Maizefield Company, Box 336, Port Townsend, Washington 98368; 360-385-6789.* **Further reading:** *The Collected Works of Count Rumford, Vol. 2*, ed. by Sanborn C. Brown, 1968, out of print; *Harvard University Press, Cambridge, MA.* **Our thanks to:** Jim Buckley, *Buckley Rumford Co., 1035 Monroe St., Port Townsend, WA 98368; 800-447-7788; http://www.rumford.com* Ann Landis, *Olympic Design Group Inc., 606 Roosevelt, Port Townsend, WA 98368; 360-385-5614.* Todd Taylor, *Groutworks, 5237 36th Ave. SW, Seattle, WA 98126; 206-937-2746.* Paul Tiegs, president, *Omni-Test Laboratories, Box 743, Beaverton, OR 97075; 503-643-3788.* The Smithsonian National Museum of American History, Archive Center, *Washington, DC.* The Thomas Jefferson Memorial Foundation, *Charlottesville, VA.*

TEXAS BARN *pp. 80-87*


TEXAS COW PALACE
hardly fit for rattlesnakes

Architects: Robert Jackson and Michael McElhaney, AIA, *1135 W. 6th St., Austin, TX 78703; 512-472-5132.* **Contractor:** Lee Roy Behrends Construction Co., *Box 933, Stonewall, TX 78671; 210-644-2439.*

AMERICAN CRAFTSMAN *pp. 88-95*



Timber framer: Tedd Benson, *Benson Woodworking Homes, RR 1, Box 224, Pratt Rd., Alstead Center, NH 03602; 603-835-6391.* **For more information:** Timber Framers Guild of North America, *Box 1075, Bellingham, WA 98227; 360-733-4001.*

Directory

Further reading: *Building the Timber Frame House*, by Tedd Benson with James Gruber, 1981, $20 (paperback); *Simon & Schuster, 1230 Ave. of the Americas, New York, NY 10020; 800-223-2336. The Timber Frame Home*, by Tedd Benson, rev. ed., available March 1997, 240 pp., $34.95, *The Taunton Press, 63 S. Main St., Box 5506, Newtown, CT 06470; 800-888-8286.*

Our thanks to: David Elliman and Andrea Branch.

WINDOWS *pp. 96-101*

Wood frame: Designer Classic; *Pella Corp., 102 Main St., Pella, IA, 50219; 800-547-3552.* **Clad wood:** *Marvin Windows & Doors, Box 100, Warroad, MN 65763; 800-346-5128.* **Vinyl:** Classic Vinyl Window System, *Harvey Industries, Inc. 43 Emerson Rd., Waltham, MA 02154; 800-225-6183.* **Fiberglass:** Ultrex, Integrity, *Marvin Windows & Doors.* **Composite:** Fibrex, Renewal by Andersen, *1700 Buerkle Rd., White Bear Lake, MN 55110; call 800-226-6619 for local dist.* **Windows: Replacement sash:** Marvin Tilt Pac, *Marvin Windows & Doors.* **Insulated-glass insert:** *Bi-Glass Systems, Inc., 35 Braintree Hill Park, Suite 112, Braintree, MA 02184; 800-729-0742.* **Secondary frame:** Pella Precision Fit, *Pella Corp.* **Complete replacement:** Tilt-Wash Double Hung Window, *Andersen Windows, Inc., 100 Fourth Ave. N, Bayport, MN 55003; 800-426-4261, x1232.* **Window repair:** David Liberty, *3-R Window Co., 105 Bennett St., Brighton, MA 02135; 617-782-9410.*

DRILL BIT POSTER *p. 104*

The numbered drill bits and labeled glossary items were provided by the manufacturers and mail-order suppliers listed below. **Manufacturers: Bits 1-6, 8, 13, 20-22, 27, 29, 32,** *American Tool Co. Inc., Box 829, Wilmington, OH 45177; 800-866-5740.* **Bits *10-11*, 14-16, *18-19, 28, 31, 33,** *Primark Tool Group, 1350 S. 15th St., Louisville, KY 40210; 800-242-7003.* **Bits 12, 24,** *W. L Fuller, Inc., 7 Cypress St., Box 8767, Warwick, RI 02888; 401-467-2900.* **Bit 23,** *Stanley Tools, 600 Myrtle St., New Britain, CT 06053; 860-225-5111.* **Bit 30,** *Black & Decker, 701 E. Joppa Rd., Towson, MD 21286; 800- 762-6672.* **Mail-order suppliers: Bits 7, 9, 25, 34-35,** *Garrett Wade Co., 161 Ave. of the Americas, New York, NY 10013; 800-221-2942.* **Bit 17,** *The Woodworkers' Store, 4365 Willow Dr., Medina, MN 55340; 800-279-4441.* **Bit 26,** *Woodcraft, 210 Wood Country Industrial Park, Box 1686, Parkersburg, WV 26102; 800-225-1153.* **Glossary Manufacturers: Center punch,** *Vermont American Corp., 101 S. 5th St., Suite 2300, Louisville, KY 40202; 502-625-2000.* **Drill gauge** and **shank extension,** *American Tool Co.* **Pin vise:** Veritas Snug Plug Cutter, *Woodcraft.* **Stop collar,** *Woodworker's Supply, 5604 Alameda Place, NE, Albuquerque, NM 87113; 800-645-9292.*

Our thanks to: Anthony Hinch, vice president and general manager, *Fisch Precision Tools, Inc., Claysville, PA.*

GARDEN STONE *pp. 105-108*

Stonemason: Roger Hopkins Landscape Artist Naturalistic Gardens, *277 Concord Rd., Sudbury, MA 01776; 508-443-7572.* **Japanese maple specialists:** Patterson Nursery, *Box 99, Boring, OR 97009; 503-668-6000.* Don Schmidt Nursery Inc., *32010 SE Kelso Road, Boring, OR 97009; 503-668-4659.* **Hanging lamp:** #MH-7, $191; *Arroyo Craftsman, 4509 Little John St., Baldwin Park, CA 91706; 818-960-9411.*

COMPOST BIN *pp. 110-111*

For your information: Norm used 14 8-foot 2x4s of pressure-treated pine rated for ground contact. He cut 6 pieces 48 inches long, 9 pieces 45 inches long and 10 diagonal braces so that long point to long point, they were 22¾ inches long. Norm also used about 100 3-inch galvanized deck screws (2 per connection); 24 feet of 14-gauge utility fencing with 2 x 4-inch mesh; ¾-inch galvanized fencing staples; 4¾-inch diameter carriage bolts 4 inches long; and 4 flat washers and 4 nuts. He used the carriage bolts to attach the top front rail. When *This Old House* priced the materials at Home Depot in Danbury, CT (203-730-9600), the cost was $108, without tax.

PAY DIRT *p. 112*

Wildflower rescue: *Wild Ones Journal,* 6 issues, $20, *Wild Ones—Natural Landscapers, Ltd., Box 23576, Milwaukee, WI 53223-0576; 414-662-4600.* **Gardeners' Glasses:** frames, $75; clip-ons, $50, both with UV protection; *BPI, Box 559501, Miami, FL 33255-9501, 800-225-5274.* **Potatoes:** Red Gold and Charlotte, $12.50 per 5 lbs.; *Ronnigers Potato Farm, Star Route, Rd. 73, Moyie Springs, ID 83845; 208-267-7938.* **Bentwood:** "How to Make Romantic Bentwood Garden Trellises," by Jim Long, 28 pp., $6.95 (inc. postage and handling); *Long Creek Herbs, Route 4, Box 730, Oak Grove, AR 72660; 417-779-5450.*

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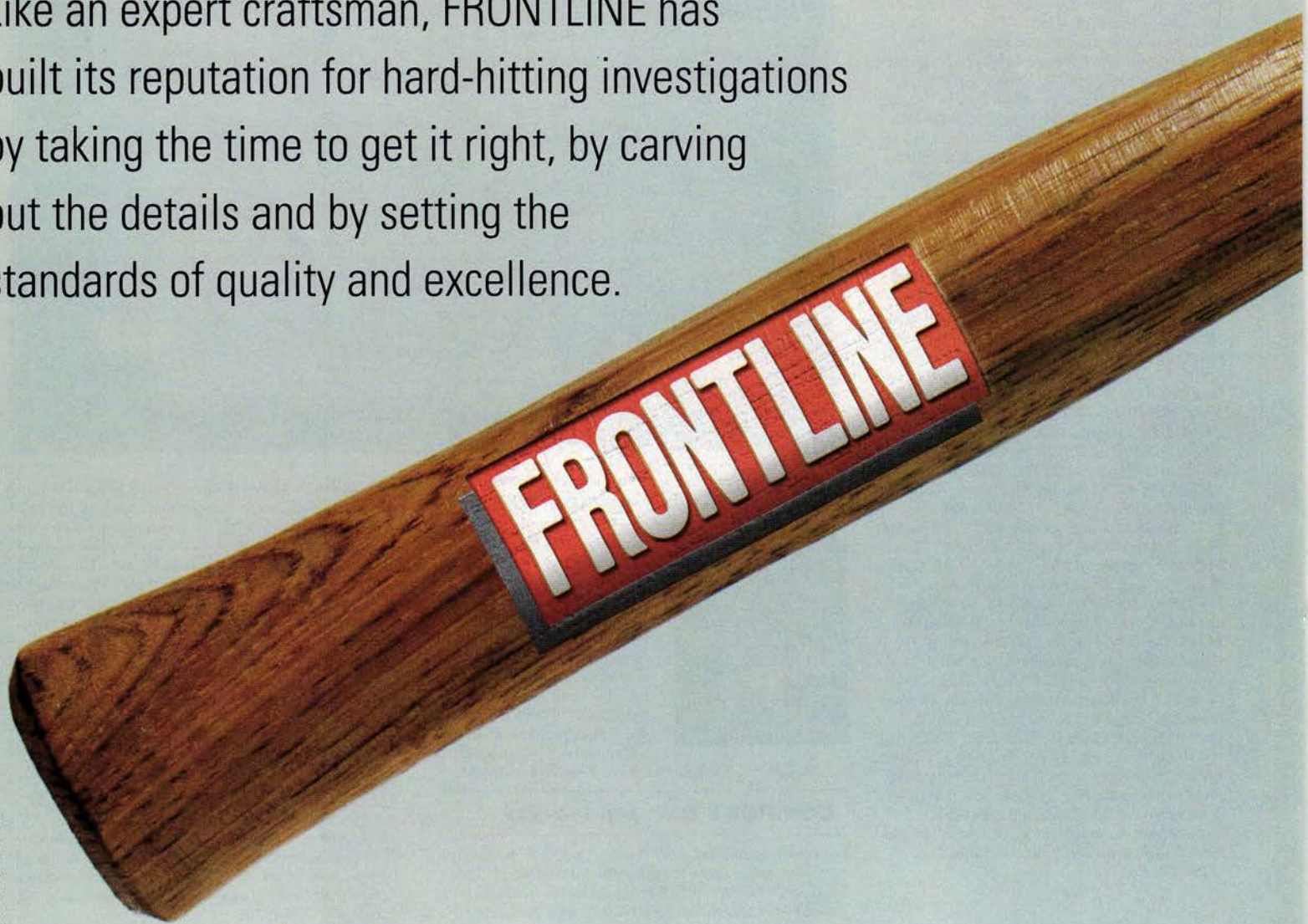

Photo: David Carmack

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After wrapping up the Concord barn, Norm Abram and Steve Thomas headed for Santa Fe, New Mexico, where they met new project homeowners James Asher and Joe Anna Arnett.

Week 15

(December 28-29) After a quick iceboat sail on the frozen waters of Lake Winnebago, Wisconsin, host Steve Thomas tours the factory where the Concord barn's custom red-oak staircase is being made. Back in New England, the kitchen begins to take shape.

Week 16

(January 4-5) With a blanket of snow covering the ground, it's time for the heating system to go in. Plumbing and heating contractor Richard Trethewey lays the pipes for the radiant floor loops, which are then buried under a layer of lightweight concrete.

Week 17

(January 11-12) Pulverized asphalt shingles, crushed bricks and oil-contaminated soil may not seem like ideal building materials, but they're the main ingredients in the pavement that goes down on the barn's driveway. Inside, Steve helps lay the Mexican tile floor.

Week 18

(January 18-19) Tiling and electrical work continue. In the workshop, master carpenter Norm Abram remills boards salvaged from the original barn to make doors for the barn's new library.

Week 19

(January 25-26) Kitchen appliances go in, carpet goes down and Richard Trethewey visits a West German factory where brass plumbing fixtures are manufactured.

Week 20

(February 1-2) The crew puts on the finishing touches. Family and friends gather again on the same spot where, on a rainy afternoon five months earlier, they celebrated an old-fashioned barn raising—only this time, they're enclosed in the warmth and comfort of a brand-new home.

Week 21

(February 8-9) A New Project Begins From the wintry chill of New England, Norm and Steve head across the country to New Mexico for the start of their next project: the renovation of a traditional adobe home in Santa Fe.

Week 22

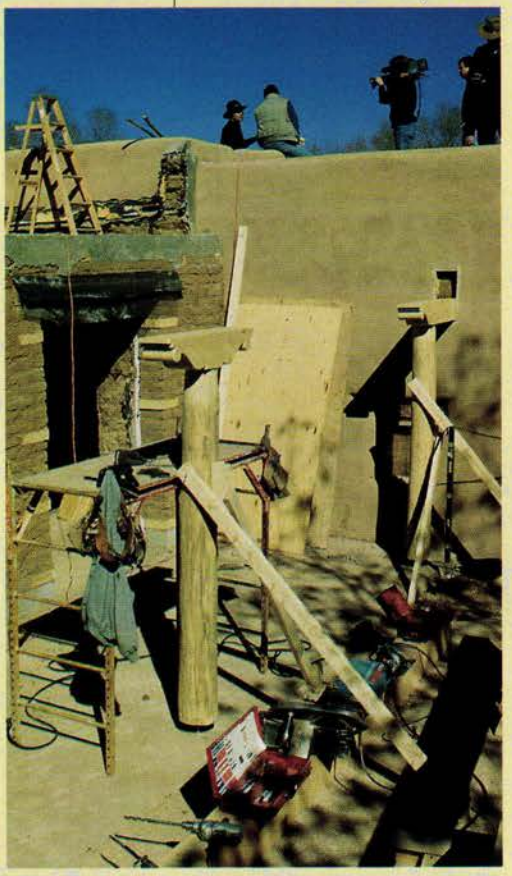
(February 15-16) Homeowners James Asher and Joe Anna Arnett, both artists, clear out their studio so Norm can set up a workshop. Steve gets a lesson in building a kiva, a Southwest-style beehive fireplace.

Week 23

(February 22-23) With its vigas (roof rafters), nichos (wall recesses) and bancos (built-in benches), Southwest architecture has a vocabulary all its own. While Steve learns the language, Norm gets started on the kitchen cabinets.

Coming Next Issue

(March 1-2) Cutting flagstones and covering a roof in polyurethane foam.



The house, built of adobe bricks covered with plaster, was a perfect example of traditional Southwest architecture.

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WWSB-TV (Ch. 40)
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WFTS-TV (Ch. 28)
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KSNW-TV (Ch. 3)
Sun. 6:30 am

KENTUCKY
Bowling Green
WBKO-TV (Ch. 13)
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Lexington
WTVQ-TV (Ch. 36)
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WHAS-TV (Ch. 11)
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WOOD-TV* (Ch. 8)
WOTV-TV* (Ch. 41)
Traverse City/Cadillac
WWTV-TV (Ch. 9)
Sun. 10:30 am
WWUP-TV (Ch. 10)
Sun. 10:30 am

MINNESOTA
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KSTP-TV (Ch. 5)
Sun. 10 am
Rochester/Austin
KAAL-TV (Ch. 6)
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Columbus/Tupelo
WCBI-TV (Ch. 4)
Sun. 5 pm
Jackson
WLBT-TV (Ch. 3)
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MISSOURI
Columbia/Jefferson City
KRCG-TV (Ch. 13)
Sun. 10 am
Kansas City
KMBC-TV (Ch. 9)
Sat. 6 am
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KMBC-TV (Ch. 9)
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KHAS-TV (Ch. 5)
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Albany
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Binghamton
WBNG-TV (Ch. 12)
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Buffalo
WIVB-TV* (Ch. 4)
New York
WCBS-TV (Ch. 2)
Sun. 7:30 am
Syracuse
WTVH-TV (Ch. 5)
Sun. 11:30 am
Watertown
WWNY-TV (Ch. 7)
Sat. 7:30 am

NORTH CAROLINA
Charlotte
WBTV-TV (Ch. 3)
Sun. 1:30 pm
Greensboro/Winston-
Salem
WGHP-TV (Ch. 8)
Sun. 8 am
Greenville/
Spartanburg/Asheville
WLOS-TV* (Ch. 13)
WFBC-TV* (Ch. 40)
Raleigh/Durham
WTVD-TV (Ch. 11)
Sun. 11:30 am

OHIO
Cincinnati
WCPO-TV (Ch. 9)
Sun. 6 am
Cleveland
WEWS-TV (Ch. 5)
Sat. 4:30 am
Columbus
WSYX-TV* (Ch. 6)
Dayton
WRGT-TV (Ch. 45)
Sun. 11 am
Toledo
WTVG-TV (Ch. 13)
Sun. 9:30 am
Wheeling/Steubenville
WTRF-TV* (Ch. 7)
Youngstown
WFMJ-TV (Ch. 21)
Sun. 10 am

OKLAHOMA
Oklahoma City
KOCO-TV (Ch. 5)
Sat. 10 am
Tulsa
KJRH-TV (Ch. 2)
Sat. 10:30 am

OREGON
Eugene
KEZI-TV (Ch. 9)
Sun. 5 pm
Medford
KOBI-TV (Ch. 5)
Sun. 4 pm
KOTI-TV (Ch. 2)
Sun. 4pm
Portland
KOIN-TV (Ch. 6)
Sun. 10:30 am

PENNSYLVANIA
Erie
WJET-TV (Ch. 24)
Sat. 6:30 am
Harrisburg/Lancaster/York
WPMT-TV (Ch. 43)
Sat. 10:30 pm

A House for Art, and Artists

James Asher and Joe Anna Arnett are both artists—he paints landscapes, she specializes in still lifes—so it seems fitting that they live in a piece of sculpture. "There are no square corners. The shapes are natural, soft shapes," Joe Anna says. "There are walls that curve, walls that aren't quite straight, and that's the charm."

It's also the nature of adobe construction. When the *This Old House* crew arrived in Santa Fe in the winter of 1990, they got their first lessons in traditional Southwest building techniques. "We still build the way the majority of the world builds, which is with mud," explains John Wolf, the project contractor. "None of these houses is ever duplicated. Every one is a handcrafted, individual home."

When Asher and Arnett bought their house in 1982, it was "a four-room adobe with enormous water damage and a dirt roof," Joe Anna says. But rather than remodel it, they hired Wolf to add on a studio, using the same plaster-over-mud-brick technique as the original. And that's where they spent most of their time for the next five years. Apart from fixing up a bathroom, they didn't touch the rest of the place.

And it might have stayed untouched, were it not for a hunch of Joe Anna's. "Jim and I were just about to go to England and do our first two-person show at our gallery over there. The dealer called and said it looked like it was going to be incredible." Anticipating a success, she and Asher pulled out a yellow pad and made a wish list of home improvements. Before they left, they gave it to Wolf, asking him "to sharpen a pencil" and come up with a price tag.

At just about the same time, *This Old House* executive producer Russ Morash was launching a search for an adobe project. The style, with its unique vocabulary of architectural details—kivas (beehive fireplaces), vigas (roof rafters), latillas (roof beams) and portales (porches)—offered a refreshing change after the Concord barn. Friends suggested Russ talk to adobe specialist Wolf. When Russ ticked off the topics he wanted to cover on the show, "John said it was like reading my list," Joe Anna remembers. The next thing she knew, a fax arrived for the couple in London, telling them to "get home as soon as you can—you're it."

In the weeks that followed, the house got a new roof, crumbling adobe was repaired, Arizona flagstones and tiles were set over radiant-heated floors and the kitchen was rebuilt, complete with marble-topped cabinets custom-made by Norm Abram.

Five years later, the couple stills spends most of their time in the studio, but it's no longer the only comfortable room in the house. Both the kitchen and master bathroom bask in sun from new skylights, double-thick adobe walls muffle noise, the stone floors are warm underfoot and the scent of piñon logs wafts from the kivas. In the high-ceilinged living room, diamond-finish plaster walls provide a backdrop for paintings, pottery and antiques. "We try to keep it simple because we both like large, clean spaces," Joe Anna says. "The star of the house should be art, because that's what we do."

Philadelphia
WCAU-TV (Ch. 10)
Sun. 11:30 am
Wilkes Barre/Scranton
WYOU-TV (Ch. 22)
Sat. 12:30 pm

RHODE ISLAND
Providence/New Bedford
WLNE-TV* (Ch. 6)

SOUTH CAROLINA
Charleston
WCSC-TV* (Ch. 5)
Florence
WWMB-TV (Ch. 21)
Sun. noon
Greenville/
Spartanburg/Asheville
WLOS-TV (Ch. 13)
Sat. 9 am
Myrtle Beach
WPDE-TV* (Ch. 15)
WWMB-TV* (Ch. 21)

SOUTH DAKOTA
Sioux Falls
KDLT-TV (Ch. 5)
Sun. 9 am

TENNESSEE
Chattanooga
WDEF-TV (Ch. 12)
Sun. 7 am
Knoxville
WATE-TV (Ch. 6)
Sun. 5:30 am
Memphis
WPTY-TV (Ch. 24)
Sun. 11:30 am
WLMT-TV (Ch. 30)
Sun. 11:30 am
Nashville
WKRN-TV (Ch. 2)
Sat. 6 am

TEXAS
Amarillo
KFDA-TV (Ch. 10)
Sat. 5 pm
Beaumont/Port Arthur
KBMT-TV (Ch. 12)
Sun. 6:30 am
Corpus Christi
KIII-TV (Ch. 3)
Sat. 5 pm
Dallas/Fort Worth
KXAS-TV (Ch. 5)
Sat. 5 pm
KXTX-TV (Ch. 39)
Sat. 5 pm
El Paso
KZIA-TV (Ch. 7)
Sun. 8 am
Houston
KTRK-TV (Ch. 13)
Sun. 11 am
Lubbock
KLBK-TV (Ch. 13)
Sun. 5 pm
Nacogdoches
KLSB-TV (Ch. 19)
Sat. 5 pm
Tyler/Longview
KETK-TV (Ch. 56)
Sat. 5 pm
Waco/Temple/Bryan
KXXV-TV (Ch. 25)
Sun. 10:30 am

UTAH
Salt Lake City
KTVX-TV (Ch. 4)
Sun. 8 am

VERMONT
Burlington/Plattsburgh
WCAX-TV (Ch. 3)
Sun. 11 am

VIRGINIA
Norfolk/Portsmouth/
Newport News
WVEC-TV (Ch. 13)
Sun. 11 am
Richmond/Petersburg
WAWB-TV (Ch. 65)
Sat. 5 pm
Roanoke/Lynchburg
WSLS-TV (Ch. 10)
Sat. 6:30 am

WASHINGTON
Seattle/Tacoma
KIRO-TV (Ch. 7)
Sat. 10:30 am
Spokane
KXLY-TV (Ch. 4)
Sun. 9:30 am

WEST VIRGINIA
Bluefield/Oak Hill
WOAY-TV* (Ch. 4)
Charleston/Huntington
WCHS-TV* (Ch. 8)
Clarksburg/Weston
WDTV-TV (Ch. 5)
Sat. 6:30 pm
Parkersburg
WTAP-TV* (Ch. 15)
Wheeling/Steubenville
WTRF-TV* (Ch. 7)

WISCONSIN
Green Bay/Appleton
WGBA-TV (Ch. 26)
Sun. 7 am
La Crosse/Eau Claire
WEAU-TV (Ch. 13)
Sun. 9 am
Madison
WMTV-TV (Ch. 15)
Sat. 5 pm
Milwaukee
WTMJ-TV (Ch. 4)
Sun. 10:30 am
Wausaw/Rhinelander
WJFW-TV (Ch. 12)
Sun. 10:30 am

*CHECK YOUR LOCAL LISTINGS

This Old House™

Where and when to see the new season's episodes on PBS stations

Program dates and times are subject to change. Please check your local listings.

ALABAMA
Birmingham
WBIQ-TV
Thu. 8:30 pm, Sat. 8 pm
Demopolis
WIIQ-TV
Thu. 8:30 pm, Sat. 8 pm
Dozier
WDIQ-TV
Thu. 8:30 pm, Sat. 8 pm
Florence
WFIQ-TV
Thu. 8:30 pm, Sat. 8 pm
Huntsville
WHIQ-TV
Thu. 8:30 pm, Sat. 8 pm
Louisville
WGIQ-TV
Thu. 8:30 pm, Sat. 8 pm
Mobile
WEIQ-TV
Thu. 8:30 pm, Sat. 8 pm
Montgomery
WAIQ-TV
Thu. 8:30 pm, Sat. 8 pm
Mount Cheaha
WCIQ-TV
Thu. 8:30 pm, Sat. 8 pm

ALASKA
Anchorage
KAKM-TV
Mon. 6 pm, Sat. 9:30 am
Bethel
KYUK-TV
Fri. 8 pm, Sat. 8 am
Fairbanks
KUAC-TV
Fri. 8 pm, Sat. 8 am
Juneau
KTOO-TV
Fri. 8 pm, Sat. 8 am

ARIZONA
Phoenix
KAET-TV
Thu. 1 pm and 7:30 pm
Sat. noon and 5 pm
Tucson
KUAS-TV
Sat. 11 am and 6:30 pm
KUAT-TV
Sat. 11 am and 6:30 pm

ARKANSAS
Arkadelphia
KETG-TV
Sat. noon, Sun. 5:30 pm
Fayetteville
KAFT-TV
Sat. noon, Sun. 5:30 pm
Jonesboro
KTEJ-TV
Sat. noon, Sun. 5:30 pm
Little Rock
KETS-TV
Sat. noon, Sun. 5:30 pm
Mountain View
KEMV-TV
Sat. noon, Sun. 5:30 pm

CALIFORNIA
Eureka
KEET-TV
Wed. 7:30 pm
Sat. 10:30 am
Fresno
KVPT-TV
Sat. 9 am, Sun. 7 pm
Huntington Beach
KOCE-TV
Sat. 4:30 pm
Los Angeles
KCET-TV
Sat. 5:30 pm
Redding
KIXE-TV
Sat. 10:30 am
Rohnert Park
KRCB-TV
Wed. noon, Sun. 7:30 pm
Sacramento
KVIE-TV
Thu. 8 pm, Sat. 3:30 pm
San Bernardino
KVCR-TV
Thu. 8 pm
San Diego
KPBS-TV
Sat. 11 am
San Francisco
KQED-TV
Sat. 5 pm
San Jose
KTEH-TV
Wed. 9 pm, Sat. 3 pm
Sun. 5:30 pm
San Mateo
KCSM-TV
Wed. 6:30 pm
Sat. 9:30 am

COLORADO
Boulder
KBDI-TV
Wed. 3:30 am and
5:30 pm, Sat. 5:30 pm
Sun. 4 pm
Denver
KRMA-TV
Sat. 2 pm, Sun. 5:30 pm
Pueblo
KTSC-TV
Thu. 8:30 pm,
Sat. 2:30 pm

CONNECTICUT
Fairfield
WEDW-TV
Tue. noon, Thu. 11 pm
Sat. 8 pm, Sun. 10:30 am
Hartford
WEDH-TV
Tue. noon, Thu. 1 pm
Sat. 8 pm, Sun. 10:30 am
New Haven
WEDY-TV
Tue. noon, Thu. 11 pm
Sat. 8 pm, Sun. 10:30 am
Norwich
WEDN-TV
Tue. noon, Thu. 11 pm
Sat. 8 pm, Sun. 10:30 am

DISTRICT OF COLUMBIA
WETA-TV
Sat. 9 am

FLORIDA
Bonita Springs
WGCU-TV
Sat. 1:30 pm, Sun. 5 pm
Daytona Beach
WCEU-TV
Tue. 8 pm, Sat. 6 pm
Gainesville
WUFT-TV
Sat. 9:30 am and 1:30 pm
Jacksonville
WJCT-TV
Sat. 5:30 pm
Miami
WLRN-TV
Sun. 10 am
WPBT-TV
Sat. 3 pm
Orlando
WMFE-TV
Sat. 9 am and 1:30 pm
Sun. 9 am
Pensacola
WSRE-TV
Sat. 12:30 pm
Tallahassee
WFSU-TV
Sat. 1:30 pm
Tampa
WEDU-TV
Sat. 11:30 am, Sun. 7 pm
WUSF-TV
Wed. 9:30 pm
Sun. 5:30 pm

GEORGIA
Atlanta
WGTV-TV
Sat. 5:30 pm, Sun. 8 pm
WPBA-TV
Mon. 8 pm, Wed. 2 pm
Sat. 6 pm
Chatsworth
WCLP-TV
Sat. 5:30 pm, Sun. 8 pm
Cochran
WDCO-TV
Sat. 5:30 pm, Sun. 8 pm
Columbus
WJSP-TV
Sat. 5:30 pm, Sun. 8 pm
Dawson
WACS-TV
Sat. 5:30 pm, Sun. 8 pm
Pelham
WABW-TV
Sat. 5:30 pm, Sun. 8 pm
Savannah
WVAN-TV
Sat. 5:30 pm, Sun. 8 pm
Waycross
WXGA-TV
Sat. 5:30 pm, Sun. 8 pm
Wrens
WCES-TV
Sat. 5:30 pm, Sun. 8 pm

HAWAII
Honolulu
KHET-TV
Thu. 7:30 pm, Sun. 10 am
Wailuku
KMEB-TV
Thu. 7:30 pm, Sun. 10 am

IDAHO
Boise
KAID-TV
Sun. 4:30 pm
Coeur d'Alene
KCDT-TV
Sun. 3:30 pm
Moscow
KUID-TV
Sun. 3:30 pm
Pocatello
KISU-TV
Sun. 4:30 pm
Twin Falls
KIPT-TV
Sun. 4:30 pm

ILLINOIS
Carbondale
WSIU-TV
Fr. 12:30 pm
Sat. 12:30 pm
Charleston
WEIU-TV
Sat. 9:30 pm
Chicago
WTTW-TV
Tue. 7:30 pm, Sat. 5 pm
Jacksonville
WSEC-TV
Thu. 10 pm, Sun. 1:30 pm
Macomb
WMEC-TV
Thu. 10 pm, Sun. 1:30 pm
Moline
WQPT-TV
Tue. 7 pm, Sat. 5:30 pm
Olney
WUSI-TV
Fri. 12:30 pm
Sat. 12:30 pm
Peoria
WTVP-TV
Thu. 10 pm, Sat. 12:30 pm
Quincy
WQEC-TV
Thu. 10 pm, Sun. 1:30 pm
Urbana
WILL-TV
Thu. 7:30 pm
Sun. 3:30 pm

INDIANA
Bloomington
WTIU-TV
Mon. 5 pm, Thu. 11 pm
Sat. 1:30 pm
Evansville
WNIN-TV
Sat. 12:30 pm and 6 pm
Sun. 4:30 pm
Fort Wayne
WFWA-TV
Sat. 10 am and 3 pm
Indianapolis
WFYI-TV
Sat. 10 am, Sun. 7 pm
Merrillville
WYIN-TV
Thu. 8:30 am
Sun. 3:30 pm
Muncie
WIPB-TV
Sun. 4:30 pm
South Bend
WNIT-TV
Wed. 7:30 pm, Sat. 2 pm
Vincennes
WVUT-TV
Wed. 7:30 pm
Sat. 1:30 pm

IOWA
Des Moines
KDIN-TV
Fri. 6:30 pm, Sat. 1:30 pm
Fort Dodge
KTIN-TV
Fri. 6:30 pm, Sat. 1:30 pm
Iowa City
KIIN-TV
Fri. 6:30 pm, Sat. 1:30 pm
Mason City
KYIN-TV
Fri. 6:30 pm, Sat. 1:30 pm
Council Bluffs
KBIN-TV
Fri. 6:30 pm, Sat. 1:30 pm
Red Oak
KHIN-TV
Fri. 6:30 pm, Sat. 1:30 pm
Sioux City
KSIN-TV
Fri. 6:30 pm, Sat. 1:30 pm
Waterloo
KRIN-TV
Fri. 6:30 pm, Sat. 1:30 pm

KANSAS
Bunker Hill
KOOD-TV
Thu. 7 pm, Sat. 12:30 pm
Lakin
KSWK-TV
Thu. 7 pm, Sat. 12:30 pm
Topeka
KTWU-TV
Sat. 9:30 am
Wichita
KPTS-TV
Sat. 11:30 am, Sun. 11 am

KENTUCKY
Ashland
WKAS-TV
Mon. 6:30 pm, Sun. 5 pm
Bowling Green
WKGB-TV
Mon. 6:30 pm, Sun. 5 pm
WKYU-TV
Tue. 1 pm and 6:30 pm
Covington
WCVN-TV
Mon. 6:30 pm, Sun. 5 pm
Elizabethtown
WKZT-TV
Mon. 6:30 pm, Sun. 5 pm
Hazard
WKHA-TV
Mon. 6:30 pm, Sun. 5 pm
Lexington
WKLE-TV
Mon. 6:30 pm, Sun. 5 pm
Louisville
WKMJ-TV
Mon. 6:30 pm, Sun. 5 pm
WKPC-TV
Sat. 1:30 pm, Sun. 3 pm
Madisonville
WKMA-TV
Mon. 6:30 pm, Sun. 5 pm
Morehead
WKMR-TV
Mon. 6:30 pm, Sun. 5 pm
Murray
WKMU-TV
Mon. 6:30 pm, Sun. 5 pm
Owensboro
WKOH-TV
Mon. 6:30 pm, Sun. 5 pm
Owenton
WKON-TV
Mon. 6:30 pm, Sun. 5 pm
Paducah
WKPD-TV
Mon. 6:30 pm, Sun. 5 pm
Pikeville
WKPI-TV
Mon. 6:30 pm, Sun. 5 pm
Somerset
WKSO-TV
Mon. 6:30 pm, Sun. 5 pm

LOUISIANA
Alexandria
KLPA-TV
Sat. 4 pm, Sun. 10 am
Baton Rouge
WLPB-TV
Sat. 4 pm, Sun. 10 am
Lafayette
KLPB-TV
Sat. 4 pm, Sun. 10 am
Lake Charles
KLTL-TV
Sat. 4 pm, Sun. 10 am
Monroe
KLTM-TV
Sat. 4 pm, Sun. 10 am
New Orleans
WYES-TV
Sat. 8:30 am
Shreveport
KLTS-TV
Sat. 4 pm, Sun. 10 am

MAINE
Bangor
WMEB-TV
Sat. 1:30 pm
Calais
WMED-TV
Sat. 1:30 pm
Lewiston
WCBB-TV
Sat. 1:30 pm
Portland
WMEA-TV
Sat 1:30 pm
Presque Isle
WMEM-TV
Sat. 1:30 pm

MARYLAND
Annapolis
WMPT-TV
Sat. 4:30 pm
Sun. 6:30 pm
Baltimore
WMPB-TV
Sat. 4:30 pm
Sun. 6:30 pm
Frederick
WFPT-TV
Sat. 4:30 pm
Sun. 6:30 pm
Hagerstown
WWPB-TV
Sat. 4:30 pm
Sun. 6:30 pm
Oakland
WGPT-TV
Sat. 4:30 pm
Sun. 6:30 pm
Salisbury
WCPB-TV
Sat 4:30 pm
Sun. 6:30 pm

MASSACHUSETTS
Boston
WGBH-TV
Thu. 8 pm, Sat. 5:30 pm
WGBX-TV
Sun. 9 am
Springfield
WGBY-TV
Thu. 8 pm, Sat. 5:30 pm

MICHIGAN
Alpena
WCML-TV
Sat. 2:30 pm
Bad Axe
WUCX-TV
Tue. 12:30 pm, Sun. 5 pm
Cadillac
WCMV-TV
Sat. 2:30 pm
Detroit
WTVS-TV
Thu. 8:30 pm, Sat. 10 am
East Lansing
WKAR-TV
Thu. 9 pm, Sat. 1 pm
Sun. 5 pm
Flint
WFUM-TV
Thu. 9 pm, Sat. 1:30 pm
Grand Rapids
WGVU-TV
Thu. 8:30 pm, Sat. 10 am
Kalamazoo
WGVK-TV
Thu. 8:30 pm, Sat. 10 am
Manistee
WCMW-TV
Sat. 2:30 pm
Marquette
WNMU-TV
Sat. 1:30 pm
Mount Pleasant
WCMU-TV
Sat. 2:30 pm
University Center
WUCM-TV
Tue. 12:30 pm, Sun. 5 pm

MINNESOTA
Appleton
KWCM-TV
Sat. 12:30 pm
Austin
KSMQ-TV
Sat. 12:30 pm, Sun. 7 pm
Bemidji
KAWE-TV
Thu. 7:30 pm
Sat. 12:30 pm
Brainerd
KAWB-TV
Thu. 7:30 pm
Sat. 12:30 pm
Duluth
WDSE-TV
Sat. 6:30 pm
Sun. 9:30 am
Saint Paul/ Minneapolis
KTCA-TV
Wed. 7:30 pm
Sat. 6:30 pm

MISSISSIPPI
Biloxi
WMAH-TV
Sat. 7 pm
Booneville
WMAE-TV
Sat. 7 pm
Bude
WMAU-TV
Sat. 7 pm
Greenwood
WMAO-TV
Sat. 7 pm
Jackson
WMPN-TV
Sat. 7 pm
Meridian
WMAW-TV
Sat. 7 pm
Mississippi State
WMAB-TV
Sat. 7 pm
Oxford
WMAV-TV
Sat. 7 pm

MISSOURI
Joplin
KOZJ-TV
Sat. 12:30 pm
Kansas City
KCPT-TV
Thu. 7:30 pm
Sat. 12:30 pm
Saint Louis
KETC-TV
Wed. 12:30 pm
Sat. 6:30 pm
Sedalia
KMOS-TV
Sat. 12:30 pm
Springfield
KOZK-TV
Sat. 12:30 pm

MONTANA
Bozeman
KUSM-TV
Sat. 11:30 am
Missoula
KUFM-TV
Sat. 11:30 am

NEBRASKA
Alliance
KTNE-TV
Sat. 10 am and 5:30 pm
Bassett
KMNE-TV
Sat. 10 am and 5:30 pm
Hastings
KHNE-TV
Sat. 10 am and 5:30 pm
Lexington
KLNE-TV
Sat. 10 am and 5:30 pm
Lincoln
KUON-TV
Sat. 10 am and 5:30 pm
Merriman
KRNE-TV
Sat. 10 am and 5:30 pm
Norfolk
KXNE-TV
Sat. 10 am and 5:30 pm
North Platte
KPNE-TV
Sat. 10 am and 5:30 pm
Omaha
KYNE-TV
Sat. 10 am and 5:30 pm

NEVADA
Las Vegas
KLVX-TV
Sat. 9 am and 12:30 pm
Reno
KNPB-TV
Sat. 10:30 am and 1 pm

NEW HAMPSHIRE
Durham
WENH-TV
Thu. 8:30 pm, Sun. 10 am
Keene
WEKW-TV
Thu. 8:30 pm, Sun. 10 am
Littleton
WLED-TV
Thu. 8:30 pm, Sun. 10 am

NEW JERSEY
Camden
WNJS-TV
Tue. 8 pm, Sat. 8 pm
Sun. 5:30 pm
Montclair
WNJN-TV
Tue. 8 pm, Sat. 8 pm
Sun. 5:30 pm
New Brunswick
WNJB-TV
Tue. 8 pm, Sat. 8 pm
Sun. 5:30 pm
Trenton
WNJT-TV
Tue. 8 pm, Sat. 8 pm
Sun. 5:30 pm

NEW MEXICO
Albuquerque
KNME-TV
Thu. 7 pm, Sun. 10 am
Las Cruces
KRWG-TV
Sat. 11:30 am
Portales
KENW-TV
Sat. 3:30 pm

NEW YORK
Binghamton
WSKG-TV
Sat. 8 am and 1:30 pm
Buffalo
WNED-TV
Sat. 10:30 am
WNEQ-TV
Sun. 7 pm
Long Island
WLIW-TV
Thu. 8:30 pm
Sat. 10:30 am, Sun. 8 pm
New York City
WNET-TV
Sat. 6:30 pm
Norwood
WNPI-TV
Sat. 10:30 am
Plattsburgh
WCFE-TV
Sun. 11:30 am
Rochester
WXXI-TV
Sat. 10:30 am
Sun. 5:30 pm
Schenectady
WMHT-TV
Tue. 1:30 pm
Sat. 10:30 am
Syracuse
WCNY-TV
Thu. 8 pm, Sat. 10:30 am
Watertown
WNPE-TV
Sat. 10:30 am

NORTH CAROLINA
Asheville
WUNF-TV
Sat. 5:30 pm, Sun. 9 am
Chapel Hill
WUNC-TV
Sat. 5:30 pm, Sun. 9 am
Charlotte
WTVI-TV
Tue. 12:30 pm, Thu. 8 pm
Sat. 5 pm, Sun. 11 am
WUNG-TV
Sat. 5:30 pm, Sun. 9 am
Columbia
WUND-TV
Sat. 5:30 pm, Sun. 9 am
Greenville
WUNK-TV
Sat. 5:30 pm, Sun. 9 am
Jacksonville
WUNM-TV
Sat. 5:30 am, Sun. 9 am
Linville
WUNE-TV
Sat. 5:30 pm, Sun. 9 am
Lumberton
WUNU-TV
Sat. 5:30 pm, Sun. 9 am
Roanoke Rapids
WUNP-TV
Sat. 5:30 pm, Sun. 9 am
Wilmington
WUNJ-TV
Sat. 5:30 pm, Sun. 9 am
Winston-Salem
WUNL-TV
Sat. 5:30 pm, Sun. 9 am

NORTH DAKOTA
Bismarck
KBME-TV
Thu. 7 pm, Sat. 6 pm
Dickinson
KDSE-TV
Thu. 7 pm, Sat. 6 pm
Ellendale
KJRE-TV
Thu. 7 pm, Sat. 6 pm
Fargo
KFME-TV
Thu. 7 pm, Sat. 6 pm
Grand Forks
KGFE-TV
Thu. 7 pm, Sat. 6 pm
Minot
KSRE-TV
Thu. 7 pm, Sat. 6 pm
Williston
KWSE-TV
Thu. 7 pm, Sat. 6 pm

OHIO
Akron
WEAO-TV
Sat. 10:30 am and 5 pm
Sun. 6 pm
Athens
WOUB-TV
Sat. 5 pm
Bowling Green
WBGU-TV
Sat. 1:30 pm, Mon. 3 pm
Cambridge
WOUC-TV
Sat. 5 pm
Cincinnati
WCET-TV
Thu. 8 pm
Sat. 9 am and 6 pm
Cleveland
WVIZ-TV
Sun. 12:30 pm
Tue. 7:30 pm, Sat. 1 pm
Columbus
WOSU-TV
Thu. 8 pm, Sat. 4:30 pm
Dayton
WPTD-TV
Thu. 8 pm, Sat. 9:30 am
Sun. noon
Portsmouth
WPBO-TV
Thu. 8 pm, Sat. 4:30 pm
Toledo
WGTE-TV
Thu. 8 pm, Sat. 1 pm
Sun. 1 pm
Youngstown
WNEO-TV
Sat. 10:30 am and 5 pm
Sun. 6 pm

OKLAHOMA
Cheyenne
KWET-TV
Sat. 9:30 am and
12:30 pm, Sun. 4 pm
Eufaula
KOET-TV
Sat. 9:30 am and
12:30 pm, Sun. 4 pm
Oklahoma City
KETA-TV
Sat. 9:30 am and
12:30 pm, Sun. 4 pm
Tulsa
KOED-TV
Sat. 9:30 am and
12:30 pm, Sun. 4 pm

OREGON
Bend
KOAB-TV
Thu. 8 pm, Sat. 5 pm
Corvallis
KOAC-TV
Thu. 8 pm, Sat. 5 pm
Eugene
KEPB-TV
Thu. 8 pm, Sat. 5 pm
Klamath Falls
KFTS-TV
Thu. 8 pm, Sat. 10:30 am
La Grande
KTVR-TV
Thu. 8 pm, Sat. 5 pm
Medford
KSYS-TV
Thu. 8 pm, Sat. 10:30 am
Portland
KOPB-TV
Thu. 8 pm, Sat. 5 pm

PENNSYLVANIA
Allentown
WLVT-TV
Fri. 7:30 pm, Sat. 6 pm
Erie
WQLN-TV
Sat. 6:30 pm
Harrisburg
WITF-TV
Thu. 8 pm
Sat 9 am and 6 pm
Philadelphia
WHYY-TV
Sat. 11 am and 6 pm
Sun. 7 pm
Pittsburgh
WQED-TV
Sat. 5 pm
WQEX-TV
Wed. 8:30 pm, Sun. 11 am
Pittston
WVIA-TV
Thu. 8 pm
Sat. 5 pm and 5:30 pm
University Park
WPSX-TV
Sat. 5 pm, Sun. 4:30 pm

RHODE ISLAND
Providence
WSBE-TV
Tue. 8:30 pm, Sun. 6 pm

SOUTH CAROLINA
Allendale
WEBA-TV
Sat. 1:30 pm
Beaufort
WJWJ-TV
Sat. 1:30 pm
Charleston
WITV-TV
Sat. 1:30 pm
Columbia
WRLK-TV
Sat. 1:30 pm
Conway
WHMC-TV
Sat. 1:30 pm
Florence
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Sat. 1:30 pm
Greenville
WNTV-TV
Sat. 1:30 pm
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Rock Hill
WNSC-TV
Sat. 1:30 pm
Spartanburg
WRET-TV
Sat. 1:30 pm
Sumter
WRJA-TV
Sat. 1:30 pm

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TENNESSEE
Chattanooga
WTCI-TV
Sat. 1:30 pm
Cookeville
WCTE-TV
Sat. 12:30 pm
Knoxville
WKOP-TV
Sat. 1:30 pm
WSJK-TV
Sat. 1:30 pm
Lexington
WLJT-TV
Thu. 9:30 pm
Sat. 12:30 pm
Memphis
WKNO-TV
Thu. 7:30 pm and
midnight, Sat. 9:30 am
Nashville
WDCN-TV
Sat. 4:30 pm

TEXAS
Amarillo
KACV-TV
Sat. 12:30 pm
Austin
KLRU-TV
Sat. 5:30 pm
College Station
KAMU-TV
Mon. 10 pm
Corpus Christi
KEDT-TV
Sat. 12:30 pm and 9 pm
Dallas/Fort Worth
KERA-TV
Sat. 9 am and 6:30 pm
El Paso
KCOS-TV
Sat. 5 pm
Harlingen
KMBH-TV
Sat. 12:30 pm
Houston
KUHT-TV
Sun. 11:30 am
Killeen
KNCT-TV
Sat. 12:30 pm
Sun. 9:30 am
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KTXT-TV
Sat. 12:30 pm
Odessa
KOCV-TV
Sun. 12:30 pm
San Antonio
KLRN-TV
Sat. 5:30 pm
Waco
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Sat. 9 am and 6:30 pm

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WETK-TV
Thu. 8 pm, Sat. 11 am
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WVER-TV
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WVTB-TV
Thu. 8 pm, Sat. 11 am
Windsor
WVTA-TV
Thu. 8 pm, Sat. 11 am

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Sun. 3 pm
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Sat. 1:30 pm
Marion
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Norfolk
WHRO-TV
Thu. 8 pm
Sat. 8:30 am and 2 pm
Norton
WSBN-TV
Sat. 1:30 pm
Richmond
WCVE-TV
Sat. 8:30 am
Roanoke
WBRA-TV
Sat. 1:30 pm

WASHINGTON
Centralia
KCKA-TV
Thu. 6:30 pm
Sat. 12:30 pm and 6 pm
Pullman
KWSU-TV
Mon. 7:30 pm
Wed. 7:30 am
Sat. 2 pm
Richland
KTNW-TV
Thu. 7 pm, Sat. 2 pm
Sun. 4:30 pm
Seattle
KCTS-TV
Sun. 5 pm
Spokane
KSPS-TV
Sat. 9:30 am
Sun. 5:30 pm
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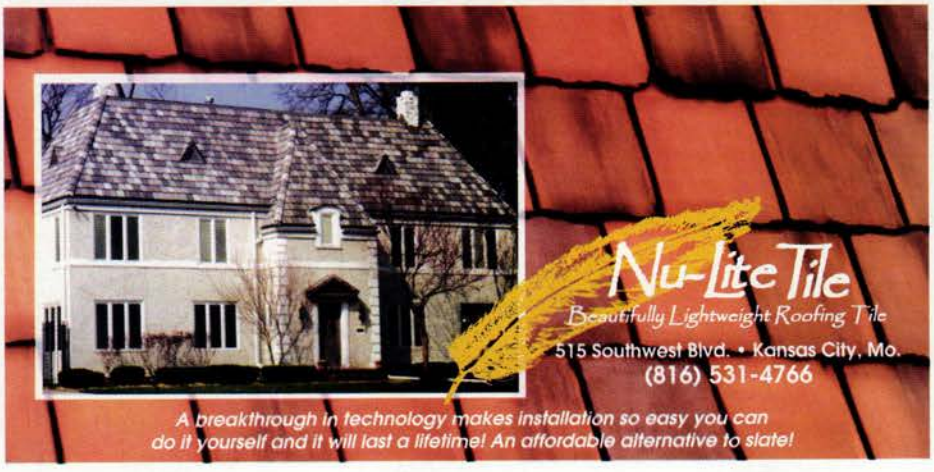

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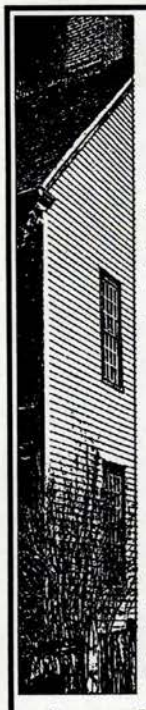

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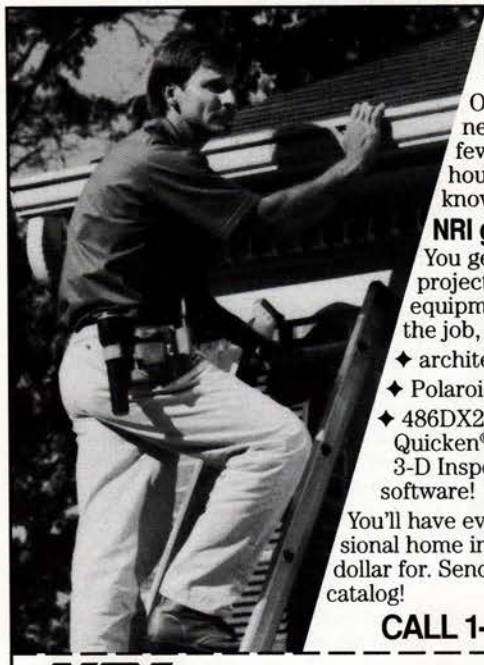

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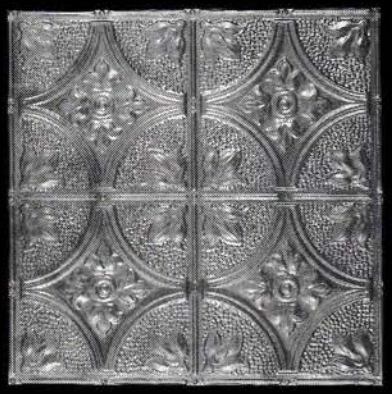

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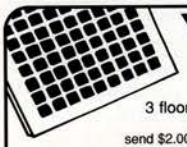

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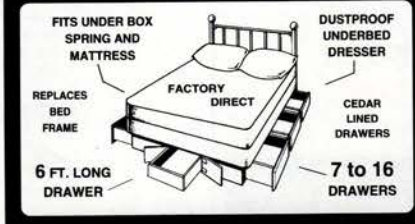

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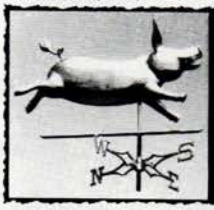

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CONTACT

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Kenner, LA 70065
800-426-4597

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RICK OLIVIER