MARCH/APRIL 1997

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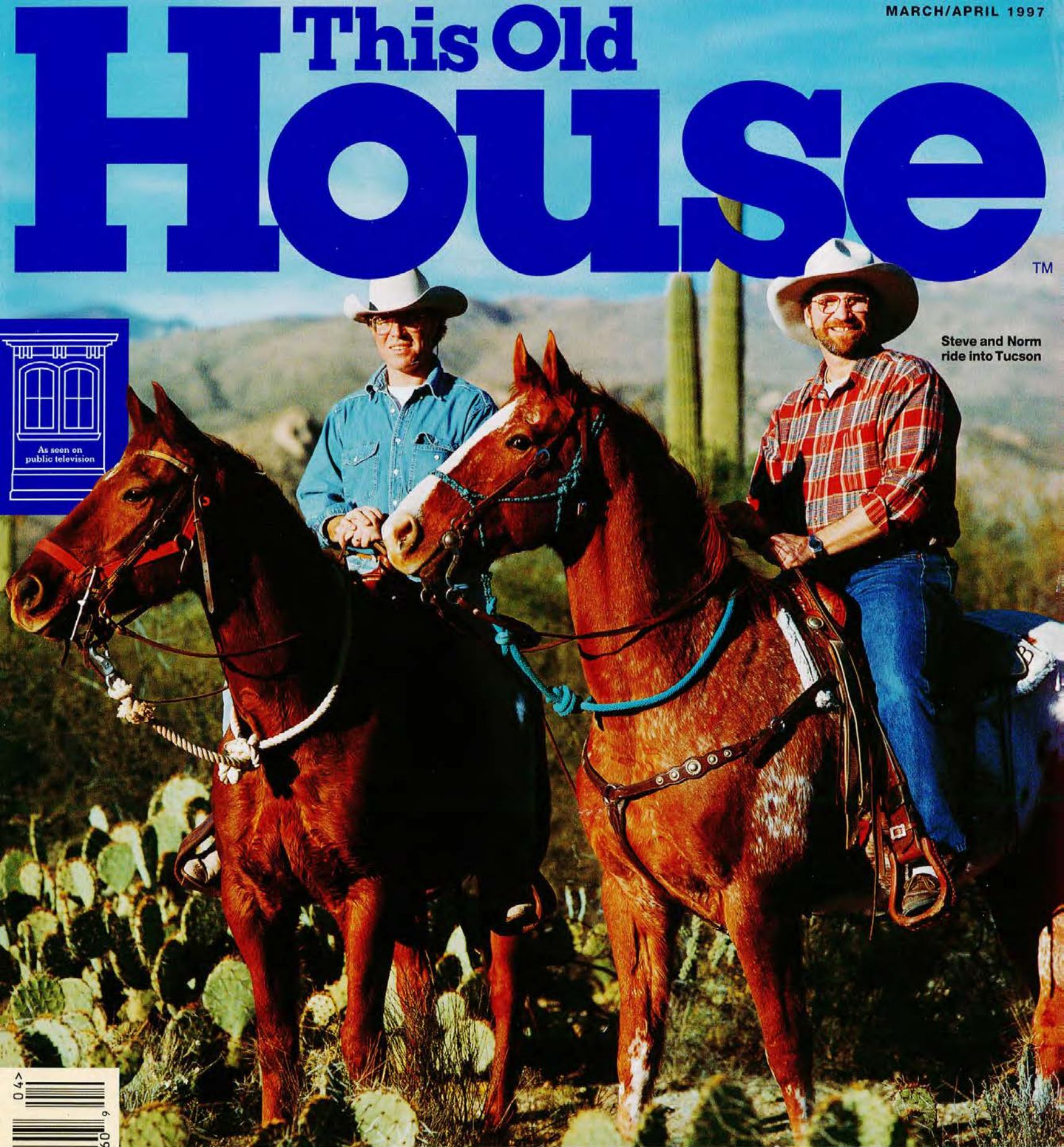

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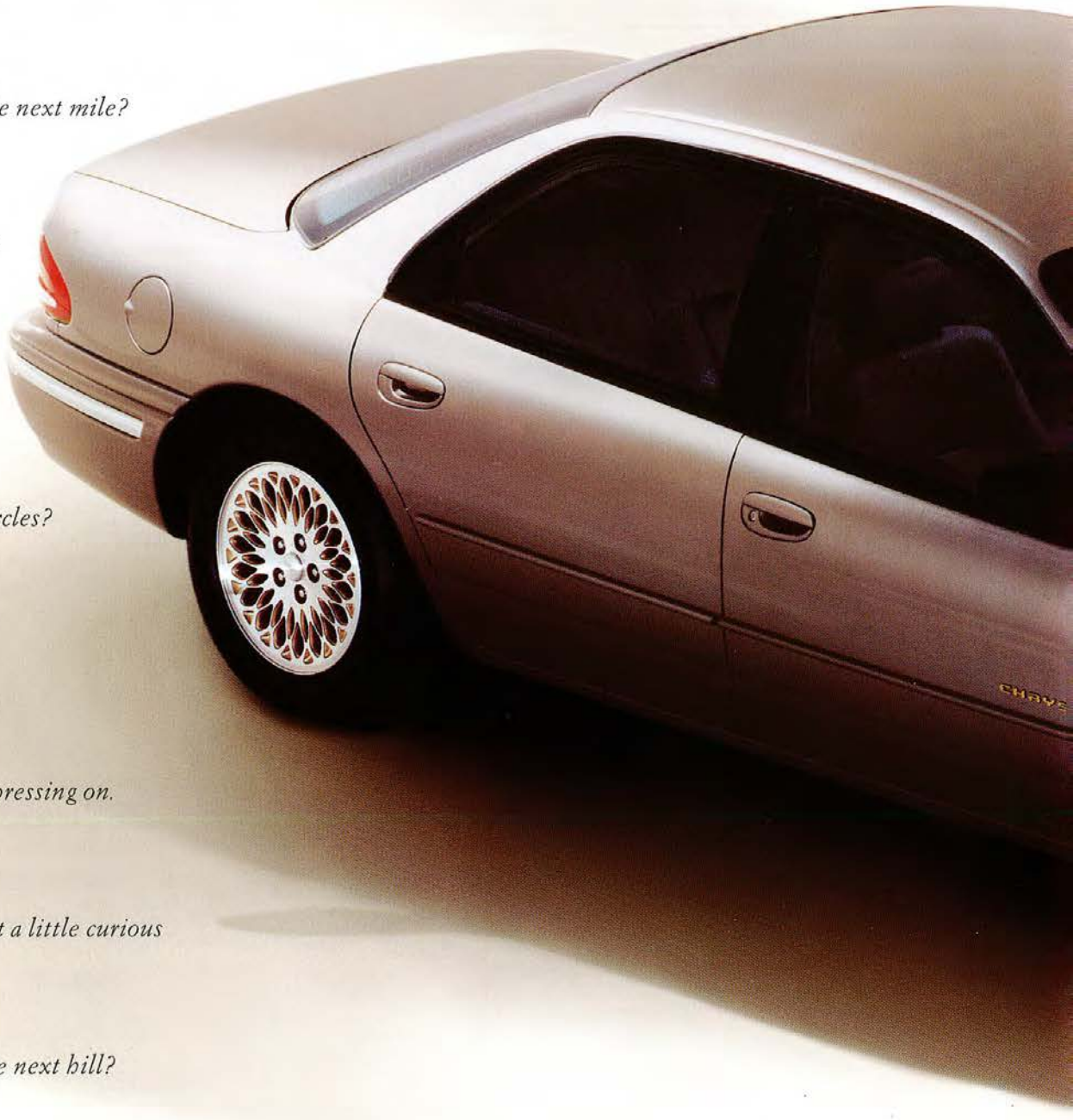

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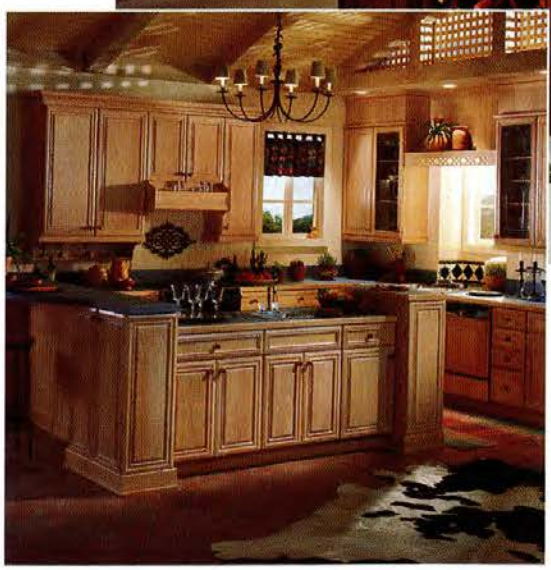

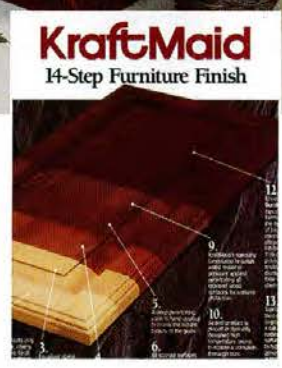

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features

MARCH/APRIL 1997

By George, p. 76

Arizona Dreaming 62

After two decades of putting off their remodeling dreams, a Tucson architectural designer and his wife jump at the chance to offer their 1932 Pueblo Revival house as the spring TV project. By Jack McClintock

Adobe, for the Future 70

A wall of 2x4s and Sheetrock feels as flimsy as a Hollywood set compared with a 16-inch-thick slab of solid adobe. But the age-old formula of mud, straw and water doesn't weather well. Adding a little 20th-century cement fixes that and allows an Arizona couple to build a house that may last until the next millennium. By Brad Lemley

Our Father's House 76

Whether leading his country into the midst of a war or fighting for the new Constitution, George Washington never forgot who he really was—an obsessed homeowner. The first of a new series on America's greatest houses. By Stephen Harrigan

Water is the Enemy 84

More than half of America's basements leak. This moist majority is only a downpour away from flooding that can destroy major systems such as heating and air conditioning. No wonder waterproofing guru Dean Maiorano is a popular guy. By Curtis Rist

An American Craftsman 90

For weeks at a time, master locksmith Bob Dix will imagine himself inside an antique lock he has never opened, trying to "see" the levers and tumblers and understand the craftiness of the original designer. Once he has figured it out, he can unlatch the lock without destroying it. By Walt Harrington

Microscopic Menace 98

Can Stachybotrys atra—one of dozens of molds that hide out in most houses—kill children? Learn why mold and mildew must be controlled and why newer homes are more dangerous than older ones. By Susan Benesch

The Poster: Moldings 104

Shaped strips of wood are crisp grace notes that bring charm, depth and soul to stark flat spaces. Rip out this month's poster to find a floor-to-ceiling guide to the classic profiles of baseboard, chair rail, casing, crown and other moldings. By John Kelsey

In the Garden 105

A classic greenhouse is reborn as a sun-filled addition; Russ Morash finds a surprising favorite among a yard-full of garden carts; and Pay Dirt looks at root cutters, carnivorous houseplants and more.

High profiles, p. 104

Fungus fighters, p. 98

Block builders, p. 70

Leak stoppers, p. 84

PHOTOGRAPHS, CLOCKWISE FROM TOP LEFT, BY SIMON WATSON, JOHN KERNICK, MICHAEL LLEWELLYN, BERND AUERS, DARRIN HADDAD

On the cover: Norm and Steve trot through the Sonoran desert on their way to the spring TV project. Photograph by Dan Borris

(Continued on page 10)

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up front

Off the Wall

Plumb Crazy **21**

Perhaps Lady Macbeth wasn't really mad, she was just in her wallpaper stage.
By Jeanne Marie Laskas

Equipment

Ladder Sense **33**

A well-dressed ladder can go a long way toward taking the fear out of climbing the rungs. By James Morgan

Power Tool

Stud Guns **39**

A new generation of high-tech nail-shooters has Tom Silva celebrating his right to bear arms. By Mark Feirer

Materials

Borrowing Light **44**

Somewhere between a window and a brick, glass block fulfilled a Depression-era ideal of simplicity. Now it's back, and in more styles than ever. By Ann Armbruster

Technique

Shingling Secrets **51**

Follow the scent of cedar and the sound of hammers back to Nantucket, where Norm shows the right way to side a house.
By William G. Scheller

Finances

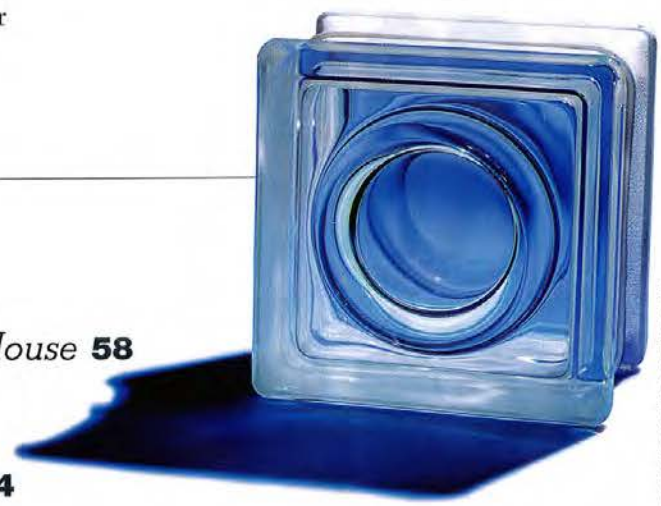
Bank Error in Your Favor **56**

Question authority—especially when it's your lender. Locating little bungles in your mortgage can yield hefty refunds.
By Lew Sichelman and Peter Miller

Shoot out, p. 39

Rung work, p. 33

Classy glass, p. 44



Plus

Contributors **14**
Letters **18**
Extras **24**
A Letter From *This Old House* **58**
TV Listings **112**
Directory **116**
Save This Old House **144**

True grit, p. 24

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/

PHOTOGRAPHS, CLOCKWISE FROM TOP RIGHT, BY MICHAEL GRIMM, TAKA, NICHOLAS EVELEIGH, DARRIN HADDAD

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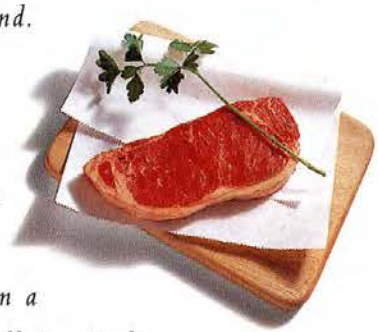

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As *This Old House*'s editorial correspondent, **BRONWEN MACARTHUR** researches and responds to all readers' questions and requests. The number one query: Will you renovate my house? The most memorable: Do we have plans for a casket, and does Steve have a *This Old House* tattoo? (We don't, and he doesn't.) **MICHAEL LLEWELLYN** (photographer, "Raising Arizona") has shot covers for *Time, Time Digital* and *U.S. News and World Report*, and his photo illustrations have appeared in more than 20 magazines. Recently married and living in Los Angeles, he will soon head for Pakistan to photograph whale fossils. German-born photographer **MICHAEL GRIMM** ("Stud Guns") has been based in New York for 10 years. He has recently completed assignments in Provence, along the west coast of Italy and in the town of Guimaraes in northern Portugal. **SUSAN BENESCH** (author, "The Menace of Mold and Mildew") was for eight years a reporter for *The Miami Herald*. She recently coauthored a book and cocurated an exhibition on English and American poets for the New York Public Library. (E-mail: 75401,2165@compuserve.com).

Next Issue

- Secrets of a lasting paint job
- Beautiful, no-maintenance concrete floors
- Kitchen cabinets made of tough mesquite
- Lightning rods to save your house
- Push mowers that make the cut

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PHOTOGRAPHS, TOP TO BOTTOM, BY RAFTER, JENNIFER ROPER, MICHAEL GRIMM, RAFTER

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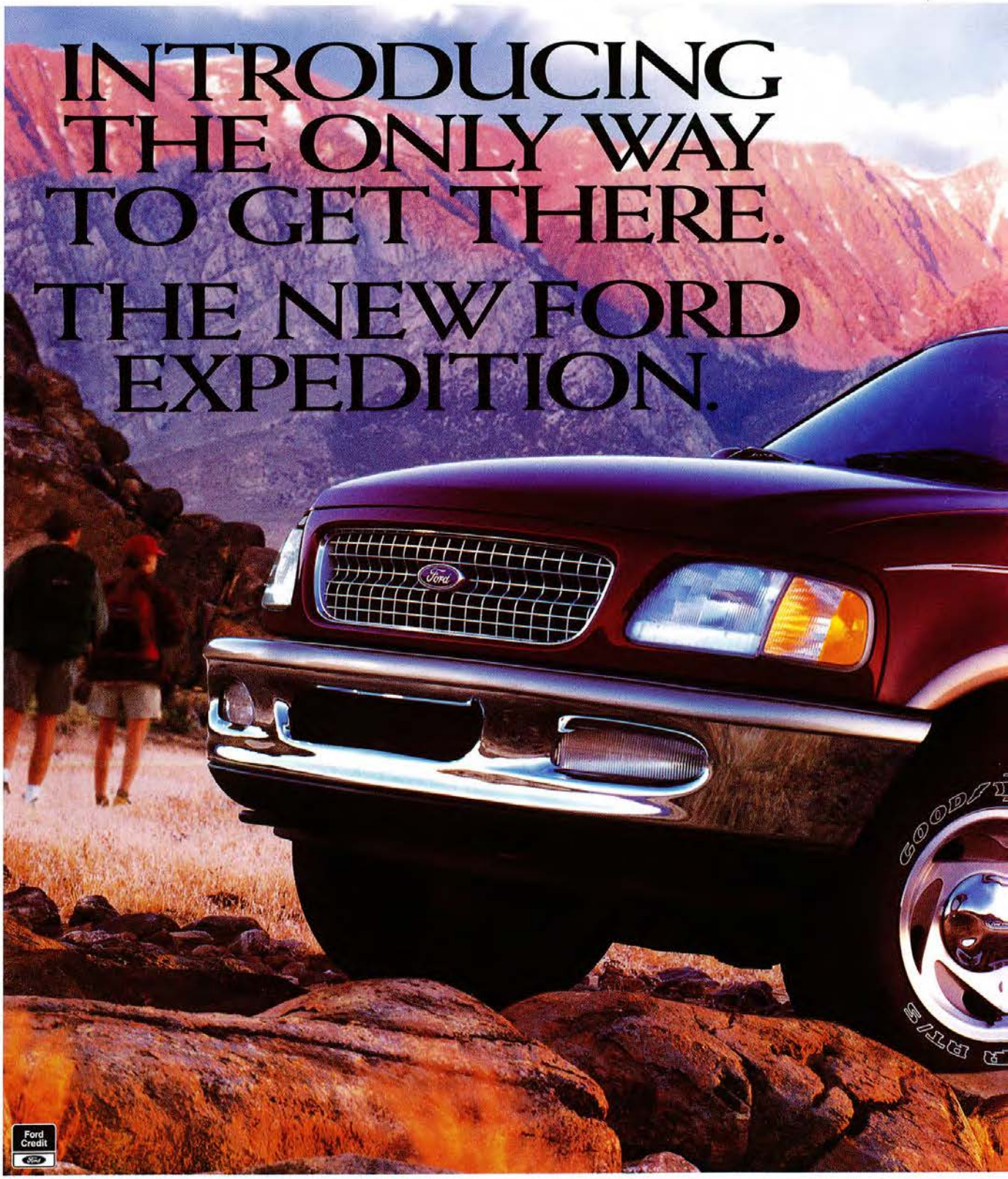

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Letters

I am living your November/December oil-tank story ["The Peril of Oil Tanks"]. In 1995, we discovered that nearly 300 gallons of oil had leaked out of our tank. We had to hire an environmental lawyer, a hydrogeologist and an expensive testing company. The clean-up itself was another $40,000, and we still have no idea if any of it will be reimbursed. Moreover, the stress of it all was a factor in the breakup of my marriage. Now I always tell people to just get rid of their tanks.

Connie Hornberger
via E-mail

Writer Pat Berry says that stress played a huge role in her oil-tank experience too, and that your letter was a grim reminder that while financial losses can be severe, the emotional damage can be even greater and more difficult to repair.

Your oil-tank article was thorough and informative, but we felt it necessary to point out that our company has the technology to clean oil, diesel and gasoline in a fraction of the "one to three years" you mentioned. Our bioremediation technique uses an oxygenation process that accelerates bacteria's natural consumption of contaminants by 1,000 times.

Wayne Simpson
Director, BioQuest
Environmental Company
Toronto, Ontario

Our coverage focused on the excavation and disposal of oil-contaminated soil—the most common cleanup method—but the EPA's Office of Underground Storage Tanks (OUST) says other techniques are cost-effective for certain conditions. The major problem in bioremediation is getting oxygen to underground microbes; even when oxygen is injected through pipes, cleanup can take six months to two years, and dense clays and silts can further slow the process. When soil or other conditions don't permit oxygen injection, other methods, such as introducing the biocatalyst your company has developed, can speed up bioremediation. But since no single treatment is going to be appropriate for all leaks, we recommend that homeowners hire a consultant who knows about all the options, as well as about local and state regulations. Information on alternative techniques, including newer technologies such as radio-frequency heating and soil washing, is available on the World Wide Web at http://www.epa.gov/OUST.

We loved your Nantucket doors ["A Door in Nantucket," November/December], but you gotta learn to speak like a Codder. That door you located in "Sconset" was in Siasconset—S'Conset, get it?

Jane Grant
Bernardsville, NJ

Your letter got us on the phone to Sarah Macey, an editorial assistant at the *Nantucket Inquirer and Mirror* and a 15-year resident of Siasconset. She assured us that the locals use both Sconset and Siasconset and that the apostrophe is optional, but, she added, it's used this way: 'Sconset. Whatever the spelling, we also learned that the town's name comes from the Algonquin Indian words for "near the great bone," a reference to whale remains that washed up on its shores.

When I cut holes in laminate counters, I use the same saw that Tom Silva used in the September/October jigsaw story ["Zigzagger"]. But instead of taping the cutline to lower the chance of the laminate chipping, I use a downstroke blade. Its downward-pointing teeth don't lift the laminate away from the substrate, and I've never had a chipping problem.

Peter Stolz
President, Kitchens & More
Walpole, MA

The four-inch antisplinter wood blade, shown at the top of page 23, cuts on the downstroke and is indeed suitable for laminate work. But Tom says he's "never been much of a downstroke-blade fan." They're no harder to use, he says, but instead of pulling the saw into the material, they tend to push it away, so you have to exert more pressure to keep the blade steady and prevent it from hopping up on the downstroke.

In your November/December story on holiday lights ["Trip the Lights Fantastic"], you provide an example for determining the maximum number of bulbs that may be connected to a circuit. Although your math is correct, you did not take into account the National Electric Code requirement (paragraph 210-23) that the load on a circuit must be limited to 80 percent of its breaker or fuse rating. The maximum allowable current on your 20-amp circuit should be 16 amps.

Philip C. Steiner
Darien, CT

Thank you (and Don Cook of Skokie, Illinois, and J. S. Tandy of Greentown, Pennsylvania) for the correction. Revised to incorporate the 80 percent rule, the permissible wattage in our example would be: 16 amps x 120 volts = 1,920 watts. That would allow for just 15 125-watt strings of C-7 bulbs instead of the 19 we originally calculated.

Our 1906 home is heated by hot-water radiators. We would love to add central air-conditioning, but the framework—oak studs with horizontal fire-blocking every 18 inches—makes installation expensive, if not impossible. What are our options?

Donald H. Bethel
Marion, IL

Richard Trethewey, plumbing and heating specialist for *This Old House,* has a few suggestions. First of all, running supply ducts to the upper floor is usually pretty easy. With the evaporator and blower installed in the attic, as they often are (and with the condenser set outside on a concrete pad), ducts for top-floor rooms are simply run to registers in the ceilings of those rooms. The main challenge is getting ducts to the lower floor. Whenever possible, installers run them down through the backs of closets and, for horizontal runs, through joist cavities. If those routes don't work, a duct chase can be built with standard stud framing. Opening up a wall cavity is usually a last resort and may only be needed for one or two duct runs.

If a standard system still poses installation problems, there are a couple of alternatives. The easiest is a high-velocity system, in which cool air is distributed through flexible, insulated two-inch ducts to small round outlets cut into walls, floors or ceilings. The small-diameter ducts make for a somewhat less invasive installation. (See the January/Februrary 1995 article "Comfort Control," on how such a system was used in the Salem project.) Another possibility is spot-cooling your house with a split air conditioner. The inside unit (the evaporator) is about 14 by 22 by 5 inches and is connected to an outdoor condensing unit only by a pair of coolant tubes. Split units are thermostat-controlled and come in a range of sizes, though even the largest won't cool a whole house. It may take two, three or more, depending on the climate and the size of your home.

I am troubled by the advice of the American Society of Heating, Refrigeration and Air-Conditioning Engineers discouraging roof ventilation in the humid Southeast ["Extras," November/December]. Having built, restored and inspected hundreds of houses, I have found that inadequate attic ventilation is the major cause of housing deterioration in the Richmond, Virginia, area. A new house with innovative air-exchange technology may work without soffit and roof ventilation, but for those thousands of standing houses, my experience leads to a contradictory position.

Bob Congdon
Building Consultant
R. J. Moore & Co.
Annapolis, MD

Your point goes to the heart of the roof ventilation debate: Is what's good for new houses good for old ones? The first guidelines about roof venting were developed in the 1950s, when houses typically had high rates of air infiltration and attic heat loss. In those houses, cold outside air would be warmed when it entered the attic, picking up moisture before exiting through an exhaust vent. According to this new theory, a tight, well-insulated house in a humid climate has, for a couple of reasons, little to gain from roof ventilation. In thickly insulated—and thus colder—attics, incoming air isn't warmed and doesn't pick up and exhaust as much moisture. It's also possible for the ridge vent exhaust rate to exceed the intake through soffit vents, in which case air can be drawn up from wet basements and bring even more moisture into the attic. Acknowledging the variations in climate, construction and insulation, the engineers' society is not flatly discouraging roof vents in the Southeast but suggesting that they may no longer be necessary. Their regional recommendations will be released at the end of this year in the 1997 ASHRAE Handbook of Fundamentals.

On Page 22 of the November/December Extras, you talk about rare-earth magnets ["May The Force Be With You"]. Rare-earth permanent magnets are typically manufactured of samarium-cobalt or neodymium-iron-boron for use on motors. The picture shows their strength in a fun way, but they are not to be played with as you might with low-strength alnico or iron magnets. Rare-earth magnets are many times stronger and dangerous if you are not careful. They can cause injury by pinching the skin and are difficult to separate if they get too close together. These magnets are also very brittle and can shatter when dropped or allowed to slam together. They shouldn't be used as toys.

Fred W. Heilich III
Programs Manager, Aerospace and Defense Products
Kollmorgen Technologies
via E-mail

While watching the rebuilding of the Concord barn on *This Old House Classics*, I saw a segment on a staircase manufacturer from Wisconsin. I am interested in knowing more about this company and the cost of a custom staircase.

Mike Wilhite
via E-mail

Arcways, a family business established 25 years ago, built the three-story open-riser staircase out of red oak to match the massive timbers of the Concord barn. Arcways says that standard staircases start at around $4,100 and go up from there. You can reach them at Arcways Inc., 1076 Ehlers Road, P.O. Box 763, Neenah, WI 54956; 800-558-5096. (For more information on *This Old House Classics*, see page 112.)

punch list

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

- Two incorrect phone numbers were listed in the January/February Directory entry for our story on the Nantucket project finale. The number for Climate Master, supplier of the geothermal heat pump, is 800-299-9747. The number for window manufacturer Kolbe & Kolbe is 800-955-8177.
- The photographs for the November/December article on belt sanders, "Sand and Deliver," were incorrectly credited. The photographer is Phillip Esparza.

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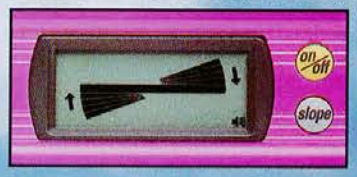

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Plumb Crazy

Hopelessly lost in the remodeling zone

BY JEANNE MARIE LASKAS

One thing about home remodeling projects is they make you focus on things you've never thought much about before. I'll give you an example: wallpapering. About five years ago, I started my first wallpapering project. The room was the kind you shouldn't even think about papering—a closet-turned-bathroom with weird angles, a crooked dormer, not a straight line in sight.

THE EVERETT COLLECTION

Many plumb-line challenges ensued, not to mention huge blobs of glue plopping onto my toes. But the real fun would come afterward. I'd be at a friend's house. The friend would be talking. The friend would be imparting big, dramatic news. But I would be otherwise engaged. I'll give you an example:

Friend: I'm having an affair with my boss.

Me: Unh-huh.

Friend: We're thinking about running away to Tahiti.

Me: That's nice.

Friend: But before that we're going to rob a lot of banks and shoot innocent bystanders.

Me: I see. So, when you hung this wallpaper, did you begin with the piece next to that door frame there?

Friend: Excuse me?

Me: And those ceiling edges. Did you use a knife or did you score the paper first and then cut it with scissors?

Friend: What?

Me: You know, my corners are a lot lumpier than yours. What's your secret?

Needless to say, friends stopped imparting big, dramatic news to me. Because my focus was elsewhere. I was in my wallpaper stage.

When a person is in his or her wallpaper stage, the whole world is suddenly divided in two. There are things having to do with wallpaper, and then there is everything else. I no longer regarded loved ones as loved ones but as people who wallpapered. Visiting my sister one day, listening to her rattle on about a trip to France—or maybe it was something about wanting to give peace a chance—I learned that she was the type to overlap her paper as opposed to butting the edges. You don't find many overlappers nowadays.

Visiting my brother, listening to him get all excited about

making waffles—or maybe it was hot-water nozzles—I learned that he is the type to forgo plumb lines altogether. His whole kitchen seemed to be leaning, thanks to the vine pattern tilting ever so slightly to the right. Why had I never noticed this before?

Because people aren't supposed to notice such things. Because wallpaper is supposed to be background. But it no longer was to me. The background of my life had become the foreground. And vice versa.

It could happen to anyone. When you take on a home remodeling project, your whole world is suddenly seen through that project. The phenomenon goes well beyond a matter of obsessing about something—as, say, you do when you're hungry and all you can think of is sinking your teeth into a burger. It's more of an organic thing, a total brain shift. Your head is not quite the head it once was.

I'll give you an example: roofing. When I was putting a new roof on my house, it got so I could look at any house in the neighborhood and accurately guess the weight of the asphalt shingles. (Well, I imagined I was accurate; I never knocked on the door to ask.) But what a fascinating detail of the world to focus on. I mean, chimney flashings are no laughing matter. And when it comes to downspouts, well, how do you tell your best friend that her gutters should be torn off and redone?

"What?" said Beth. "Why?"

"Because your gutters are more than 35 feet long, and you need a drop of a sixteenth-inch for each foot of length for proper drainage, which will mean you'll want them to slope from the center down to two downspouts, one on each side," I said.

"Oh, brother," she said.

"Is something wrong?" I said.

"I didn't invite you over to look at my gutters," she said. "I invited you over for dinner." She lured me into the kitchen with crab cakes. We sat down. She started telling me about a promotion—or maybe it was a demotion—when suddenly I saw it: Her kitchen window was sagging. (I was heavily into a double-hung window stage.) I told her how easy it is to replace a sash chain, but she was very rude and cut me off with something about getting a divorce—or maybe it was buying a horse.

"The truth is," I told her, "if you're going to replace one sash chain, you may as well go ahead and replace both. Do you have sash-weight pockets on these windows?"

She gave me a blank stare.

I apologized, explaining how hard it can be to yank your focus away from a remodeling project when you're in the midst of one.

"It can be very hard on relationships too," she said.

At least one ex-boyfriend of mine would agree. But in this particular case I plead innocent. Because it is a fact of life: All six-panel doors are not the same. I hadn't noticed this until it came time for me to replace my bedroom doors. I picked the good ones, the solid pine ones. And then I couldn't help myself. I went around knocking on people's interior doors to see if they had the solid kind or the hollow kind. Butt hinges or loose-pin hinges? And what brand of latch-bolt assembly?

Well, one day I knocked on the interior doors of the boyfriend's condo to discover an unsettling truth. His doors weren't solid wood. They weren't hollow wood either. They were...plastic.

"Composite!" he insisted, grasping for forgiveness.

It's interesting to note how my life could be entirely different had I not entered my six-panel door stage. I might have gone on obliviously opening and shutting the plastic doors of this man's condo all the way to the altar had the foreground of my life not become background, and vice versa.

Wallpaper is supposed to be background. But it no longer was to me. The background of my life had become the foreground. And vice versa.

It is a necessary shift in paradigm. Home remodeling obsessions are what enable you to do good work. To lose yourself in a project to such an extent that one detail of the background of your life becomes the entire foreground is the true mark of craftsmanship.

Or so I tell myself. What, after all, becomes of the person prone to remodeling obsessions? Do you turn into a complete neurotic who can never again focus on a conversation and who continually lectures friends on inferior building materials? I don't think so. Home remodeling fixations fade, though minor twinges do remain. I can't remember the last time I knocked on someone's interior doors, although I have to admit it's difficult for me to resist tapping on the occasional oak table and guessing at how many coats of urethane might have been applied.

And my wallpaper obsession? Well, nowadays when I walk into a bathroom I don't even notice the wallpaper. I'm far too busy studying the caulking bead, wondering if the person who applied it held the gun at a 45-degree angle, a 30, or perhaps a 75.

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Look what you get in every bag.

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Energy from carbohydrates, found in rice and barley.

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Protein for strong muscles. Vitamin B to help them work harder.

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All the nutrition your dog needs for a long and healthy life.

That bag contains 100% of the balanced nutrition your dog needs for a healthy, active life — no other dog food can beat it. And with rice, which is easy to digest, your dog will get the most out of what's in it. Naturally, the meaty taste ALPO's long been famous for is in there, too.

A GREAT DOG DESERVES **ALPO**

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extras

Photographs by Darrin Haddad

grime control

the **treasure** in the old post

Jeff Wuesthoff was renovating the stairway in his 107-year-old Atlanta Victorian when he peeked into the hollow newel post, a place where builders often left treasures. He was rewarded: Inside was a note that read "Made by G.M. Fishback, Feb. 6, 1889." Intrigued, Wuesthoff decided to see if any of Fishback's descendants were still in the area. Through a friend, he learned of woodworker Joe Fishback, who gives lectures on his craft using a set of old tools. Turns out that Fishback, right, is the grandson of George Martin Fishback, and those tools are the very same ones G.M. used on Wuesthoff's staircase. When Wuesthoff invited Fishback over to check out his forebear's handiwork, he learned how G.M. got his start. He had lived through the battle of Atlanta during the Civil War, and soon after, at 16, began learning his trade in the rebuilding of the city.

A satisfying moment: When work is done, you wash your hands of the day's hassles and grime. Getting rid of the stress may take some time, but with today's hand cleaners, the dirt goes fast. Waterless creams **(6)**, gel soaps **(2)** and premoistened paper towels **(3)** are gentler than some of the 19th-century concoctions we've learned about—straight borax, blends of turpentine, fish oil and sulfuric acid—but they still contain solvents and detergents (which, in extreme cases, can cause nerve damage) and lanolin (a common allergen). To play it safe, dermatologist Boris Lushniak of the National Institute for Occupational Safety and Health recommends using mild cleansers—and no more often than is absolutely necessary. Products with abrasives such as pumice **(5)**, sand and powdered nutshells **(1)** are okay for dirty palms, where skin is toughest. On tender skin, abrasives may cause a tingling sensation, but "that isn't 'deep cleaning,'" Lushniak says. "It just means skin has been removed." Skin care can also start before the work does, with barrier creams **(4)** applied several times a day. And when it's time to wash up, don't let cleansers soak in. Instead, scrub hands quickly with a soft surgical brush, rinse right away with water and apply moisturizer. Here the choice is easy: Tests have shown that common, inexpensive brands are just as effective as fancy formulas that cost a lot more.

6

5

2

3

4

Home on a Range

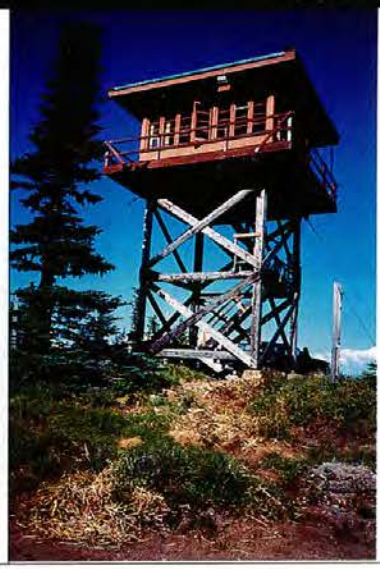
As any home seller knows, the more people who visit, the better the chances of getting an offer. And beefing up traffic is the no-holds-barred objective behind value-range marketing (VRM), a pricing gimmick now being used by a few agencies. Instead of attaching a single price to their property, sellers put their houses in a range from a low-end price to the highest figure they could hope for. In the traditional approach, a seller who wants $215,000 might list his house for $225,000, but with VRM he would put it in the $185,000 to $225,000 range in hopes of drawing buyers who normally wouldn't look at houses above, say, $200,000. The problem, says Stephen Krawse, a Denville, New Jersey, broker who doesn't use VRM, is that most sellers have no intention of accepting a low-end offer. "We're seeing buyers lured into a property they can't afford based on a range that isn't a true indicator of the seller's position. VRM fulfills every negative perception of the salesperson: Bait and hook." Nonetheless, market tests conducted by Prudential Real Estate Affiliates showed that their VRM-listed homes sold 50 percent faster than single-price listings and that most sold at or above the midpoint of the range.

FISHBACK PHOTOGRAPH BY NIGEL MARSON

(See Directory, page 116, for details and sources)

"I don't know many **carpenters** who don't carry a **jackknife**."

Norm Abram



Can't Beat the View

Got a burning desire to get away from it all? A fire tower may be just the place to quench it. A new book, *How to Rent a Fire Lookout in the Pacific Northwest,* gives details on dozens of former ranger cabins, warming shelters, bunkhouses and lookouts in national forests of Oregon and Washington. We're dreaming of a few nights in the Indian Ridge Lookout in Willamette National Forest, pictured at left. Just $20 a day buys a 16-by-16-foot perch atop a 30-foot tower. You'll have to come well prepared, though—the place lacks plumbing, heating and electricity.

NOT CAUSING A STINK

Chasing the occasional stray dog from your yard is one thing; getting rid of a roving skunk is something else entirely. That was the problem for one Rowayton, Connecticut, homeowner who stepped outside to find a skunk flopping about the lawn—ensnared, it turned out, in a badminton net left on the ground. A call to the town animal control department was fruitless. "We don't do skunks," said the voice at the other end. A company advertising humane animal relocation in the Pest Control section of the Yellow Pages didn't do skunks either but offered a tip: Use mothballs to keep them from moving into a crawl space or other potential burrow. A few more calls led to a trapper, who agreed to tackle the job for $60. "Happens all the time, especially with soccer goals," he said. By speaking soothingly to the animal, he was able to slip a bag over its head, cut the netting from around its feet and set it free—all without a whiff of that familiar scent.

Events and Appearances

Norm Abram April 18 Blain's Farm and Fleet Store Love's Park, IL 608-754-2821

Steve Thomas March 14-15 Fraser Valley Home Show Tradex at Abbotsford Airport, Abbotsford, BC 800-633-8332
April 4-5 Kitchen and Bath Show Baldwin Hardware Booth, McCormick Place, Chicago, IL 800-527-0207

Tom Silva March 1-2 Youngstown Home and Garden Show Eastwood Expo Center, Youngstown, OH 330-865-6700
April 4-5 Southern Ideal Home Show Charlotte Merchandise Mart, Charlotte, NC 800-849-0248 ext. 106
April 13 New Jersey Home and Garden Show Raritan Center, Edison, NJ 914-356-2100

Richard Trethewey March 8 Builder's Home and Garden Show America's Center, St. Louis, MO 314-994-7700
April 4-5 Southern Ideal Home Show (see above)

eastern blocks

With this maple block set, your little Ivan (or Ivana) the Terrible can create mini Kremlins and dachas. The award-winning 57-piece collection contains 17 shapes, including the familiar onion domes that adorn Red Square.

CREDIT

(See Directory, page 116, for details and sources)

make a **splash**

If water—or spilled coffee—has ever wiped out a page of shop notes or sketches, you'll appreciate Rite in the Rain notebook paper. Its patented coating sheds water but doesn't resist scribblings in pencil or ball-point pen.

a man's 10½ shoe = 1 foot (12 inches, that is)

six-inch **skyscrapers**

Who'd have guessed that the Empire State Building pencil sharpener you loved as a kid would someday be a museum piece? Margaret Majua and David Weingarten have collected the hundreds of building miniatures that are on display through May 4 at the Octagon, the Museum of the American Architectural Foundation in Washington, D.C. Among the souvenir skyscrapers, cathedrals and monuments are many that do double duty: Statue of Liberty lamps, Big Ben cigarette lighters, Independence Hall coin banks, even Cleopatra's Needle salt and pepper shakers. The museum, knowing an opportunity when it sees one, is selling its own eight-sided mini (proceeds to benefit the foundation).

ILLUSTRATION BY ROB LAYTON; LOOKOUT BY FOLEY/STEINFELD; BUILDING MINIS FROM *SOUVENIR BUILDINGS/MINIATURE MONUMENTS FROM THE COLLECTION OF ACE ARCHITECTS.*

Site Visits

When Jon Zimmers started his Web site in 1994, it was the first of what are now several sites devoted to finding, buying and selling vintage tools. "People warned me that old-tool guys don't use computers," Zimmers says, "but now I do a third of my business on the Internet." As well as doing a brisk trade in Victorian block planes, Zimmers' Antique Tools **(www.teleport.com/~jonz)** links to regional clubs and offers reprints of old catalogs. At Antique, Collectible and Ornamental Tools **(tooltimer.com),** there are more want ads and a fascinating homage to the ornamental turning lathe, an obscure contraption coveted by collectors and craftsmen. For collectors and noncollectors alike, the Museum of Woodworking Tools **(trilux.com/tools.html)** has several virtual exhibitions, including "English Shoulder Planes, 1860-1938" and "Details: Toolmaking as Art."

save those **empties**

When retired undertaker David H. Brown built a house, he chose a material that was close at hand—and free: empty embalming-fluid bottles. Although he was, he said, indulging "a whim of a peculiar nature," his choice was a practical one. The bottles' square shape made construction easy. (Brown used some 600,000 bottles, representing final preparations for about 185,000 clients). The insulation value of the walls, which are one bottle-length thick, is estimated to equal that of 40 inches of fiberglass. Winters are serious in Boswell, British Columbia, but one fireplace heats the entire 1,200-square-foot house. Even before it was finished in 1952, the castle-like structure drew a disconcerting number of curious visitors. Charging admission didn't discourage them—but it did add up to a profitable sideline, which Brown's heirs, who no longer live in the house, continue to operate.

volcanic counters

From a quarry in southern France comes a unique addition to the list of counter materials: lava. The dull brownish stone, mined from an ancient volcano, is glossed over with impermeable glazes to create a surface that looks like one piece of brilliantly colored tile. Custom-fabricated in slabs up to 9 by 4 feet and 1½ inches thick, pieces can be joined and sealed with a color-matched grout. The rock weighs slightly less than granite and marble, but the cost is a lot heavier: about $200 a square foot.

Continued on page 30

We started with an open mind. And proved how surprisingly responsive, roomy, capable and comfortable a truck can be.

We cater to your individual needs by offering a driver seat that does, too. Note, for instance, the adjustable lumbar support. What's more, the all-new Dakota Club Cab's driver seat can be reclined 27°. And the seat itself is designed to help protect you in the event of a rear collision.

Rear-wheel anti-lock brakes are standard on the new Dakota. And for extra control when braking and steering, you can opt for four-wheel anti-lock brakes.

The many cubbyholes, cupholders and storage bins offered in the new Dakota make it a great place to put your stuff. While things like standard dual airbags and high-strength steel door beams make it a great place to put yourself.*

With up to 30% more seat travel, comfort is within easy reach, whether your legs are on the short side… the long side… or somewhere in between. Great news, since even a little discomfort can really be magnified over a long drive.

You can opt for a premium Infinity® stereo system with cassette and CD player in the new Dodge Dakota. Eight speakers in six locations kick out some real concert-quality sound.

Thingies, doo whatchamaca & other nifty no

CDs, cell phones and other everyday necessities can be conveniently stowed away in the all-new Dakota's optional mini business console.

A pickup that offers the luxuries of a car… the conveniences of a people hauler… and the cornering predictability you might expect of a sport sedan?

Most times, you won't be hauling much more than a steaming cup of coffee in the morning… or that oversized soda that makes the afternoon commute bearable. It's for precisely those occasions that we offer up to five cupholders in the new Dodge Dakota.

We stand behind the name Dakota, with our Customer One Care™ 3-year or 36,000-mile bumper-to-bumper warranty and 3/36 Roadside Assistance.†

Surprise. It's the new Dodge Dakota.

We're willing to bet, you're a fun person. That being the case, you probably have some toys. With the new Dakota, we offer you some great places to put them.

The new Dakota is the roomiest truck in its class. There's even a forward-facing rear seat in Dakota Club Cab, with enough hip room to seat three across. Your passengers will be beside themselves with comfort.

dads, llits tables.

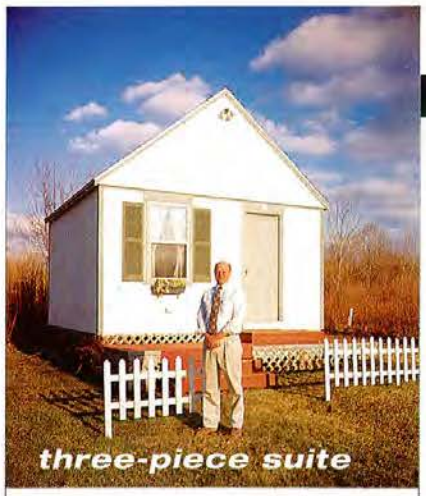
The new Dakota Club Cab's forward-facing rear bench is only part of the story. For another pleasant surprise, check out the convenient storage bins under the seat.

For more surprising facts, call 1-800-4-A-DODGE, or visit our Web site at http://www.4adodge.com

*Always wear your seat belt for a fully effective airbag. Rearward-facing child seats cannot be used in standard cab models. †See limited warranty & restrictions at dealer. Excludes normal maintenance & wear items.

Club Cab Sport 4x4

The New Dodge Dakota
It's full of surprises.



three-piece suite

Connecticut architect Dennis Davey thinks small. He's the brain behind Home4Me, a modular design meant to grow from a one-room starter unit (225 square feet) to a compact one-bedroom home (675 square feet) in three stages. With a twin bed, sofa, bathroom (shower, no tub), teeny kitchen and dining area shoehorned into a 15-foot square, the starter module verges on the monastic. But it's also affordable. Davey says all that's needed is $13,500 and a buildable lot. (Be sure to check local zoning rules.) Another $10,000 buys the 225-square-foot bedroom addition; the same-size family room goes for $9,500. His concept for a small, low-cost dwelling "includes everything I know about design," says Davey. "It answers the question 'What is a house?' in terms of absolute essentials."

The Big Spill

Putting the laundry room upstairs is efficient but also risky. "It destroyed my parents' house," says Richard Trethewey, *This Old House*'s plumbing expert, about the deluge—and $20,000 worth of damage—from a burst washing-machine hose. Hoses do indeed fail and should be checked regularly for bulges, cracking and stiffness, or simply replaced with today's better version: a hose jacketed with braided stainless steel. If it does give out it will only leak, not burst. For about $25, that's pretty good protection. Even better, install a shutoff valve between the hoses and the water supply. The manual type, right, controls both lines with one lever; the automatic valve, left, opens only when the washer is running.

blow out

What's the best way to clear the air when using solvents indoors? To find out, the International Brotherhood of Painters and Allied Trades experimented with a window fan in a room that was being painted. Solvent levels dropped dramatically when the fan blew from the doorway into the room and toward an open window. (With the fan turned around to pull air out, levels were twice as high.) Another tip: Always work in the direction of the fan, where fresh air is most plentiful.

LOW-E ON A ROLL

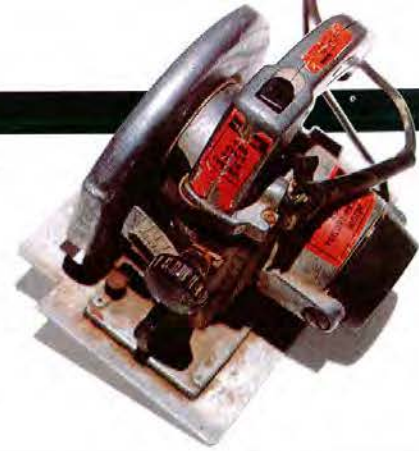
Add-on films have long been used to cut incoming sunlight (and cooling bills), but now the high-tech films that raise the efficiency of new windows can be applied to existing units. With the inclusion of the "low-e" feature of high-performance glazing, some of these sun blockers also reduce heat loss. In a test conducted by an independent lab, one brand cut heat loss by 30 percent. It also reduced heat gain by 79 percent—nice in summer but a possible drawback on south-facing windows in winter. In the way of all window films, low-e versions are applied with a roller or squeegee and a dilute mix of water and dish soap. We can't say how much energy this effort will save—a funky sash can still let in a lot of cold air—but at about a buck a square foot, it sure beats the price of a new window.

Grow in Peace

If you're planning to build an addition to your house, don't forget to increase your insurance coverage as well—*before* you start. Most homeowners don't do it until the work is done, but if the addition is damaged or destroyed before that, it might not be covered. Your agent may ask for a list of any special features and a rough estimate of the square feet to be added. The call will also ensure that jobsite materials are covered against theft. Emanuel George, an agent in Tarrytown, New York, says that in most cases the annual premium will increase by less than $100. Since it's going up anyway, why not get the most from your money.

MODULAR HOUSE BY JOHN KERNICK; FAN ILLUSTRATION BY BOB HAMBLY

Save This Old Tool



Thanks to Woodcraft of Parkersburg, West Virginia, worn but willing power tools are getting a new lease on life. Repair chief Bob Neff began the service last year and has been taking in half a dozen tools a week from homeowners and tradespeople. "The estimate is free," he says. "You pay for parts plus labor at 47 cents a minute with a 15-minute minimum. Tools beyond hope can be donated to the Great Cannibalization Pool. We pillage them for spare parts." Drills, saws and routers account for most of the repairs, and the oldest patient so far has been "a Stanley router, about 30 or 40 years old. I found new bearings for it," Neff says, "but I'm still hunting for brushes."

"A house consumes the lion's share of our wallet **and the sweetest side of our material dreams**."

Duo Dickinson, architect

alternative rock

We've all seen fake rocks for stashing keys outdoors, but what if you want to hide something bigger, like a sprinkler or a spotlight? You need an artificial boulder. We don't recommend them for landscaping (most fakes look that way and are about as unwieldy as the real thing), but they do offer features nature could never provide.

1. These hollow boulders have ample room for garden tools, sprinklers, pool supplies or other items better left outdoors. At about 20 pounds per cubic foot, the molded concrete shells are about one fifth the weight of a comparable hunk of granite.

2. Designed for any of the 150,000 U.S. communities where satellite dish placement is restricted, this giant carapace of fiberglass and granite dust weighs 27 pounds and conceals a standard 18-inch unit. Should a lone boulder seem out of place, smaller "companion" rocks are available for verisimilitude.

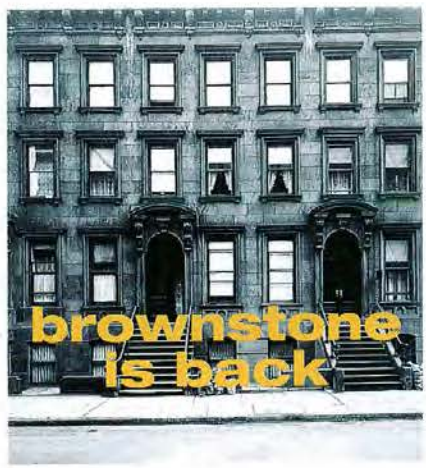
3. Many homeowners use rock lights for security, hooking them up to motion sensors. The beam can also be angled to highlight garden displays.

4. For piping music into outdoor spaces, a cottage industry has sprung up around stone-like speakers (not to mention the accompanying "rock" puns). Most are made of a plastic composite housing waterproof audio components.

BROWNSTONE BY ARCHIVE PHOTO

shear **strength**

When it's tough to cut through metal, there's an easy way to put more power in your hands: Turn the tin snips around and cut toward you. You'll get more leverage because you've increased the distance between the snips' pivot point and the point where pressure is applied on the handle.



In 1850s America, brownstone was the preferred building material of the urban upper-middle-class. Spreading throughout the Northeast (some 50,000 brownstones remain in New York City alone), it became the 19th-century equivalent of aluminum siding as more and more builders used it as an elegant veneer over common brick. But the soft stone didn't always weather well, and today so many old brownstones are on the rocks that a Connecticut quarry, closed since 1938, has reopened to help save them. Before he restarted the operation, Mike Meehan, owner of Portland Brownstone Quarries, spent a year researching the market. Now, he says, "I've got over 30 purchase orders. The business is going to work." It's good news for restorers because until now the standard repair involved chiseling away the damaged area, combining the chips with concrete (for color) and troweling on the mixture. But that method was only good for small patches. For bigger jobs needing solid slabs, Meehan's quarry can fill the bill, and it's one of a very few that can.

(See Directory, page 116, for details and sources)

Georgians. Colonials. Victorians. They're architectural jewels of an era long since past. Jewels that embody your passion for grace, elegance and style.

Restoring them is your labor of love. But as beautiful as these classic homes may be, their rubble stone basements, uninsulated walls and typical nooks & crannies mean high energy costs and annoying discomfort. Until now, the only solution was stripping plaster to the studs.

Introducing The Icynene™ Insulation System.

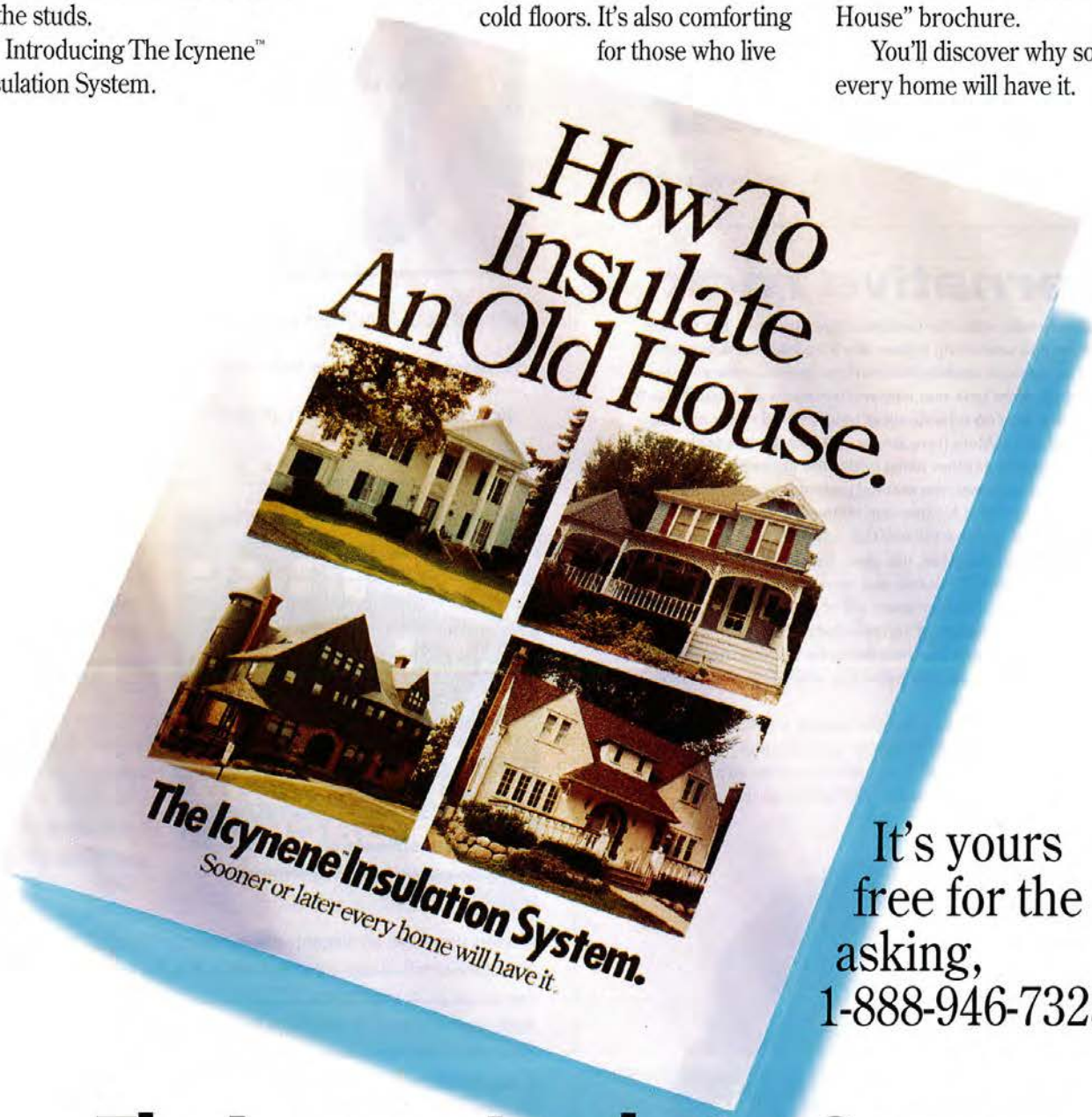
With Icynene, we can help you preserve those architectural elements you truly love, while substantially improving your home's comfort and energy efficiency. And because Icynene expands to fill every nook & cranny and adheres to everything it touches, you can eliminate costly secondary building materials, like vapor barrier and caulking.

The result is a home air sealed from the outside world. No drafts. No icy cold floors. It's also comforting for those who live in sweltering southern climates.

For allergy and asthma sufferers, Icynene is a breath of fresh air. It prevents the development of mold in wall cavities and prevents dust, pollen and other pollutants from entering your home. In fact, it's used in Lung Association Health Houses.®

But hey, don't just take our word for it. Call the number below today and we'll send you our free, comprehensive "How To Insulate An Old House" brochure.

You'll discover why sooner or later every home will have it.



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The Icynene™ Insulation System.

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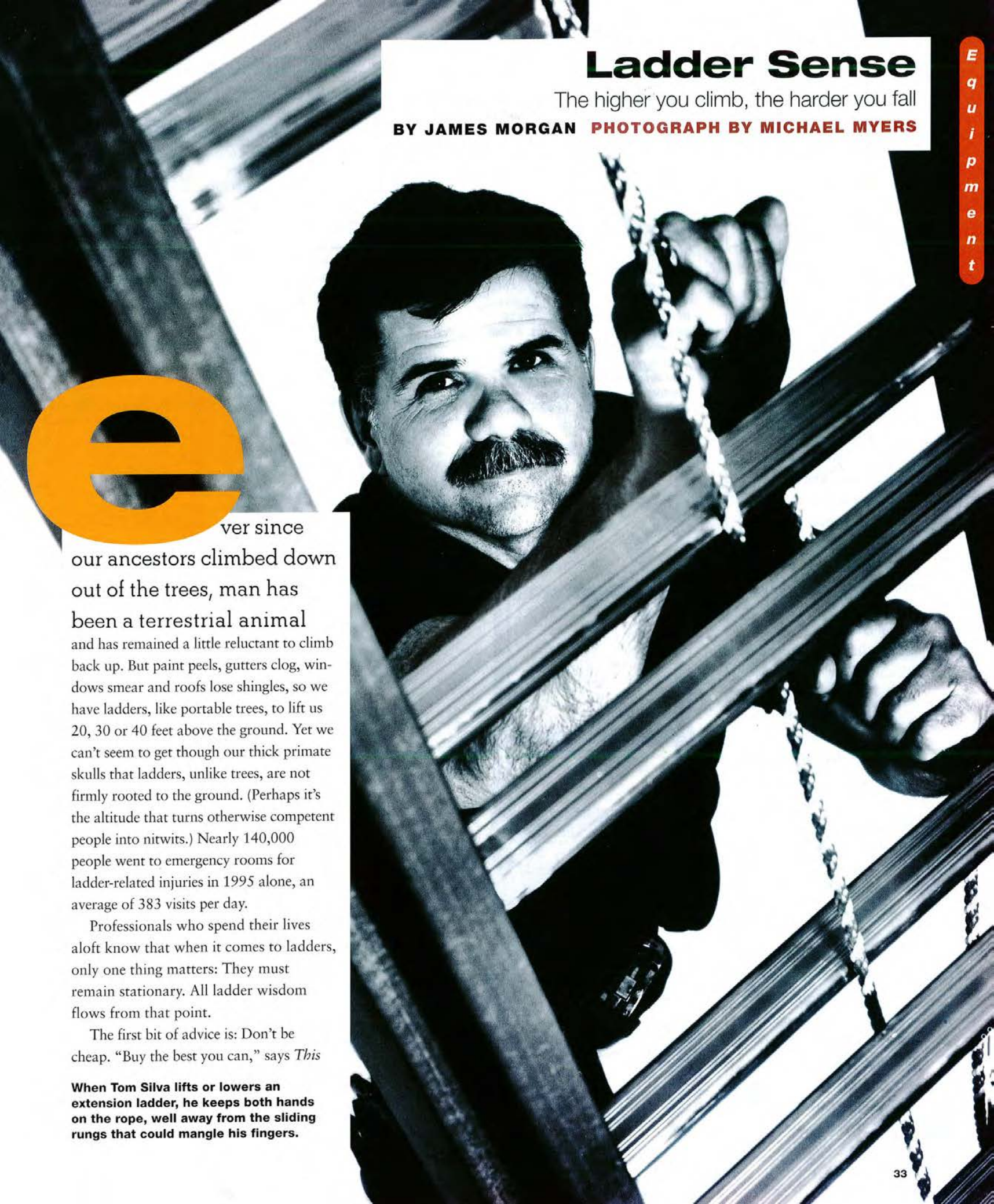
Ladder Sense

The higher you climb, the harder you fall

BY JAMES MORGAN PHOTOGRAPH BY MICHAEL MYERS



Ever since our ancestors climbed down out of the trees, man has been a terrestrial animal and has remained a little reluctant to climb back up. But paint peels, gutters clog, windows smear and roofs lose shingles, so we have ladders, like portable trees, to lift us 20, 30 or 40 feet above the ground. Yet we can't seem to get though our thick primate skulls that ladders, unlike trees, are not firmly rooted to the ground. (Perhaps it's the altitude that turns otherwise competent people into nitwits.) Nearly 140,000 people went to emergency rooms for ladder-related injuries in 1995 alone, an average of 383 visits per day.

Professionals who spend their lives aloft know that when it comes to ladders, only one thing matters: They must remain stationary. All ladder wisdom flows from that point.

The first bit of advice is: Don't be cheap. "Buy the best you can," says *This*

When Tom Silva lifts or lowers an extension ladder, he keeps both hands on the rope, well away from the sliding rungs that could mangle his fingers.

Reach for the sky

PHOTOGRAPHS BY DARRIN HADDAD

Old House contractor Tom Silva. "Life's too valuable to cut costs." Tom uses only commercial- or industrial-grade aluminum ladders. "Frankly, I don't think there should be anything else out there," he says.

But there is. Ladders come in three materials—wood, aluminum and fiberglass—and four grades: light household duty; commercial, for painters and general handymen; industrial, for contractors and maintenance workers; and professional grade, for rugged industrial and construction use. The most important difference between the grades is the weight they will carry—from a 200-pound maximum for household duty to 300 pounds for professional grade. Tom learned this the hard way early in his career, when he still felt invincible. "I went to a job and didn't have my ladder with me, so I borrowed the homeowner's cheap aluminum one. The chintzy thing buckled and I fell."

Having chosen a good ladder, there's the critical business of its steepness. According to John Dee, a painting contractor in Concord, Massachusetts, a ladder's feet should be planted away from the wall one-quarter of the ladder's extended length. In other words, a 16-foot ladder should be four feet from the surface it's leaning against. "And it's always safer to pull the

Telescopes

Judged on the ratio of storage size to extended height, the telescoping ladder can't be beat. Collapsed, this 23-pounder fits in a suitcase; expanded, its 12 sections grow to 12½ feet. A pull on two levers below each rung closes every section with a startling guillotine snap. The ladder needs consistent cleaning and oiling to keep the rails from sticking.

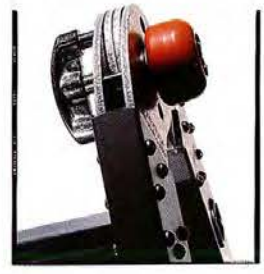
Stacks

Gas-lamp lighters created tapered wooden ladders to hook onto the tops of lampposts. Window washers found the tip nestled nicely on mullions and made stackable versions their trade's standard. Built in sections that reach up to 30 feet, tapered ladders are either progressive, meaning each segment is a different size and must be used in order, or interchangeable, meaning middle pieces can be added or removed. Rails have long been made of clear Sitka spruce, but that wood's increasing scarcity has forced some manufacturers to use fiberglass.

Extends

An extension ladder should always be set against a wall with the moving half—the fly section—on your side. A rope and pulley haul it up and flippers lock it in place. This industrial-grade ladder has fiberglass rails and steel shoes with picks that jam into soft ground. Fiberglass is strong and safer around wires than aluminum, but it's heavier. Sunlight degrades it, exposing fibers and letting in moisture. If the surface is damaged, spot-cover with polyurethane paint.

Folds and slides



This articulated aluminum ladder, which expands to three times its 4'7" storage size, has rails that run one inside the other and spring-loaded pegs, top, that snap into the rungs. Self-locking hinges, above, turn the ladder into an adjustable-height A-frame stepladder as well. Shorten one side of the A and the ladder sits level on staircases or sloped ground; flared legs give additional side-to-side stability. Aluminum is light, strong and durable but also a wonderful conductor; it should never be used near overhead wires.

The well-dressed ladder

Padded standoffs prevent sharp-edged ladder rails from putting scratches on walls.

Steel roof hooks safely hold a ladder to the roof peak. This pair swings in for storage.

Rubber booties are another way to protect walls from ladder-rail corners.

A sturdy, welded aluminum step makes long stays aloft more comfortable on the feet.

Two-toed feet keep an extension ladder from pitching over backward as it's being raised.

Self-leveling feet compensate for uneven terrain, so the rungs remain horizontal.

This standoff rests on the roof, sparing gutters from metal-bending collisions.

A stabilizer bar works around windows and provides a perfect spot to hang paint cans.

ladder out farther than to push it in," Dee says.

Up to a point, Tom adds. "If the ladder's not steep enough, you can't have good footing." Tom uses the L-shaped symbol stuck on each of the ladder's rails as his guide. If the L's short leg is horizontal and its long leg is plumb, the ladder is at the correct angle.

Once a ladder is at the proper angle, it needs solid footing to stay that way. On soft ground, turn pivoting shoes so they dig in or drive wooden stakes behind the shoes to prevent slippage. When the ground is too hard or too slippery, or there's nowhere to drive stakes, tying off a lower rung to an immovable post or two is cheap insurance. "Never stand a ladder on a drop cloth," Dee says.

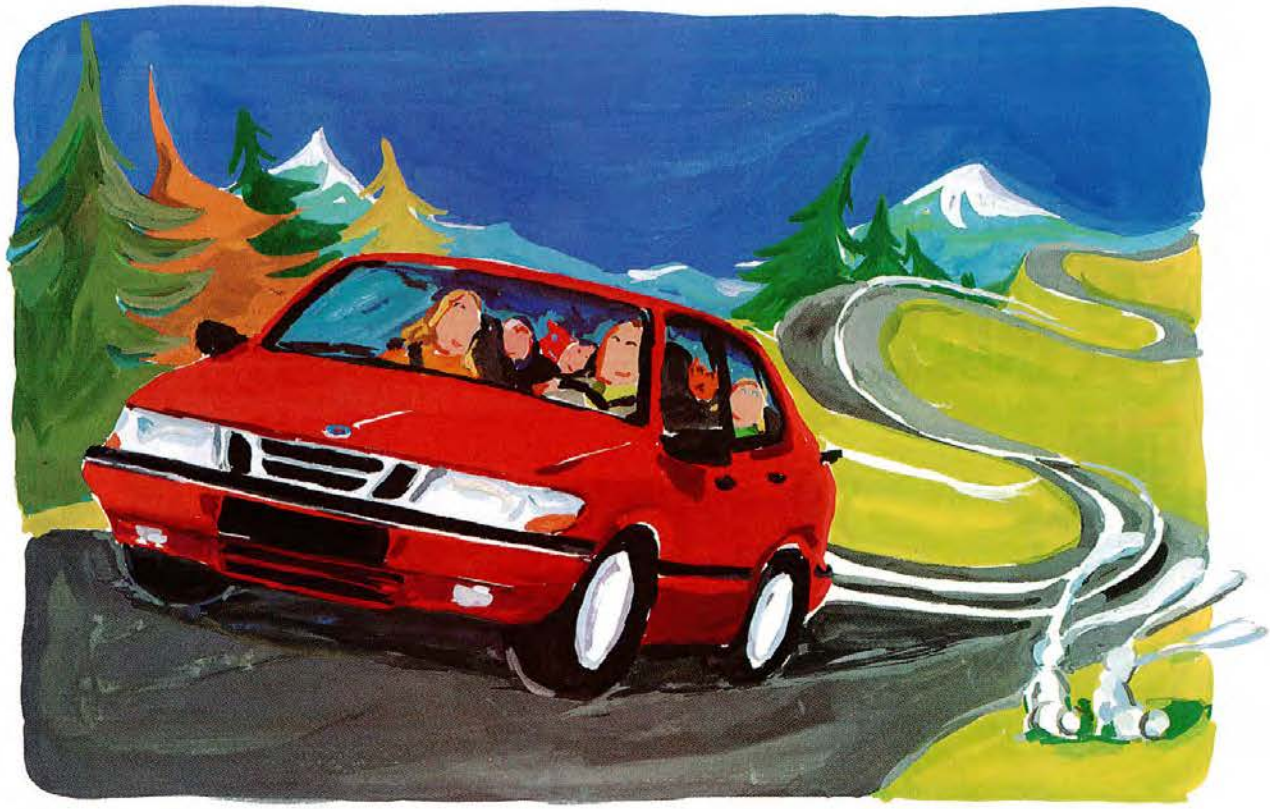
Even after a ladder is placed, staked and tied, Dee doesn't climb until he applies his cardinal rule: "Settle the issue of ladder stability on the first rung." In other words, if a ladder doesn't rock to one side or pull away when he leans back as far as he can, he'll be safe near the top. Dee fixes any problem while he's securely on terra firma. "If you take your fear up the ladder, it will affect your work," he says.

It's tempting to dress up a ladder with accessories, if you don't mind the added weight. Some added features protect walls and gutters from scars; others, such as self-leveling feet, improve safety. But common sense is the most important ingredient. Dee has seen people perched on the top rung of an extension ladder (you shouldn't go higher than the fourth rung) or standing on one foot doing an arabesque off to the side. "Reach with your arms, not your body" is Dee's advice. He's seen people carrying fully extended ladders and walking backwards—blind to limbs, windows and power lines. "Always collapse an extension ladder before moving it," Tom says.

Perhaps the most bizarre example of common sense taking a vacation is Dee's tale about the guy who put his ladder on the roof to access a dormer. "He didn't have a roof hook, so he tied a rope to the ladder, swung it over the peak of the house and secured it to the bumper of the client's car." You can imagine the rest.

PHOTOGRAPHS, CLOCKWISE FROM TOP LEFT, BY TAKA (1, 3, 5, 7) AND SPENCER JONES (2, 4, 6, 8)

(See Directory, page 116, for details and sources)



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Stud Guns

Ask questions first, shoot later

BY MARK FEIRER

The wail of a circular saw and the steady rumble of a concrete truck have long been signature sounds of house construction. Now there's another: the whip-crack of steel being shot into concrete. The device at work is a "powder-actuated fastener tool"—what most workmen call a stud gun. Tom Silva (above), contractor for *This Old House,* calls it invaluable. There's no faster way to join wood to concrete or steel, he says. Tom uses his stud gun to nail framed walls or flooring sleepers to concrete floors, to secure wood nailers to steel support beams and to fasten furring strips to masonry block walls. For finishing off a basement, he says, "Nothing beats 'em."

A stud gun works like a miniature pile driver: Exploding gunpowder propels a ram against a hardened nail called a pin. The pin moves so fast—up to 328 feet per second—it can shoulder aside steel or concrete. Both materials are elastic enough to squeeze back around the fastener the instant it stops. A pin needs to penetrate only an inch or so into concrete (it must go through steel), but that's more than enough to keep walls in place on a slab. "To pull a pin out," Tom says, "you'll need a three-foot crowbar"—a force of up to 1,890 foot-pounds. There are other fasteners that hold better, but once the walls are in place, pins won't be subject to withdrawal anyway. Don't even try to pull one from steel—you can't.

A pin shot perfectly into steel penetrates just past the taper. The steel grips the pin shaft in a tenacious, nearly unbreakable hold.

The gunpowder charge, known as the load, determines how deep a pin will go. Loads, like the guns themselves, come in calibers of .22, .25, and .27. All loads are numbered from 1 (weakest) through 12—many are also color-coded—but loads and pins are not always

TOP PHOTOGRAPH BY KELLER & KELLER; BOTTOM BY DARRIN HADDAD

interchangeable between makes. Pins also come in a variety of diameters, lengths and styles, depending on the job they need to do. Most are made of heat-treated, high-carbon steel, which will rust if it gets damp. Where corrosion could be a problem, use stainless-steel pins.

Even with all that firepower behind it, there's no guarantee a pin will penetrate. Concrete varies in density—old concrete is harder than new, for example—and it's laden with stone aggregate that sometimes stops pins. Steel is also unpredictable. Tom never knows if the I-beam he's firing into is stewed from scrap bolts (soft) or Buick bumpers (hard). He usually test shoots a couple of pins, starting with the lightest load he thinks will work, before he settles on a charge that doesn't bend the pin or send it too deep. An overdriven fastener buries its head in the wood, dishing washers and reducing holding power. "Not a pretty sight," Tom says.

Some materials (ceramic tile, glass block, fireplace brick) are too brittle to withstand the force; others (stone, steel welds) are too dense to penetrate; wood is too soft to hold a pin. In suspect surfaces, do a punch test first by hitting a pin with a couple of moderate hammer blows. If the pin's tip blunts, the material is probably too hard. If the material cracks or chips, it's too brittle.

Once Tom matches pin and charge to the substrate, he can shoot as quickly as he can load. He just slips a pin into the barrel, holds the gun perpendicular to the surface, presses down hard with both hands (to cock the trigger) and fires—no drilling, no dust, no sweat.

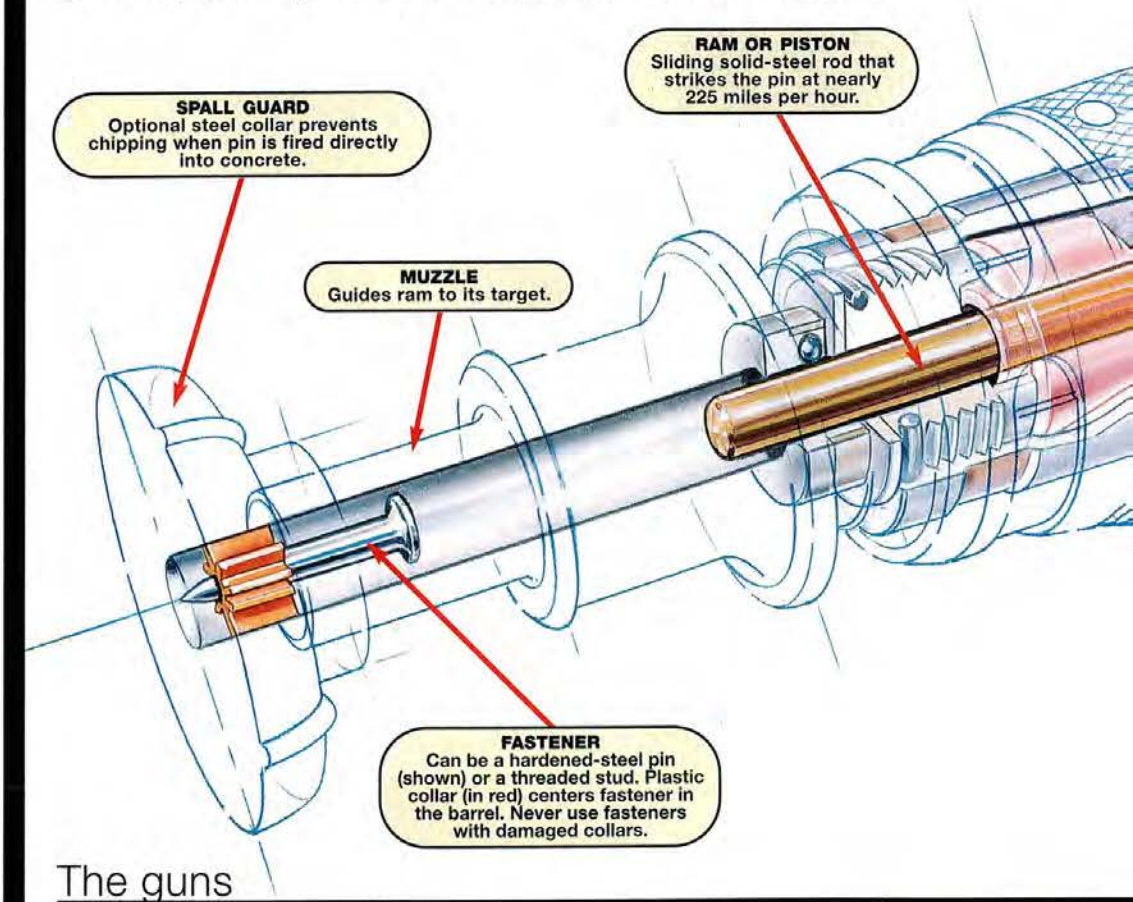
Tom first used a powder-actuated tool 20 years ago, when his dad was running crews. "We'd put one pin and one shot into a thing that looked like a bicycle hand grip with a mushroom

(Continued on page 43)

Ready to fire

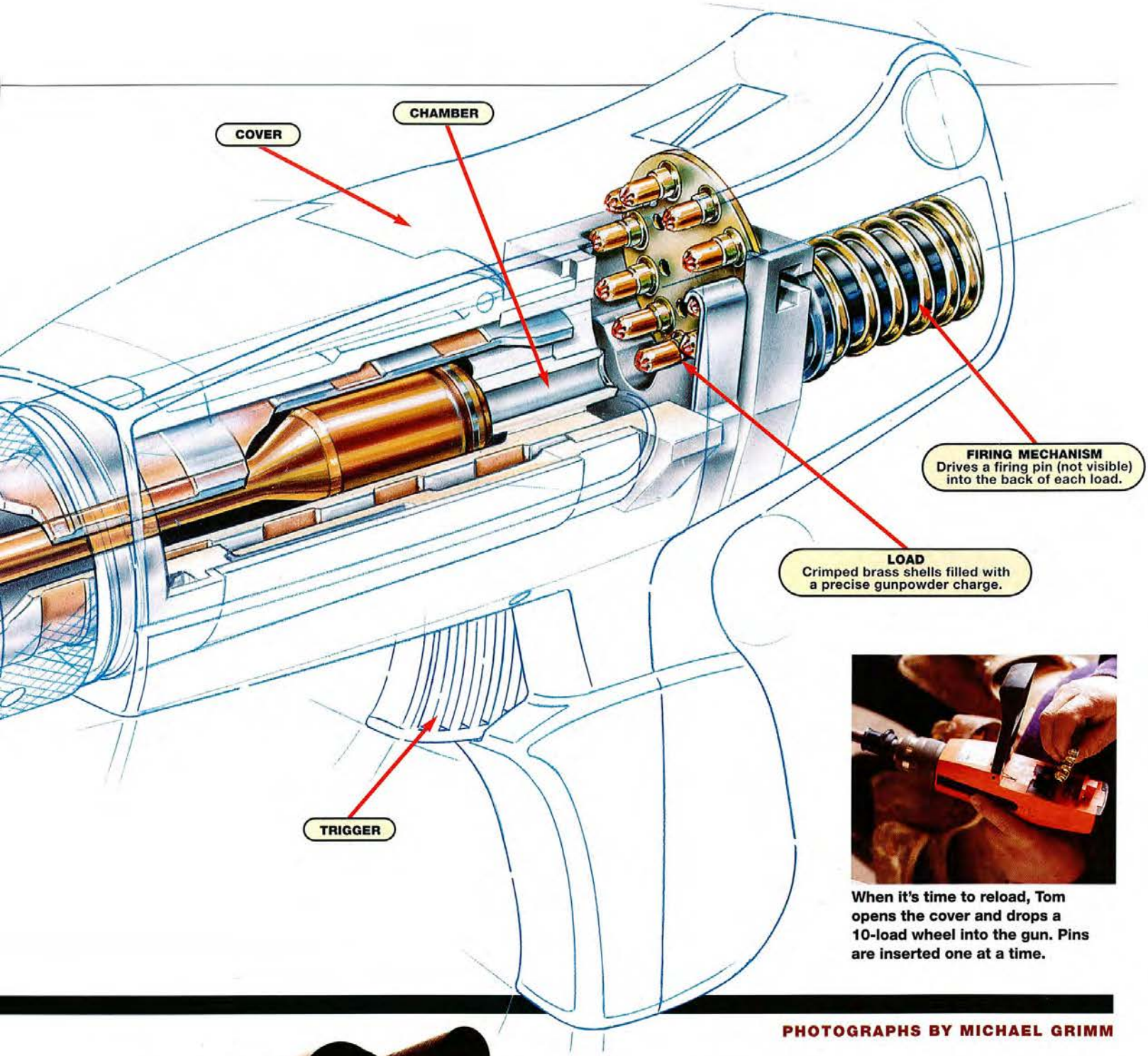
ILLUSTRATION BY TOM SIEBERS

Pulling the trigger smacks the spring-loaded firing pin into the back of the gunpowder-stuffed load. The fierce explosion that follows blasts the ram against the head of a hardened steel pin with enough force to instantly drive it home. Stud guns aren't weapons; they're engineered to fire only when pressed firmly against a hard surface.



The guns

The most obvious distinction between stud guns is the way pins and loads are inserted. The basic models, right and middle, are single-pin, single-load: You insert one pin and one load at a time (and in that order, to minimize the chance of accidental discharge). The next step up is to a single-pin, multi-load tool like the one that Tom Silva uses (illustrated above). Ten loads are mounted on a revolving brass disk, but he still inserts pins one by one. Other brands accept 10-load plastic strips. The ultimate stud gun, far right, would please Elliot Ness: It's a multi-pin, multi-load model with a magazine that feeds collated pins as a disk or strip feeds loads. It can shoot pins like the dickens.



When it's time to reload, Tom opens the cover and drops a 10-load wheel into the gun. Pins are inserted one at a time.

PHOTOGRAPHS BY MICHAEL GRIMM

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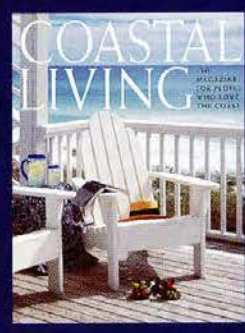


Taking you there.

The ammunition

Stud guns consume a steady stream of fasteners and loads. (1) Pins (first three on the left) come in differing diameters and lengths, for different applications. A stud (fourth from left) is a pin with a threaded top to accept nuts. Electricians gobble up plenty of pin clips, right, when securing conduit to hard surfaces. (2) Collated pins mean no reloading between shots. (3) Strips of loads also speed the firing process. (4) Acres of rubber roof membrane are held in place with these two-part plastic fasteners.

top, and I'd just whack it once with a small sledge." Later models replaced the sledge with a trigger-activated firing mechanism, and the modern stud gun was born.

One older style of gun didn't have a ram; the powder charge drove the pin directly. But injuries mounted as these high-velocity guns sent fasteners ricocheting off the base material or through hollow walls and floors. Manufacturers stopped making the guns and replacement parts in the early 1990s; they even offered a $100-per-tool bounty to choke off supply. Now the only stud guns sold are the low-velocity kind—slightly less effective but a great deal safer.

Even with low-velocity guns, it's crucial to clear the area in the line of fire, as well as places on the other side of a wall or floor. Hearing protection is essential, especially in enclosed areas. "The sound is wicked," says Tom. Another essential is a good pair of Z87.1 (ANSI impact rated), scratch-resistant safety glasses with side shields, to stop errant pins or ricocheting bits of collar. The goggles that come with the tool aren't up to Tom's standard.

Periodic maintenance is another must. On most tools, a modular design allows quick disassembly so the gun can be cleaned and worn parts replaced with a minimum of effort. Frequent cleaning, with a stiff brush and a rag moistened in a solvent-based cleaning fluid, removes the black-gray powder residue that collects on internal parts. After two or three thousand firings, the ram's tip can get misshapen, so Tom files off the burrs and flattens the tip. In time, repeated filing will shorten the ram, and it will need to be replaced.

The perfectly shot fastener needs only to penetrate concrete an inch or so for a sure grip.

Once he has cleaned and reassembled his gun, Tom dry-fires it to test the mechanism. With no pin or charge inside, he cocks the gun by pressing it against a piece of scrap wood and pulls the trigger. If he hears a click, all's well. If not, he takes it apart again to find out what's wrong.

Paradoxically, though a stud gun requires less skill than a hammer swing, it's the only one of all the cutting, grinding and shooting tools on a jobsite that needs an operating license. "You can't let just anyone use one," cautions Tom.

OSHA enforces licensing for contractors, but for everyone else, the requirements are more blurry. Stud gun manufacturers require anyone buying the tools directly from them to pass the written, practical and colorblindness tests administered by their reps, just the same as a contractor. Going this route is a good idea even for non-contractors because the reps provide valuable training and technical support.

This pin met its match—a surface too hard to penetrate fully—and split the wood where it bent. On his next shot, Tom would try a heavier pin or a lighter charge, which subjects a fastener to less stress.

Home centers have a more relaxed attitude; they probably won't ask for a license or offer training. Much the same is true for renting. In calls to rental yards across the United States, only three out of 20 said they require a stud-gun license. Make sure that someone at the rental yard thoroughly explains the tool's use and supplies an instruction manual; otherwise, rent from someplace else.

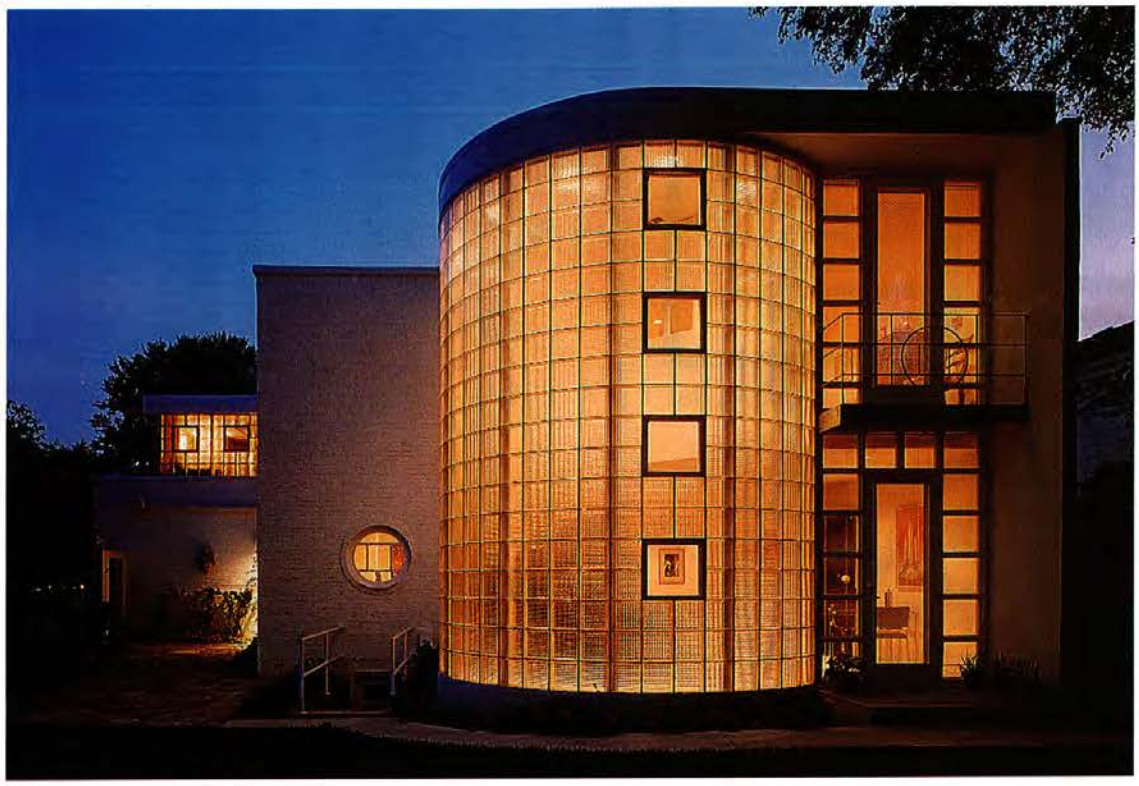
TOP AND BOTTOM LEFT PHOTOGRAPHS BY DARRIN HADDAD; BOTTOM RIGHT BY KELLER & KELLER

(See Directory, page 116, for details and sources)

Borrowed Light

Glass block recaptures its old mystique

BY ANN ARMBRUSTER PHOTOGRAPHS BY NICHOLAS EVELEIGH

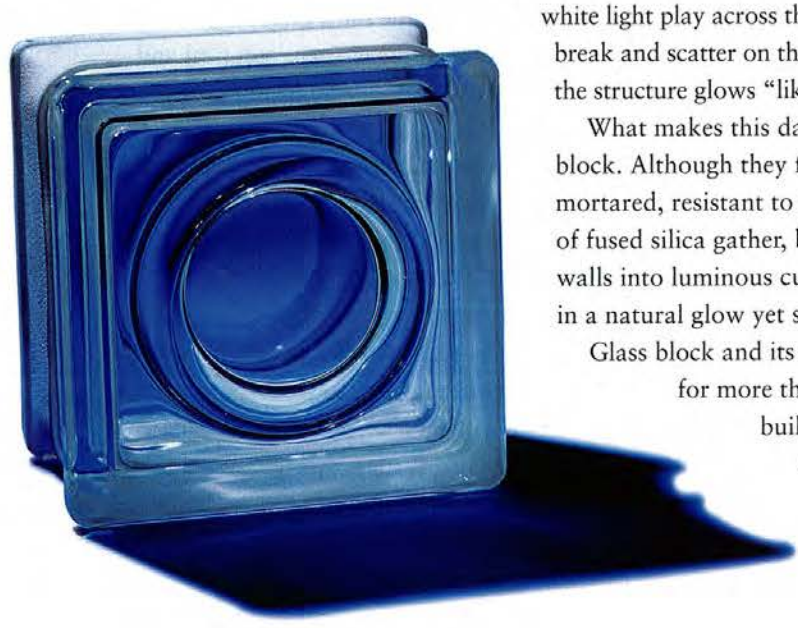


This shimmering 1985 addition to one of the Chicago area's best-preserved Art Deco houses is as tough as it is translucent. The two-story, steel-reinforced tower contains 344 glass blocks patterned to match the house's Depression-era originals.

Whenever the sun shines, Roselynn and Arthur Don witness a mesmerizing light display at their 1935 Art Moderne home in Wilmette, Illinois. From dawn to dusk, a curved two-story tower at one end of the living room is awash with subtly shifting rainbows from refracted sunbeams. At night, silent bursts of soft white light play across the wall as headlamps from passing cars break and scatter on the tower's ribbed surfaces. From outside, the structure glows "like a spaceship," Roselynn says.

What makes this daily entertainment possible is glass block. Although they function like bricks—stacked and mortared, resistant to fire and vandals—these hollow blocks of fused silica gather, bend and refocus light, turning solid walls into luminous curtains. Glass block can bathe interiors in a natural glow yet seal out the elements and prying eyes.

Glass block and its antecedents have been borrowing light for more than 100 years. Nineteenth-century boatbuilders embedded thick glass lenses in ships' decks to carry illumination below. Solid cylinders of glass dotted city sidewalks, brightening subterranean storage areas. Glass



When glass block faced extinction in American factories, architects spoke up to save it. Now its use in homes is growing more than 10 percent a year.

HOUSE PHOTOGRAPH BY HOWARD N. KAPLAN /HNK ARCHITECTURAL PHOTOGRAPHY INC.

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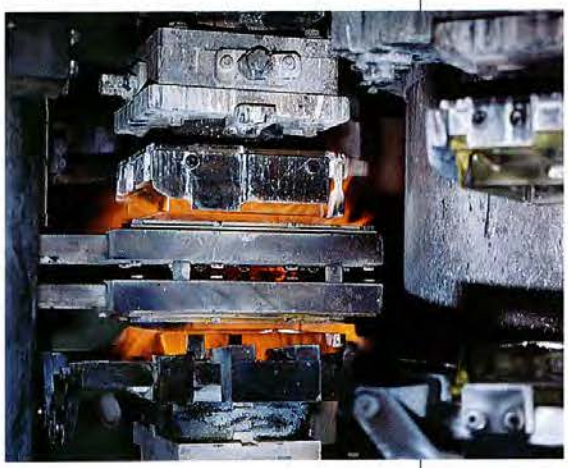
Building blocks

Because of the searing temperatures of its raw material, the manufacture of glass block is a highly automated process. First, the

ingredients are heated to 2,600 degrees Fahrenheit in a brick-lined tank. Then a teardrop or "gob" of molten glass, above, is cut off and dropped into an open cast-iron



mold. A plunger with a patterned face presses the viscous glass into the shape of a shallow cup, then lifts it free of the mold. (The face of the mold, the block's exterior, is smooth.) As the half blocks move down the assembly line, their edges are heated to approximately 1,500 degrees before the two halves are mated in the sealing machine, above, which fuses the pieces and drives out most of the air. Before the machine's invention, the halves were joined with lead, which let in water vapor that condensed on the block's walls. After a reheating in the lehr, an annealing oven that relieves the cooling stresses in the glass, the block's edges are coated with paint or with a plastic that helps the block bond with mortar.

slabs paved the stacks of Victorian libraries, filtering light from floor to floor.

The first stackable, hollow glass block, mouth-blown into a mold, was patented by Gustave Falconnier in 1886. But it wasn't until the mid-1930s that Pittsburgh-Corning perfected the hermetically sealed "pressed" block used today. Depression-era architects embraced the material as a symbol of purity, radiance and a better tomorrow—not to mention an inexpensive way to streamline old-fashioned facades. Between 1938 and 1940, 20 million blocks were sold. But as the '40s edged into the '50s, sales began to slip. The glamour girl of the masonry world suddenly looked out of fashion, deemed suitable only for plugging basement windows and factory walls.

Dwindling demand shut down one glass-block factory after another. In the late 1970s, Pittsburgh-Corning, the last manufacturer in the United States, announced it would cease production. A cry of protest went up among prominent architects—Richard Meier, Charles Gwathmey and Robert A.M. Stern, to name a few. Their letter-writing campaign succeeded in reversing the company's decision. At the same time, glass block got a boost from the TV hit *Miami Vice*, which featured historic Art Deco and postmodern buildings. Demand began to grow. Now homeowners, armed with how-to videos, drive away from home centers with trunkfuls of the stuff.

Basement and bathroom windows, as well as entryway sidelights, are still the most popular household uses. Other uses include dividing walls, interior windows, shower stalls and kitchen islands, as well as the occasional aquarium stand, platform-bed base or barbecue pit. For the decoratively outré, glass-block makers supply fancy shapes, subtle tints and whimsical patterns like "Star" and "Spray."

Glass block makes sense in areas prone to high winds or hurricanes—tests show its quarter-inch-thick inner walls can withstand the blows of 2x4s shot out of a cannon at 60 miles per hour—but, curiously, it is not a load bearing material. The Dons' tower stands thanks to a framework of steel.

The hollow interior provides some insulation, but glass block is not a stellar energy saver; the R-value of a 32-by-48-inch assembly of 4-inch-thick bricks is about that of a similarly sized double-pane window (R 1.96). "We

All glass block is not created equal. The LX block at left has a fiberglass scrim sealed across its center to improve energy performance, minimize heat gain and muffle noise. The Vista Brick, right, a solid 3-inch-thick chunk of glass weighing 15 pounds, is made for demanding situations. It will withstand a 1,500-degree fire for 90 minutes and stop a .357 magnum bullet. Plus, it is 32 percent better at reducing noise than its hollow cousins.

FACTORY PHOTOGRAPHS COURTESY WECK GMBH

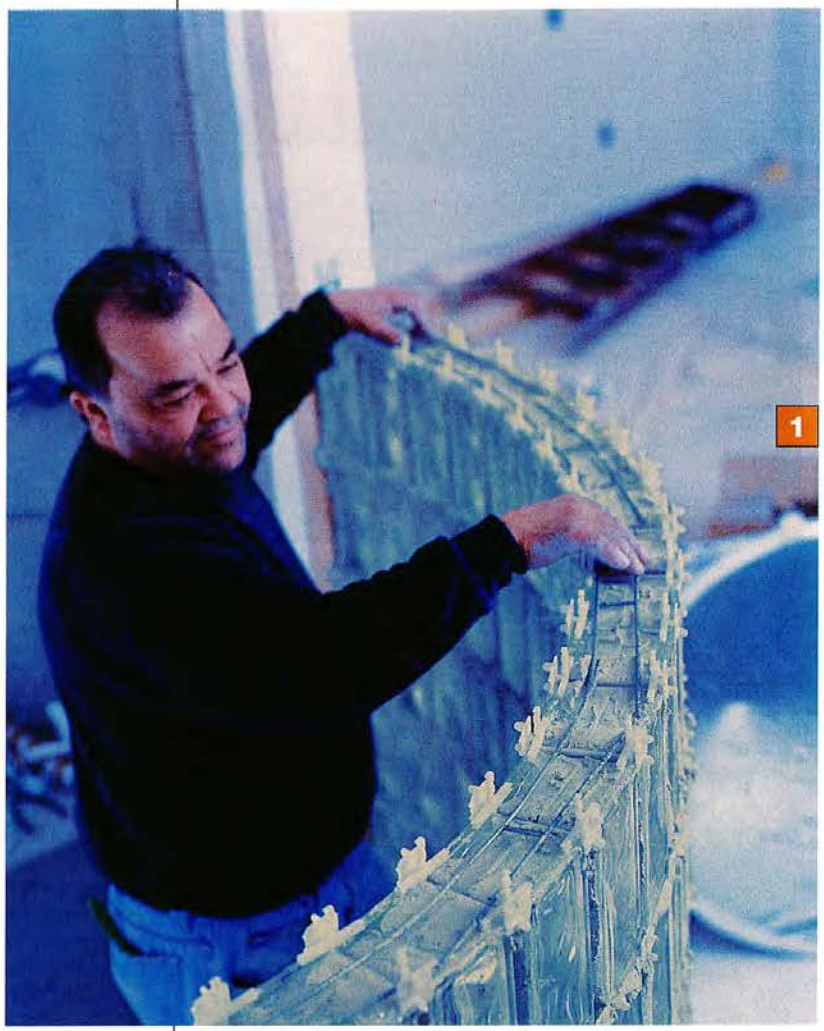
Trickier than brick

PHOTOGRAPHS BY DAVID BARRY

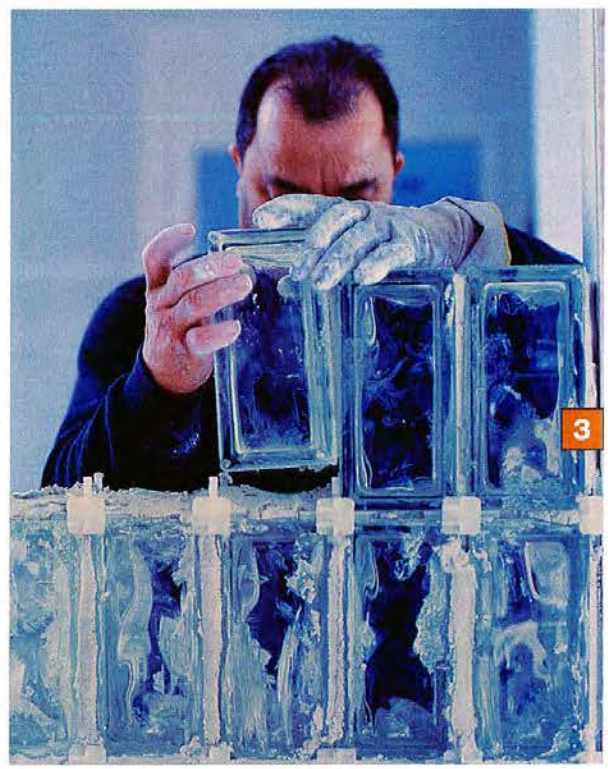
can't compete with those low-E or triple-pane windows," says Pittsburgh-Corning systems engineer Nicholas Loomis, "but glass block is a lot less expensive on a square-foot basis." Solar gain, the heat trapped from the sun, can be significant with large glass-block walls. Tight patterns diffuse light and limit heat gain better than more transparent styles.

Choosing the installation method is at least as important as picking color and pattern. Chris Patterson of Strictly Glass Block in Miami is a mortar purist—"it shows that the wall required some workmanship," he says. Masons in the New York area charge about $35 a square foot to set standard 8-by-8-inch block in mortar. (Retail, the block costs about $4.50 apiece, including accessories, or $10 a square foot).

Manufacturers also market mortarless systems to do-it-yourselfers. Pittsburgh-Corning's Kwik 'n' Easy system, for instance, uses premolded vinyl strips for spacing and a silicone sealant to caulk the joints. Silicone's fans praise its clarity and strength, but Patterson thinks it's tougher to install than it looks. "I get a lot of calls to repair jobs where a homeowner is standing by a pile of blocks with silicone stuck all over them," he says.



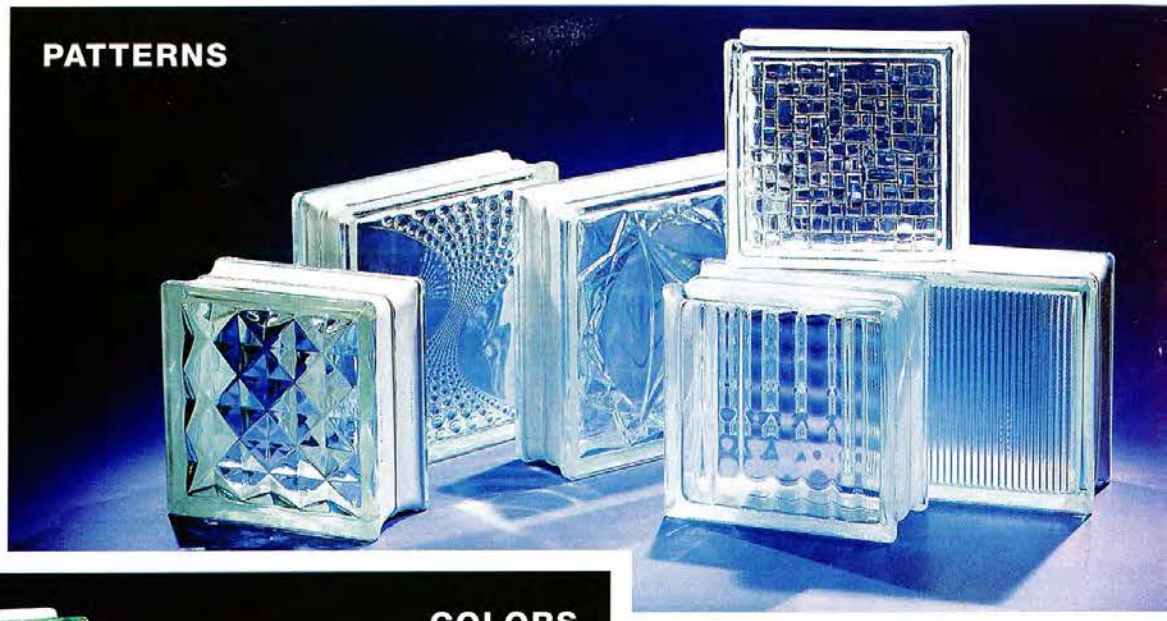
The tools are similar, but installing glass block isn't like bricklaying, as mason Hermán Ramos demonstrates when he puts up a shower wall.
1. The blocks can't be cut (they implode if punctured), they can't be staggered, and every third course needs galvanized stabilizing rods. Because glass doesn't absorb water, a course or two of freshly laid block, left to its own devices, will squeeze out the mortar before it hardens. Ramos fights sag with white plastic spacers that support the block and insure a consistent joint width. "With these, I can do an eight-foot wall in one day," he says.
2. After Ramos slathers mortar on the horizontal joint and sets the spacers, he trowels a thick layer of mortar on one side of a block.
3. He presses the block firmly into place. Too little mortar between joints is a common mistake, he says.
4. When the mortar is firm, Ramos twists off the spacer caps, covers the hole with a dab of mortar and tools the joints smooth with a bent Lucite rod. Cleanup is easy—he buffs the blocks with 3-grade steel wool. "See how it shines?" he says.

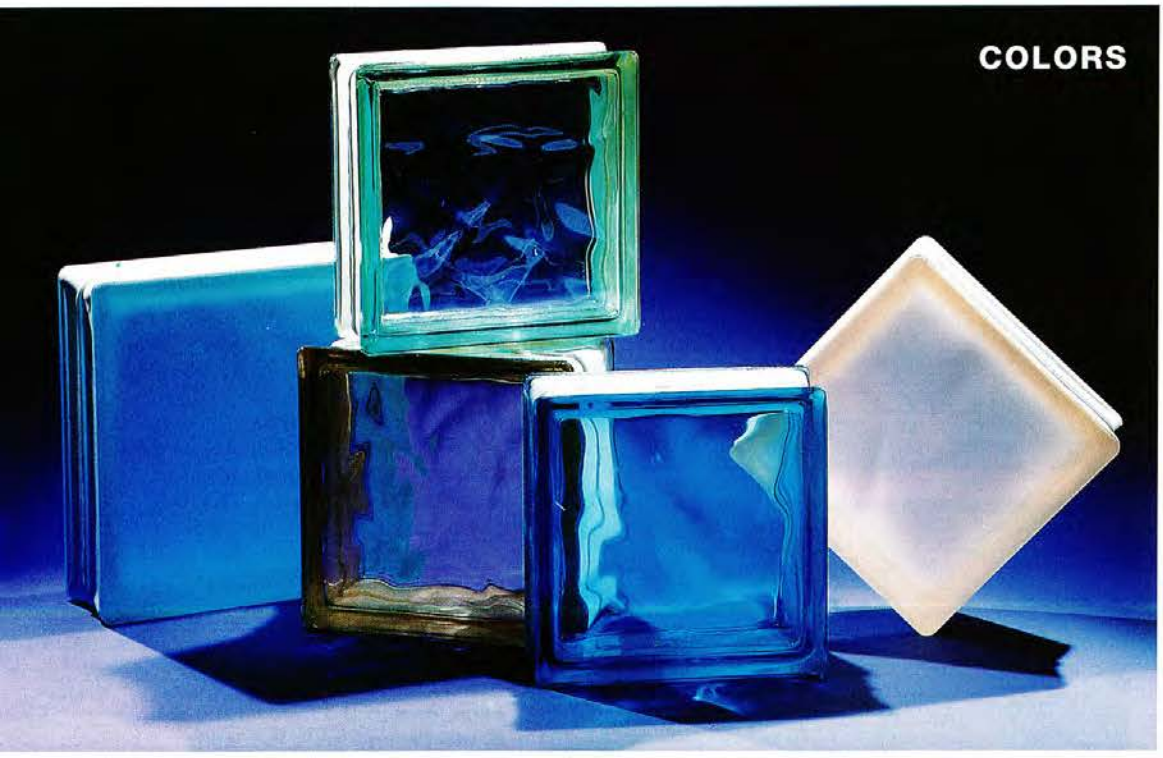


Glass menagerie

In Depression-era America, when glass block flourished, there wasn't a wide selection to choose from. The mass-produced bricks were available in one shape (square), two principal patterns (an undulating wave or two sets of ribs molded at right angles) and one color: "white," as clear block is known in the trade.

But the common block that thrived in the stricken '30s and nearly disappeared in the go-go '60s revived in the booming '80s, thanks to architects' innovations and some timely adaptations. Beefed-up marketing pushed its decorative uses in kitchens and baths, and the new applications spawned a diversity of colors, shapes and patterns. Says Miami architect Thorn Grafton, "Twenty-five years ago, a building catalog might have had a couple of pages on glass block; now it's a section a half-inch thick."





Factories now turn out rounded corners, bullnoses, bullseyes and triangles for complex installations. Although the traditional wave and ribbed patterns still dominate, glass block's renaissance has inspired "designer" creations, some molded in elaborate patterns, others acid-etched. Classicists won't have anything to do with these parvenus: Roselynn Don, whose 1935 house was built only with cross-ribbed block, shudders at even a basic wave design.

European factories make tinted blocks, which are infused with metal oxides (cobalt yields blue, manganese purple and nickel brown). Traditional white block ranges from crystal-clear Italian glass made with low-iron Belgian sand ("the Cadillac of glass block," says Marcel Wilhelm, owner of International Glass Block Company) to high-iron German and American block, with greener glass.

Glass block's near-death and transfiguration have left the industry craving a middle ground. Warren Wind, vice president of a German block distributor in the United States, sees variety as a ticket off the roller coaster: "With the wider range of applications, the valleys shouldn't be as low next time."

—Peter Edmonston

(See Directory, page 116, for details and sources)

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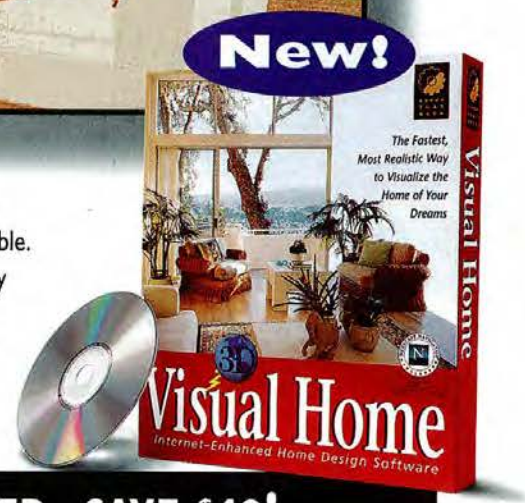

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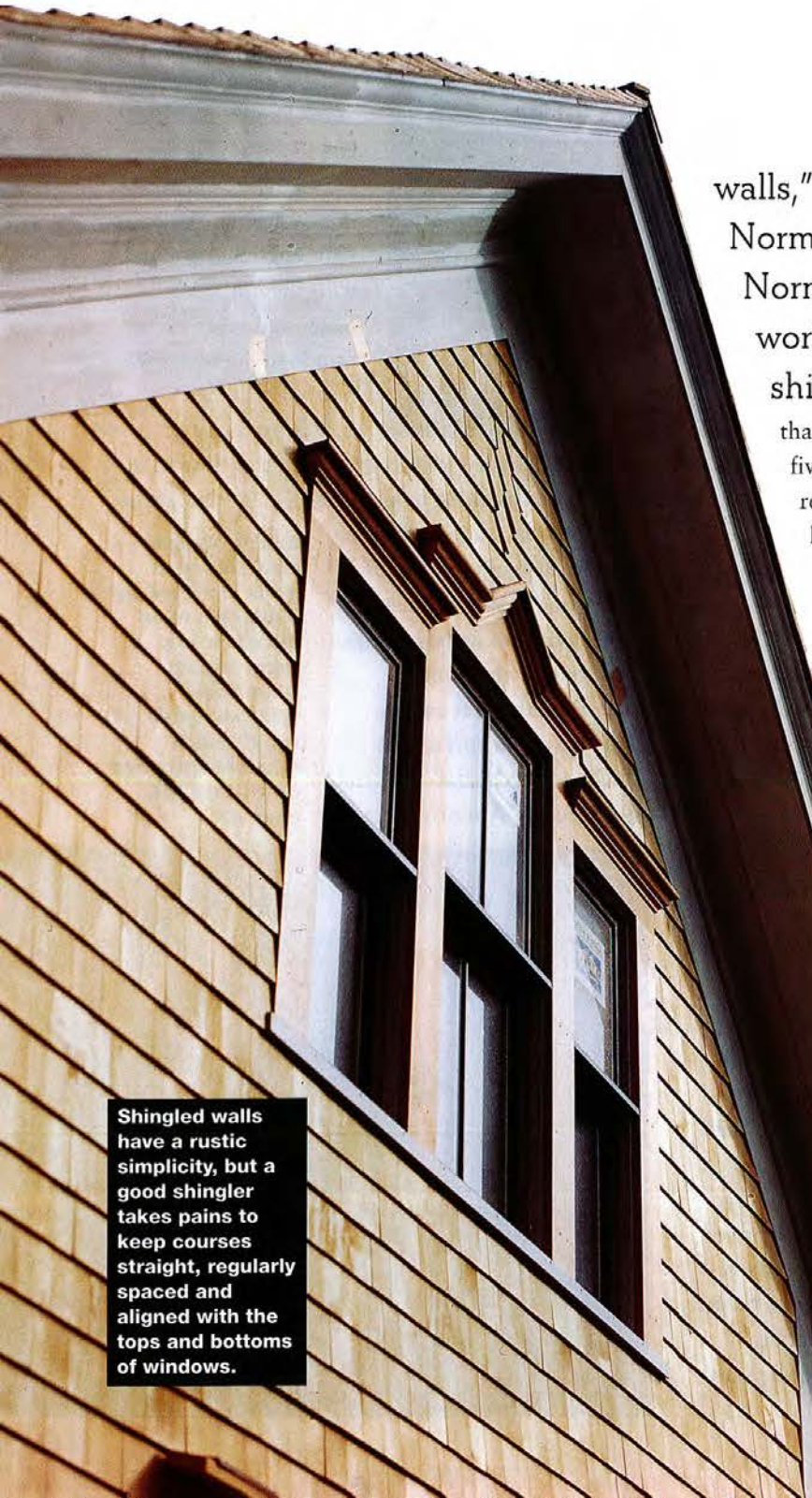
Shingle Savvy

Adding the grace of fine wood to the facade of a house

BY WILLIAM G. SCHELLER **PHOTOGRAPHS BY MATTHEW BENSON**

PHOTOGRAPH BY KELLER & KELLER



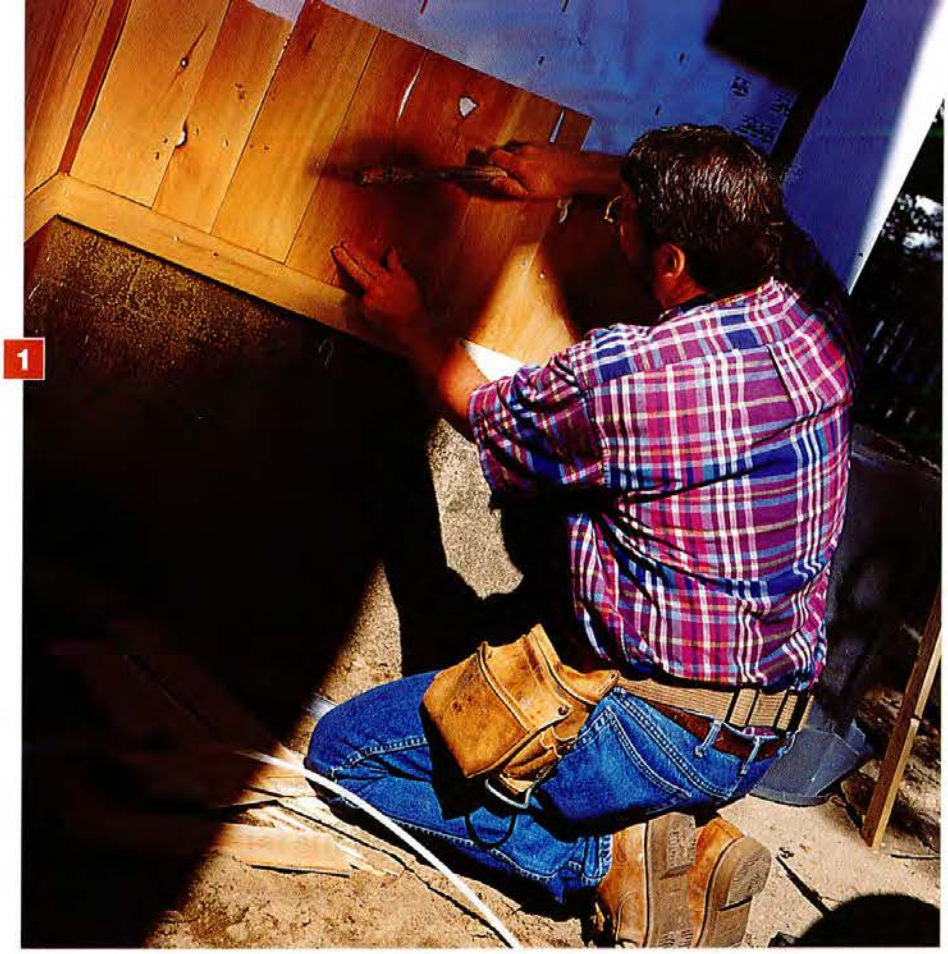
Shingled walls have a rustic simplicity, but a good shingler takes pains to keep courses straight, regularly spaced and aligned with the tops and bottoms of windows.

"I've always liked to shingle walls," says *This Old House* master carpenter Norm Abram. "It really dresses up a house." Norm began shingling as a teenager, when he worked with his father. "It's hard to say why, but shingling is rewarding," he says. "It's not a job that flies—I can put up clapboard five times as fast—but it's very relaxing. It's something that you like to do for a while, and then like to not do for a while."

Norm was in his "like to do" mood as he helped contractor Bruce Killen's crew shingle the walls of the show's project house on Nantucket last summer. Killen's carpenters had already prepped the job—stapling on housewrap, inserting strips of 30-pound builder's felt behind vertical window casings and corner boards, and flashing the window and door tops with copper. Fragrant bundles of cedar shingles lay within easy reach.

For a weathertight fit around windows, Norm Abram notches the shingles next to the sill horns.

The first thing a shingler has to decide is how much shingle to leave exposed to the weather. White cedar shingles, the kind most commonly used on Nantucket, can have as much as seven inches of exposure. But the island's fierce storms mandate five inches or



For the first row, Norm nails up an undercourse of knotty, low-grade shingles, then covers them with another course using A-grade material. He makes sure every joint under successive rows is overlapped and is at least 1 inch from the one above it.

less, so that any point on the wall is covered with at least three overlapping layers of wood.

To get consistent spacing between courses, shinglers use a story pole, a kind of giant yardstick. Instead of inches, though, it's marked in increments of how much each shingle will be exposed. This simple layout device, made at the jobsite, eliminates guesswork and repetitive measuring.

Story pole in hand, Norm marks the location for the next course of shingles. A story pole ensures that courses will have consistent spacing around the entire house.

To make one, Norm lays a straight length of 1x3 scrap alongside a window, upper end butted against the frieze board (the trim piece just beneath the eave), lower end extending below the wall. He marks the top and bottom of a window on the pole, which divides it into three sections. Then he divides each section by the shingle exposure he wants—in this case, five inches. If the window is 60 inches tall, for example, 12 courses will align with it top and bottom.

Shinglers seldom are that lucky. When wall sections don't divide evenly, they'll fudge an eighth of an inch here or there to get a full exposure above and below the windows and under the frieze board. Any fudge they make, they mark on the pole.

To begin this job, Norm holds the pole against the frieze board and transfers the marks to the corner boards. At the start of each row, he snaps a chalk line over the previous course of shingles between the marks on the corner boards. Then he tacks a guide cleat, another long, straight 1x3, to the wall so its top edge sits at the chalk line. All he has to do now is rest the shingle's butt (the thick edge) on the cleat with one hand and nail with the other. It's faster and more accurate than aligning each butt with the line.

But on the first course, which extends a couple of inches below the wall, there is nothing to snap a chalk line against or nail a cleat to. Norm's solution is to nail a shingle near each wall corner and in the center of the course so its butt hangs down two or three inches lower than the first course. This provides a surface on which to snap a chalk line and nail the cleat. After the first

Setting shingles on a horizontal guide cleat makes it easy to follow the chalk line. Norm installs white cedar shingles tightly against each other. As the wood dries, gaps will open up.

course is finished and the cleat is moved up, he just scores and snaps off the tag end.

On the first course and over windows and doors, the shingling is doubled—one course is nailed directly over the other with no exposure. Doubling ensures joints are covered so water doesn't reach the wall. Above windows, doubling also builds out thickness so shingle slope is consistent throughout the course. Knotty, low-grade cedar shingles make adequate undercoursing. Everywhere else, premium A-grade shingles are the rule.

Whether nailing with a carpenter's hammer or a pneumatic nail gun like that used by the Nantucket crew, a shingler plants two 3d (1¼-inch-long) galvanized ring-shank nails into each shingle, about half an inch from the edge and high enough above the butt so the next course covers the nailhead.

Norm works from the ends to the middle of each course. He selects wide and narrow shingles as needed to keep the joint between shingles at least one inch away from the joint in the row below and to prevent joints from aligning within any three courses of shingles. Each shingle is pressed snugly against its neighbor. Gaps will open up as they dry, Norm explains. To fit the last two shingles in a course, he overlaps the pair, scores the bottom one with a utility knife along the overlap line and snaps off the excess.

As is customary on Nantucket, the shingles on the project house are neither painted nor stained but left "to the weather," so they will turn the much-loved silver-gray. But the island's punishing environment will scour them down to about half their original ⅛-inch thickness in 20 years or less, when they'll have to be replaced. In less brutal conditions, untreated shingles might last a century or more; protected with a coat of paint or stain, they may last as long as the house.

The shingles go up quickly, to the rhythmic pop of the nail guns, until they reach the windows. The tops in the two courses immediately below the sills have to be lopped off to achieve the desired exposure, and those that meet the sill's projecting "horns" have to be notched out with a utility knife (if they can't be slipped behind). The courses to either side get shorter and so demand more fitting.

"I don't know if I'd like to be a shingler getting paid by the square," says Norm, using the standard measure for 100 square feet of coverage. "If you're fast, you can do two squares a day. But it gets tough when there are a lot of windows to go around."

4

Norm shingles from either end of a course toward the center. He gets a tight fit between the last pair by overlapping them, then scoring the one underneath with a utility knife and snapping off the waste.

To get a full exposure under windows, Norm cuts the shingles short and tucks them under the sill. A portable shingling bench slipped under a lower course holds his supplies within easy reach.

5

Going gray

Three elements are needed for unpainted shingles to acquire the prized silver-gray patina worn by a seaside home: sun, moisture and salt. "The ultraviolet degrades the wood fiber, and moisture in the air oxidizes it, leaving the gray," says Paul Tillman, a technical specialist at Cabot Stains. (That's why shingles under overhangs gray slower.) The salt abundant in seaside air suppresses the

mildew that can turn shingles black even a few miles inland. Red cedar is particularly prone to the fungus. Bleaching oil, a concoction that artificially oxidizes the wood, helps turn shingles a uniform gray when the sea is distant. "It works for a while," says Norm, "but you don't get the same nice silver gray, and eventually it will turn black." Tillman insists a new coat every three to five years will keep blackness at bay. Instant gray from a can of stain or paint may be artificial, but it prolongs shingle life. "Inland, I'd stain red cedar shingles over an oil-based primer," Norm says. "If I were going to paint, I'd use the new preprimed white cedar shingles."

Sidewall Shingle Talk

A shingle looks innocent enough. A piece of wood, thin at one end, thick at the other. What's to know? Lots. Like the difference between No. 2s and blue labels, R&Rs and perfections, Alaska yellows and Western reds, cedar shingles and cedar shakes. Here's a quick course in shingle grades, species and the lingo of the lumberyard.

Glossary

BUTT: The thick end of a shingle.
FIVE-Xs (or 5-xs): Sixteen-inch shingles, so called because five shingles stacked butt-to-butt are two inches thick. Like perfections and royals, 5-xs aren't kiln dried, and sides aren't squared to butt. More rustic looking than R&Rs. Sold bundled.
PERFECTIONS: The standard shingle, 18 inches long, with ⅝-inch butt thickness.
RESQUARED AND REBUTTED (R&R): An 18-inch kiln-dried shingle that's run through a jointer to square sides to butt. Sold boxed. Speeds installation and looks more uniform.
ROYALS: Shingles 24 inches long with ½-inch thick butts.
SQUARE: 100 square feet of wall or roof.

Grading

Shingles are graded by color. **Blue label,** the best (and most expensive) grade, is clear, 100 percent heartwood. **Red label** is clear with some sapwood. **Black label** is a utility grade to be used only when low cost is the priority. Undercoursing, the cheapest, knottiest grade, has a **Green label.**

White cedar, in addition, has its own letter grading system:
A (extra) = Blue label;
B (clear) = Red label;
C (2nd clear) = Black label;
D (undercourse) = Green label.

Western species (redwood, western red cedar and Alaskan yellow cedar) use a parallel but more stringent numbering system enforced by the Cedar Shake and Shingle Bureau:
No. 1 = Blue label (all vertical grain);
No. 2 = Red label (some flat grain);
No. 3 = Black label (no knots closer than six inches to butt).

Blue label white cedar is not the equivalent of Blue label on a western species. Grade-A white cedar, for instance, allows flat-grain shingles, while No. 1 red cedar should be 100 percent vertical grain wood, which is less likely to cup or shed paint.

Species

PHOTOGRAPHS BY DARRIN HADDAD

1. WESTERN RED CEDAR
More dimensionally stable than white cedar. Stainless-steel nails recommended to prevent discoloration. Available prestained, fire treated, or CCA pressure treated. Lengths: 16, 18 and 24 inches. Shown: No. 1 R&R, $170 per square at 7-inch exposure.

2. EASTERN WHITE CEDAR
Milled from the second-growth stands in Quebec and Maine. Galvanized nails won't discolor the wood. Available in 16-inch lengths, with or without factory-applied stain or CCA pressure treating. Shown: Grade B clear, $104 per square at 5-inch exposure.

3. ALASKA YELLOW CEDAR
A tight-grained, durable wood from the coastal rain forests of British Columbia and Alaska. Weathers to a light gray, like white cedar, but has the longevity of red cedar and the same installation requirements. Available as both perfections and R&Rs. Lengths: 16, 18 and 24 inches. Shown: No.1 perfection, $170 per square at 5½-inch exposure.

4. REDWOOD
A long-lived shingle, like red cedar, with the same grading and installation requirements. Salvaged from old-growth stumps and logs. Lengths: 16, 18 and 24 inches. Shown: No. 1 5x, $136 at 5-inch exposure.

5. RED CEDAR SHAKE
Shakes are generally recognized by their highly textured, split faces and butts of ⅝-inch thickness or more. Shingles always have sawn faces—with telltale arced lines left by saw teeth—and butts ½-inch thick or less. There are also sawn faces on tapersawn shakes, but their thick butts give them away. Split-face shakes are seldom used on walls in New England and aren't recommended for preservation projects. Lengths: 18 and 24 inches. Shown: No. 1 hand-split and resawn, $115 per square at 10-inch exposure.

(See Directory, page 116, for details and sources)

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Bank Error in Your Favor

Collect hundreds—thousands—if your lender messes up your mortgage

BY LEW SICHELMAN AND PETER MILLER

For Stuart Rabkin, the check really was in the mail. Two days after his mortgage lender learned about errors in his account, Rabkin got a check for $5,700. "There were no games, no nothing," says Rabkin, a Rockville, Maryland, business executive. "The company couldn't have been nicer." It couldn't very well have made a fuss: Because of the errors, Rabkin had been overpaying the withholding for property taxes and insurance for at least a year; the money was his. Yet he might never have gotten that check had he not responded to an ad for a $95 escrow-account audit. It may have been the best $95 Rabkin ever spent.

Unfortunately, Rabkin is but one of a growing number of borrowers whose monthly mortgage payments have been inflated by lender error and miscalculation. Loan accounts are sometimes bulging with excess cash—hundreds and even thousands of dollars that rightfully should be back in the borrowers' pockets. Common mistakes result in too much money being collected for property taxes and homeowner's insurance, as in Rabkin's case, or the interest on an adjustable-rate mortgage being set too high. Borrowers can also end up shelling out more than they should when payments for private mortgage insurance continue long after the coverage is needed. Sometimes lenders put money in the wrong place: Instead of crediting an extra payment to the loan principal, it goes into the escrow for taxes and insurance. A loan is particularly vulnerable to error when it is sold from one lender to another. But with a little vigilance and a calculator, you can protect yourself against blunders and recoup whatever you're owed.

ILLUSTRATION BY STEVEN WACKSMAN

Escrow accounts are the easiest places to find mistakes. In addition to loan principal and interest, monthly mortgage payments may also include money to cover property taxes and homeowner's insurance. It goes into an escrow or "impound" account from which the lender pays taxes and premiums. In the past, lenders sometimes collected more than was needed, presumably to cover increases, but changes in federal law have put a stop to that.

Under the new rules, lenders can only collect enough money to pay tax and insurance bills and maintain a two-month cushion, plus $50. Collections above that must be returned. Escrow accounts must also be analyzed each year, and borrowers must receive a 12-month projection of activity. In addition, some states require lenders to pay interest on the escrow money they hold. But rules notwithstanding, borrowers should check statements carefully to make sure they square with their actual tax and insurance costs.

When it comes to keeping accounts, borrowers tend to believe that bankers and other lenders aren't going to goof. But if you have an adjustable-rate mortgage (ARM), don't let down your guard. David Ginsburg of Loantech, a Gaithersburg, Maryland, firm that

audits mortgage and escrow accounts, says he finds adjustment errors in a quarter to a third of the loans he checks.

The most common ARM error is due to good math with bad numbers. ARM rates go up or down according to the movement of an index, such as the interest rate for one-year treasury securities. The loan interest rate is calculated by adding a margin—usually 2 to 3 percentage points—to the index. So the rate for an ARM with a 2-point margin would be 8 percent one year when the index was 6 percent, and 8½ percent the next year if the index moved up half a point. Everything works fine as long as the right index and margin are used, but they may not be. The lender could also be off schedule on the date the index must be set (usually a specified number of days before the loan rate actually changes). Index levels shift constantly, so if the rate is set too early or too late, you could get stuck with the wrong number and an undue increase.

When borrowers look at payment statements and do the figuring, all may seem well, but you should still look deeper and make sure that the bank's numbers match the terms of your loan note. And make it a habit because it's not just this year or the next that you're checking. An incorrect adjustment can set off a string of overpayments that continues for the life of the loan.

Borrowers who routinely make extra payments on the loan principal should also be vigilant. Sending in an extra $50 a month to speed up the loan payoff is great—as long as the money really reduces the debt. But a lender could mistakenly put that money into an escrow or a so-called suspense account. Money in a suspense account is not applied to taxes, insurance or principal. Instead, the borrower's cash just sits there—in suspension—until the lender moves it to an escrow account, perhaps to cover a shortage, or actually applies it to the loan balance. Because of their accounting procedures, some lenders won't credit partial payments until they add up to a full monthly payment. This can result in the money accumulating in a suspense account for many months. And during that time the lender, not the borrower, collects interest on it. Bottom line: If you are paying in more, always fill out the payment stub to reflect the extra amount and check the next mortgage bill to be sure it was properly credited.

Errors can also creep into a mortgage when the lender sells the note to another company. Interest-earning debt is an asset that can be sold and resold, and a mortgage note can change hands more than once before it's paid off or refinanced. But again, borrower beware: Examine monthly and annual statements to make sure the terms remain the same and aren't misapplied or altered by a new owner.

If you suspect problems with your mortgage but can't pinpoint them, it may make sense to have your loan audited. For $95 to $275, depending on the loan's complexity and age, an audit specialist—don't choose just any accountant—will examine the complete loan history and find out if the escrowing, rate adjustments, prepayments and all other activity have been properly accounted.

If an error is found, a "lender refund request letter" is provided to the borrower along with the audit report, Ginsburg says. "This letter is sent out by certified mail with a return receipt and cites federal law requiring the lender to respond within 60 days or face a $1,000 fine. But usually the whole process [from notice to refund] is wrapped up within a month. We have never had a situation in which a lender refused to make an adjustment, issue a credit or make a borrower whole. It's either correct or not."

What if an audit reveals that the lender has made an error that resulted in the borrower underpaying for months or even years? The borrower will have to make up an escrow shortfall but will probably owe nothing in the case of an interest-rate error. "I have never seen an attempt to 'invoice' the borrower when a lender discovered it had applied an interest rate lower than called for," says Marie McDonnell, head of The Mortgage Counselor, a Needham, Massachusetts, firm that does mortgage audits. Many lawyers argue that lenders have waived their right to the extra money. Looked at that way, you only stand to gain by keeping accounts and managing your mortgage.

Shedding coverage

Though it's usually not subject to error, private mortgage insurance (PMI) is a cost you may be able to eliminate. It's normally required for houses that are financed with a down payment of less than 20 percent. Bankers say they assume more risk in those deals because a financially troubled borrower with little equity is more likely to abandon the property and default on the debt. If the property is foreclosed and doesn't sell for enough to cover the mortgage, PMI pays the lender the difference.

If you've borrowed $200,000, PMI can cost $600 to $1,800 a year, depending on the amount of the down payment and whether the loan has a fixed (less risk) or adjustable (more risk) interest rate. After a few years of rising values and declining principal, the homeowner's equity will often exceed 20 percent, and PMI payments may be discontinued. But it's not automatic. A federal judge recently ruled that lenders aren't required to cancel PMI, but many will because of the reduced risk and out of fear that the borrower may refinance elsewhere. It might take an appraisal to verify the house's current value, but the $200 to $300 cost will be recovered in a few months if the PMI is canceled.

One type of coverage, lender-paid mortgage insurance (LPMI), can't be stopped because the cost is built into a higher interest rate. The borrower gets a larger tax write-off on mortgage interest, but even when there is ample equity, the only way to get rid of the coverage and the cost is to refinance the entire loan, though dickering with the current lender might also get results.

(See Directory, page 116, for details and sources)

A Letter From This Old House™

My favorite *This Old House* projects are those that take their identity from their surroundings. The adobe house we rebuilt in Santa Fe seven years ago always said Santa Fe, not Phoenix or San Antonio. And it's hard to imagine a more appropriate place than New England for the timber-frame barn that Tedd Benson put up for us.

This winter, we fled the shores of Boston for the desert landscape of Tucson, a town with a core of houses that seem especially suited to their physical and historical environment. Tucson looks and feels like an old Western village right out of the movies. Stark dry mountains studded with saguaro cactus rise up on all sides. You could point your horse toward the setting sun and ride right into a John Wayne scene, many of which were actually filmed at the old Tucson studios. But the town's deeper roots are Native American and Hispanic.

Our project house is a blend of all three traditions. The living and dining rooms are reminiscent of an old Western lodge. The house is organized around a central courtyard like a Spanish hacienda, and its style is called Pueblo Revival because its sloping, earth-colored exterior walls are reminiscent of the original Pueblo Indian dwellings. The architect's plans are ambitious, and a project like this could easily slip out of control, getting bigger, more complicated and more expensive than intended. If that happened, the biggest danger would have less to do with economics than with design: The informal charm and sense of place in this house could be easily destroyed. Jim and Colleen Meigs, the homeowners who have lived here for 17 years, are not about to let that occur. Jim, an architectural designer with many Tucson houses to his credit, has delineated clear boundaries in this revamping. For example, he has refused to renovate the original bathrooms. He likes their funky-colored tiles. And he has been equally adamant about keeping the original steel windows, even though a window manufacturer offered to replace them free of charge. Jim says his biggest challenge will be to keep the size of the new addition small enough that it won't overpower the original structure.

The Meigses are keenly aware that what makes their house special is a sense of proportion rooted in its history and location. "We have an old Tucson house," Colleen says. "We want to keep it that way."

—Steve Thomas

A poured concrete floor, tinted red, will spruce up the cozy old Arizona room, entertainment central for the Meigses.

Project contractor John McCaleb (with Steve and Norm) is a Chicago transplant who loves Tucson's desert climate.

Long-unfinished columns will become a part of the new courtyard, but a pit dug years ago for a hot tub will be filled in.

PHOTOGRAPHS BY DAN BORRIS

Already breathing fire during a taco break, Steve tries in vain to share his onions with Norm.

Spring Hill meets Japan. Saturn is about to lay claim to the title "import."

Opening soon, our newest location: Saturn of Yokohama.

With 125 million people packed onto an island, room is not something folks in Japan have a lot of. Needless to say, there are some pretty tight squeezes passing as parking spaces. We've been told our dent-resistant bodyside panels will be most appreciated. Although it sure sounds like our interiors will be the biggest selling point. Literally.

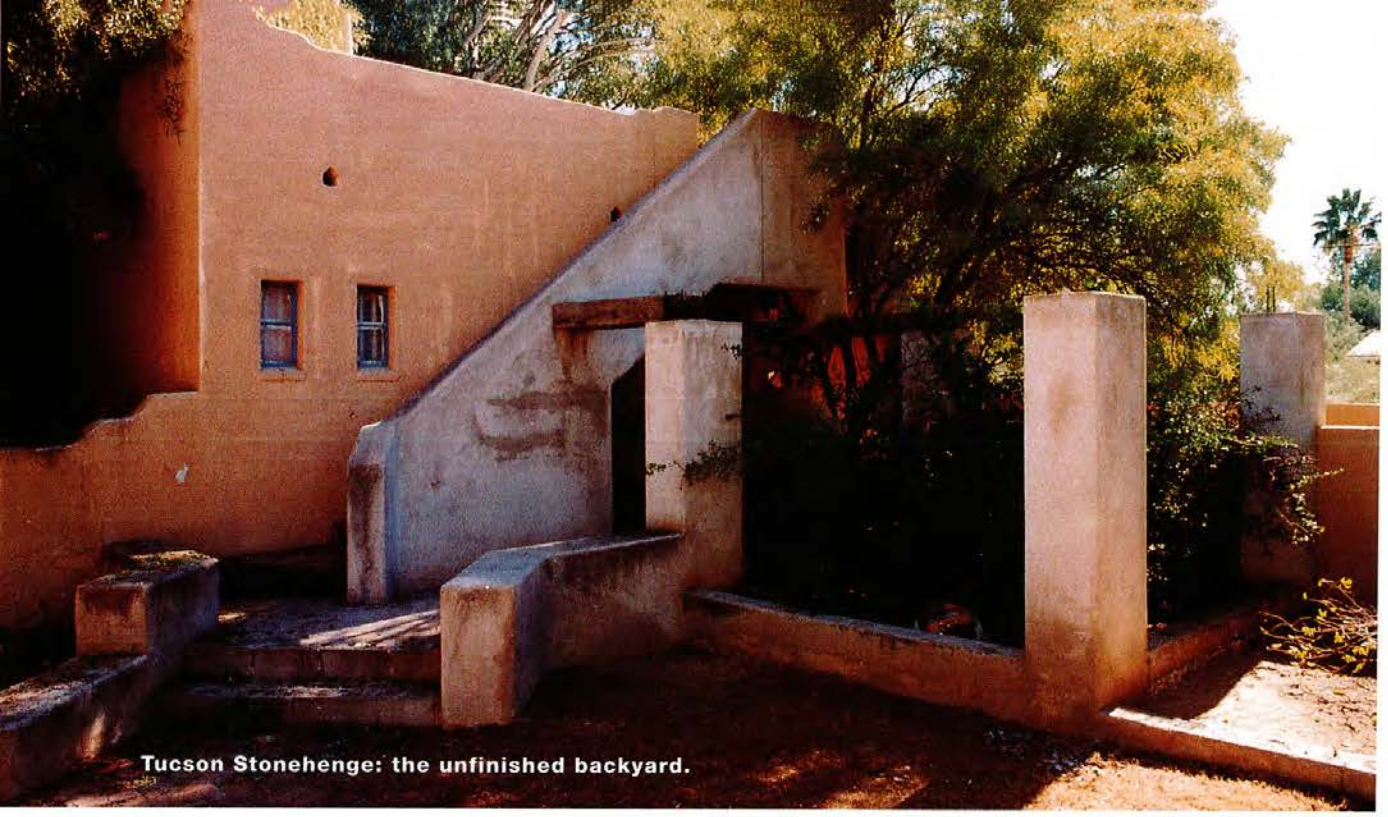
When you buy a car in Japan, the salesperson takes time to get to know you. Pleasantries are exchanged. Questions are answered. And never, ever is the buyer put in a position of disrespect. So you can imagine, in our decision to send Saturns to Japan, we had to focus on many cultural nuances. Like moving the steering wheel to the right-hand side of the car. And changing the frequencies on the radio. Even shortening the turning radius for those narrower streets. As for the way we sell Saturns, however, we found that we didn't have to change much at all. Respect, it seems, translates no problem.

THE 1997 SATURN SL2

Understandably, everyone in Spring Hill is pretty excited with the idea of Saturns going to Japan. Or, as somebody over in Cockpit Assembly put it, "It's going to be a great feeling knowing those ships are going back to Japan loaded, instead of empty." Amen.

A DIFFERENT KIND *of* COMPANY. A DIFFERENT KIND *of* CAR.

This 1997 Saturn SL2 has a base M.S.R.P. of $12,895, including retailer prep and transportation. Of course, the total cost will vary seeing how options are extra, as are things like tax and license. We'd be happy to provide more detail at 1-800-522-5000 or look for us on the Internet at http://www.saturncars.com. *©1997 Saturn Corporation.*

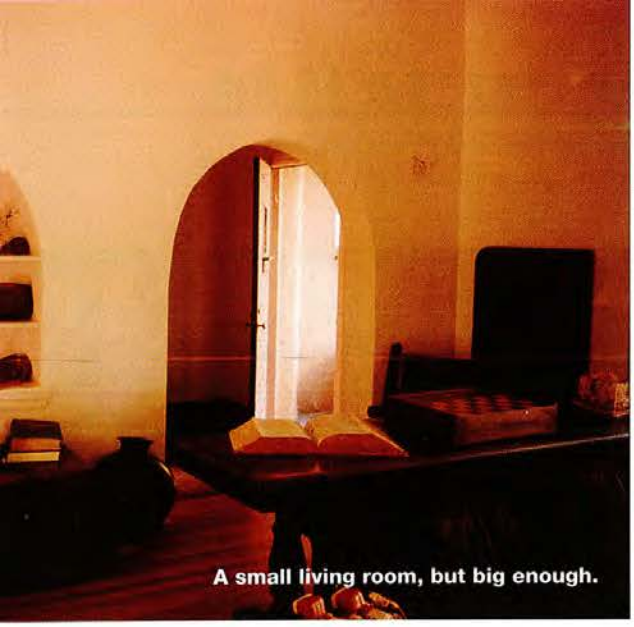


Tucson Stonehenge: the unfinished backyard.

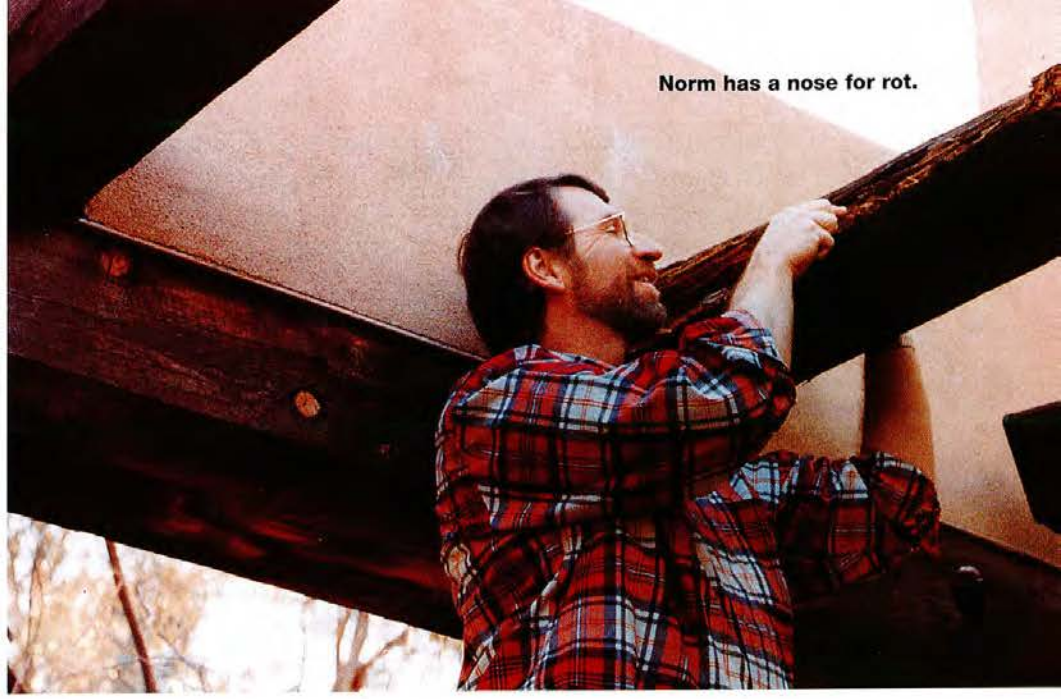
RAISING ARIZONA

The crew from **This Old House** takes a Pueblo Revival home in **Tucson** to a new level of livability

"Hey, Norm, ever see a kitchen cabinet made of mesquite?"



A small living room, but big enough.

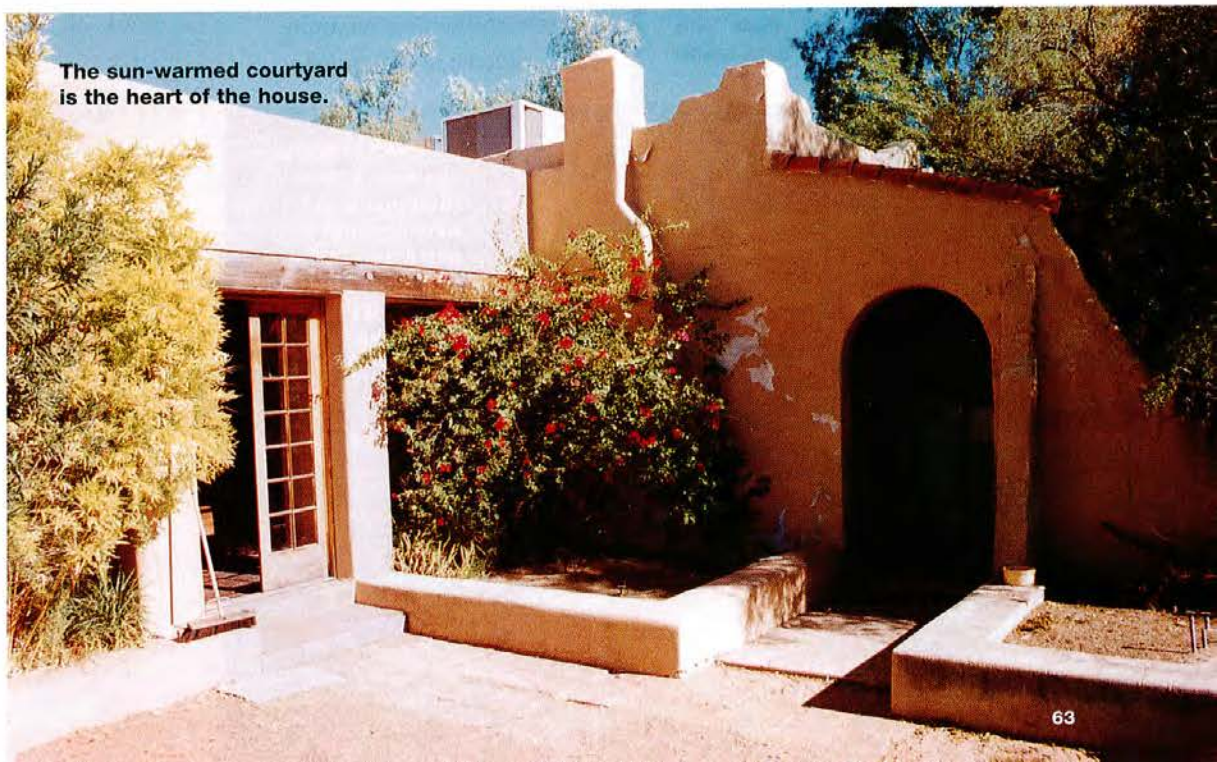


Norm has a nose for rot.

MOST MORNINGS, ARCHITECTURAL DESIGNER JIM MEIGS IS UP AT 3:30 AND OUT IN HIS BACKYARD STUDIO, SIPPING coffee and sketching plans for other people's houses. As the sun comes up, he can see brown mountains, the spiky gray-green plants of his own one-acre swatch of desert and an occasional roadrunner or coyote passing by in the sharp, clear light. Inevitably, the Southwest finds its way into his designs. Meigs (rhymes with eggs) loves the relaxed, somewhat sleepy atmosphere of Tucson. "It's a big small town," he says. One of the oldest continuously inhabited settlements in the United States, Tucson, now a city of 600,000, looks southward toward Mexico 60 miles away. The city sprawls through a valley surrounded by five mountain ranges, with long fingers of

BY JACK McCLINTOCK PHOTOGRAPHS BY DAN BORRIS

In the old "Arizona room," the fireplace is too big.



The sun-warmed courtyard is the heart of the house.

development reaching out from the glinting peaks of downtown high-rises into the dusty foothills. Colors are bright, nearly every chef cooks inventively with chilies, and summers are hot ("But it's a dry heat," a bumper sticker wryly points out). Rivers and creeks are dry most of the year. Yet there are two rainy seasons—one from July through October, called "the monsoon," and another in midwinter—which often bring flash floods that turn roads into instant rivers. The surrounding Sonoran desert blooms with cactus flowers.

When Meigs's mind wanders during those hours before dawn, he might dream of a weekend escape from the desert to pursue the family passion: sailing on San Diego Bay or cruising the Sea of Cortez. Or he might ponder the renovation of his own house, which he and his wife, Colleen, bought in 1978 and have been thinking about ever since. The first year, they added a shady, tiled front porch, with eight-by-eight ponderosa pine beams, where they could have toast and coffee in the morning or entertain clients in the evening. A few years later, Jim started building an ambitious walled and columned

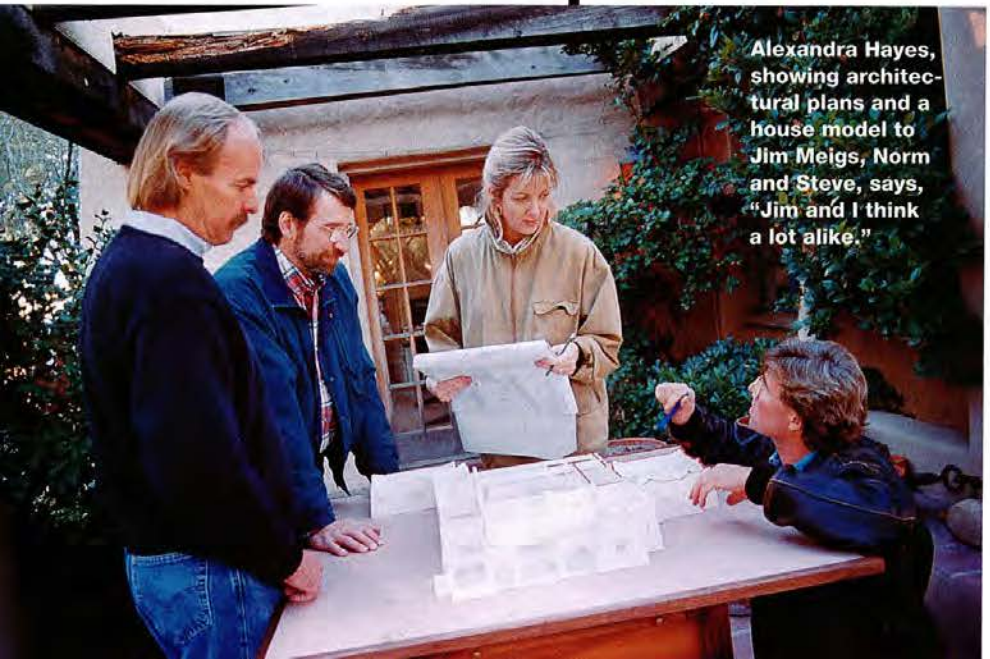
Hiring an Architect

The Meigses had spent nearly two decades thinking about what to do with their house. But when it came time to turn their plans into reality, they wanted a second opinion. "When you're the owner and the architect," Jim Meigs says, "you're so close to it, you can't see the forest for the trees."

For a fresh perspective, he turned to Alexandra Hayes, a Tucson architect with whom he'd worked comfortably before. "I wanted someone to prioritize the job and look at the budget," Meigs says. Hayes quickly discovered that the Meigses' $150,000 budget wouldn't cover tearing down the garage and replacing it with a new, larger one. So they'll keep the old garage.

She also helped resolve differences that could have led to domestic stress. "Sometimes one client may be rigid, or another may want something but be afraid to bring it up," Hayes says. "I'll present the pros and cons, show them some sketches and try to marry the ideas and have a win-win outcome."

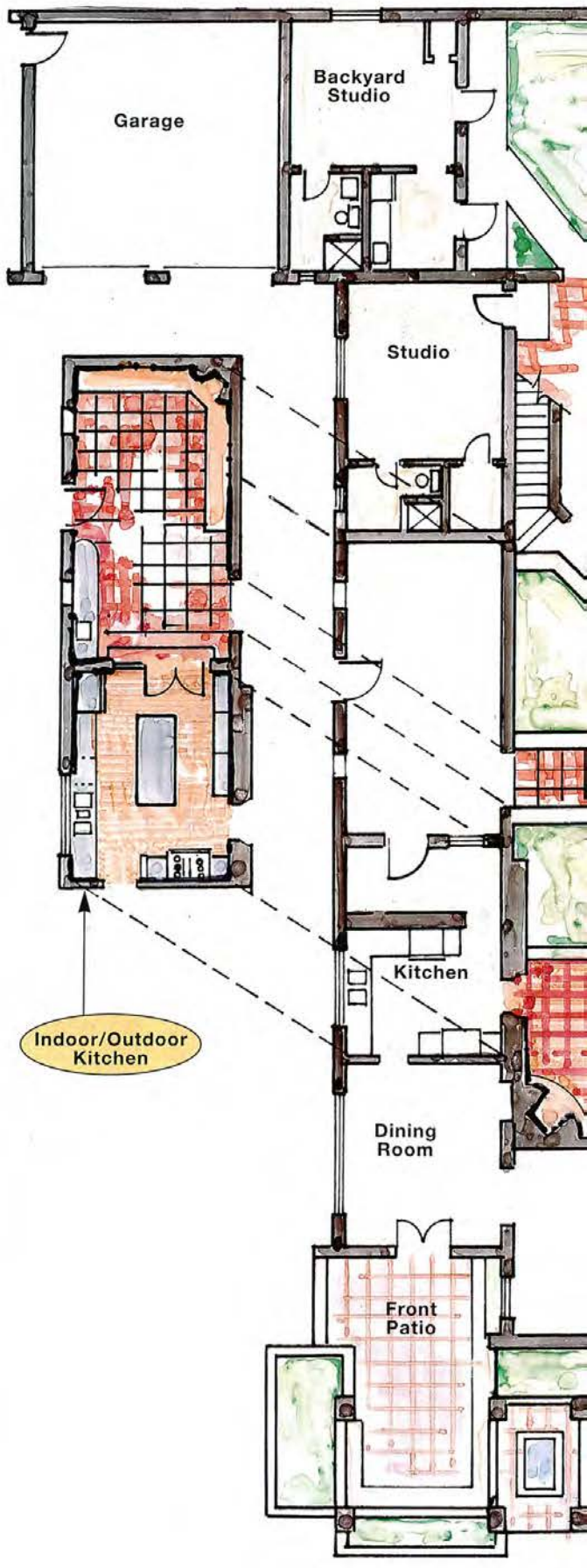
That's how she helped the Meigses resolve their different views of the new master suite. Colleen wanted a large room with two queen beds, so the kids could come in, flop down and watch TV without crowding them. Jim thought a smaller room would be more proportionate to the house. Hayes presented suggestions, ideas, sketches, and they ended up with a room smaller than Colleen wanted, larger than Jim wanted, but acceptable to both—with one king-size bed.



Alexandra Hayes, showing architectural plans and a house model to Jim Meigs, Norm and Steve, says, "Jim and I think a lot alike."

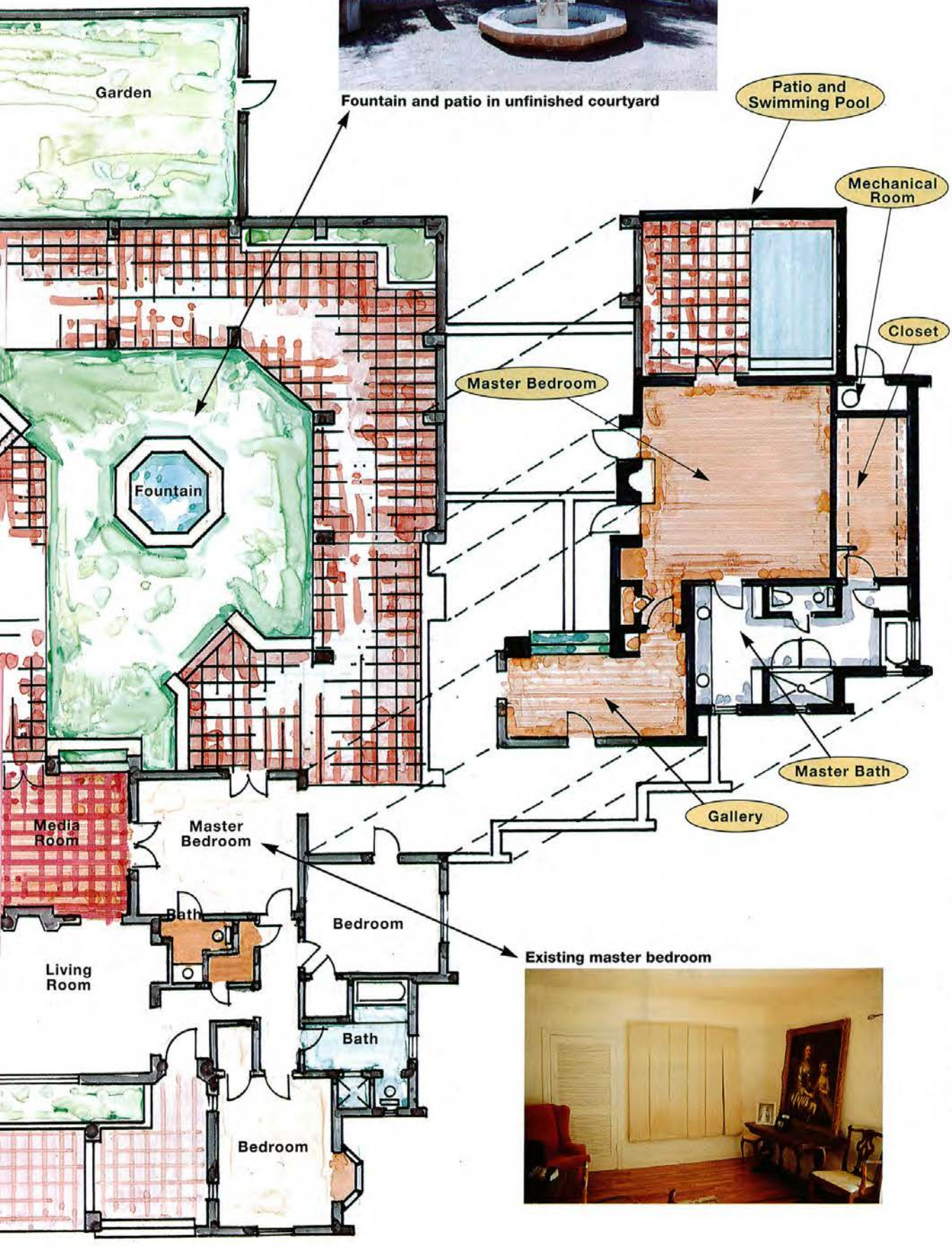
THE MASTER PLAN

New additions and spaces slated for renovation are identified in yellow



Fountain and patio in unfinished courtyard

ILLUSTRATION BY ALEXANDRA HAYES



Existing master bedroom

The Meigses' house in the desert embraces a south-facing courtyard, with a fountain and patch of green lawn providing a central oasis. Follow the dotted lines to see the two main additions, which project out from this plan view by architect Alexandra Hayes. To the left is the new indoor-outdoor kitchen; to the right, the master suite. From the front patio, French doors open into the dining room. The cramped original kitchen adjacent to the dining room will be expanded into what is now a utility space, beyond which is Jim Meigs's small studio with outside stairs leading to a rooftop patio. The media room will have a new poured-concrete floor and doors leading to the old master bedroom, which will become a library. The new master suite will connect to the library via a gallery/hallway with a courtyard view. At the far right of the new wing, a closet will help insulate the west wall. A swim-in-place pool is just outside.

courtyard out back, with a fountain set in the center. But children came, there was work and sailing, and he never finished the job. The courtyard's 12 masonry columns still stand, giving the yard a sad, unfinished look. Friends chortle about Meigs's "Stonehenge."

For years, whenever they discussed the house, Jim and Colleen would find themselves immobilized by the various pros and cons, and finally Colleen would say in frustration, "Well, at least let's do the kitchen." She loathed the old cooking area. Fire and flood (the results of a faulty floor heater and a dishwasher malfunction) had only made the kitchen more dingy and inconvenient. The counters were narrow, the cabinets shallow, the tile cracked. Still, renovation got postponed. Jim worked, Colleen looked after Elizabeth, now 12, and James, 5, and did some fabric design and volunteer work. They all went sailing.

Now, with the help of the *This Old House* team, the Meigses' plans for refurbishing the house are finally being realized.

Steve Thomas and Norm Abram drove into Colonia Solana—"a country neighborhood in the center of the city," as Jim Meigs calls it—one morning in early December for an inspection. The earth-colored house is a series of rounded cubes with a flat roof and thick, stepped parapet walls. Built in 1930, it is surrounded by mature mesquite, paloverde, prickly pear, ocatillo and century plants. There are three bedrooms and three baths, with a separate garage, studio and guest quarters out back, all uniformly stuccoed in a khaki hue. Jim calls the style Sonoran Pueblo Revival, and it resembles the familiar Santa Fe pueblos, although it lacks the protruding roof beams, or vigas. There are also Spanish Colonial features (arches, tilework, the fountain).

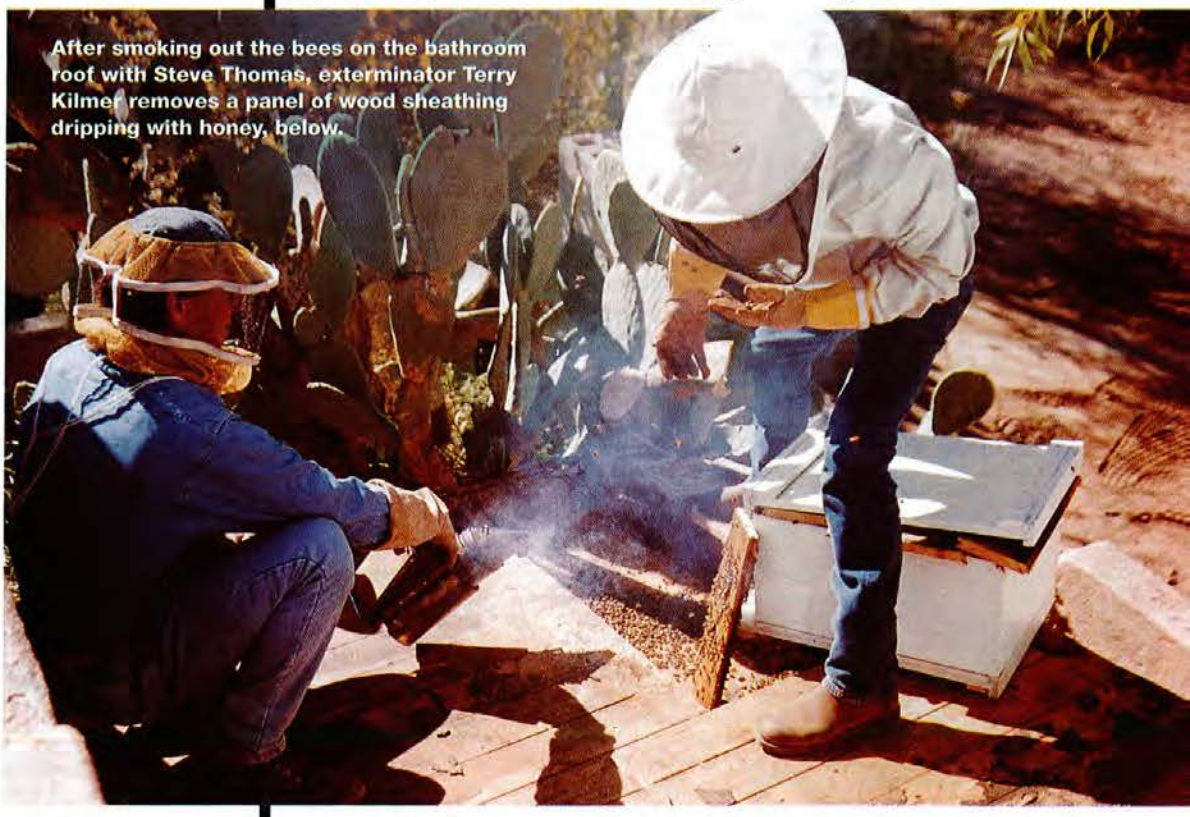
Like the houses at most cultural crossroads, it's an architectural mix. And it is apt for a desert location where nights are cool and days can be grimly hot: The thick walls of fired

Pacifying the Killer Bees

Steve Thomas is on the bathroom roof, a bee veil on his head and a power saw in his hand. There's buzzing in his ears and smoke in his eyes because the bee guy, Terry Kilmer, is calming the hive—or so Steve hopes. He grits his teeth and the saw screams.

The first bees arrived at the Meigses' house five years ago. They got in under the eaves and had to be exterminated. But then Africanized bees colonized the hive. They were so aggressive—one stung Colleen on the face—that "you could hear them hitting the windows," Jim recalls. When they started swarming out of the light fixtures in the media room, the family moved out and the exterminators returned.

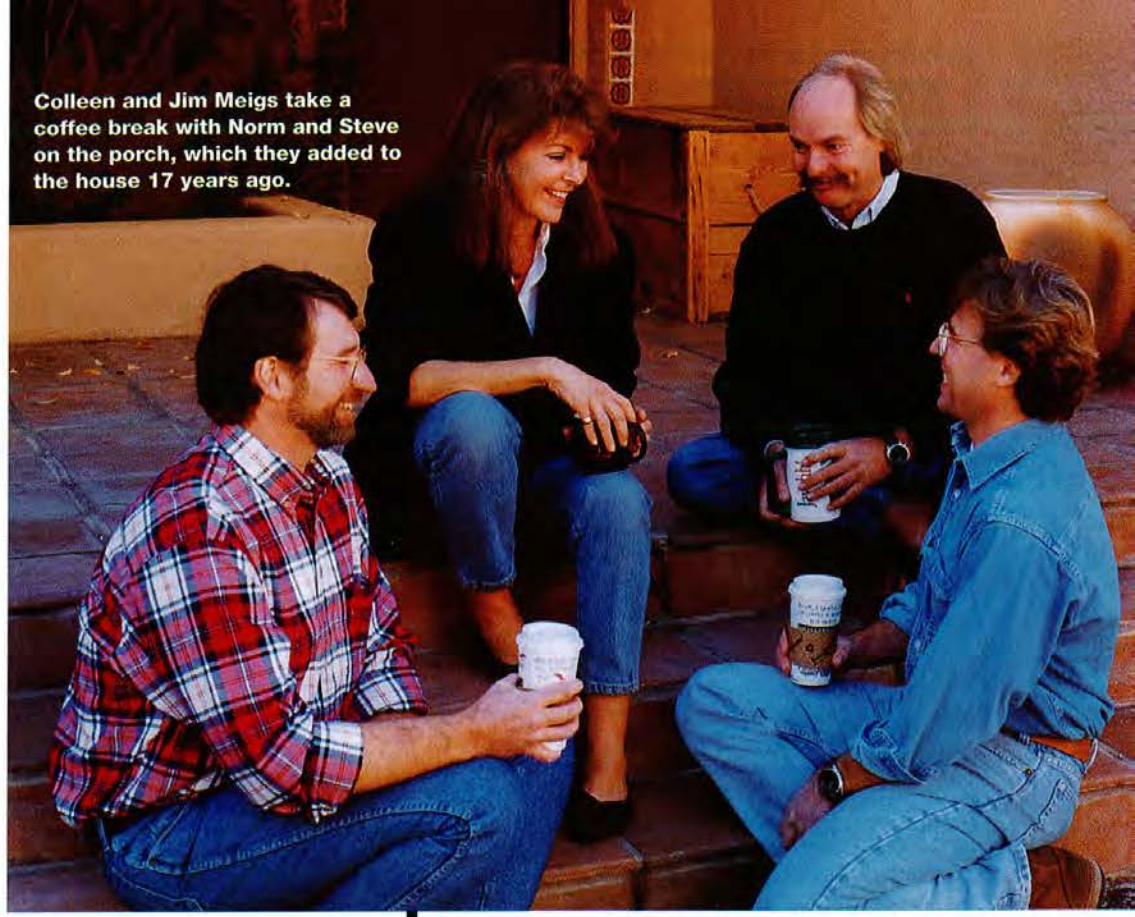
European settlers introduced bees to the New World during the 1600s. Now there are 3,500 species in North America, and a third of our food crops depend on them for pollination. Bees settle in cavities, make honey for food, reproduce until the colony is overcrowded and then swarm: The queen takes off with 5,000 or 10,000 bees seeking a new cavity. Temperate European bees do this in March, April and May, but Africanized bees throw off four or five swarms a year and can be extremely dangerous.



After smoking out the bees on the bathroom roof with Steve Thomas, exterminator Terry Kilmer removes a panel of wood sheathing dripping with honey, below.

Like Frankenstein's monster, the Africanized bee was introduced by a well-intentioned scientist. Geneticist Warwick Kerr brought them to Brazil in 1956 thinking they would improve on the Brazilian bee, which produces little honey, and the European bee, which died in tropical droughts. He set his African queens in hives, hoping they would hybridize with the Europeans. Instead, they escaped. Twenty-six queens swarmed and began moving north. En route, the bees have killed at least 600 people. The first Africanized bee was seen in Tucson in 1993. Two years later, 58 percent of the bees there were Africanized, and by November 1996, that number had risen to more than 70 percent. "Now people don't even check to see what kind they have," says Kilmer. "They just eradicate them."

When Steve finishes sawing and Kilmer lifts the roof sheathing, nearby workers gasp. The comb is four feet long, dripping with honey and buzzing with bees. Kilmer says he hopes he got the queen; it will be weeks before he knows whether the bees are Africanized or European. "A bit unnerving," Steve says gamely, as he comes down from the roof.



Colleen and Jim Meigs take a coffee break with Norm and Steve on the porch, which they added to the house 17 years ago.

adobe brick can delay temperature changes for as long as six hours. Inside the house are wood floors, coved ceilings and white-plastered walls against which heavy, dark antique furniture contrasts dramatically.

"The home is basically in good shape," Steve said after a walk-through. "But it's at the point where it really needs what we're going to do."

That judgment was echoed by a professional inspector, Allen Blaker, in a 42-page report. A textured exterior coating on the house—what project contractor John McCaleb called "the vinyl siding of the Southwest"—was peeling off in sheets. The porch's pine beams were rotted halfway through. The floor in Jim's studio was water-buckled. Electrical wires ran insanely up the downspout and across the roof. Vise-Grips stood in for valve handles in two bathrooms. Rot infested a patio roof outside the kitchen door. There were broken light fixtures, cracked tiles, loose firebrick in a fireplace and probable termite damage. What's more, a hive of bees had settled in the roof of the master bath, and honey had dripped down and stained the walls yellow.

Unfazed, Meigs called the bee-removal man. He knew many repairs on the house were long overdue, and he had deliberately waited until the work could all be done at once. But, he acknowledged, "It's gone from a renovation to a restoration."

There are three main projects: creating an indoor-outdoor kitchen, building a new master suite and finishing the abandoned courtyard. With each, Meigs wanted to maximize the house's pueblo feeling, as he had begun doing that first year by building the porch. "We're going to mimic what's here," he said, conceding a single exception. Elizabeth had always wanted a bay window in her room, and her father had decided that, although it didn't exactly fit the architectural style of the house, she would get one now—"a Pueblo Revival one," he said with a smile.

The first priority was to do something about the bees in the bathroom roof. So Terry Kilmer, the bee exterminator, got to work, with Steve Thomas's nervous help (see story, page 66).

As soon as the bees were gone, McCaleb and his crew started by tearing off the old master bath to make room for the new master suite. (Jim had always thought the bath was a 1950s add-on, but workmen found a 1934 Tucson newspaper under the tub.) The old master bedroom was to become a library, a quiet room for Colleen and Jim, and a hallway gallery for family photos would lead to the new suite.

Designing the addition was a challenge for Meigs. An admirer of Frank Lloyd Wright, he often mused that "proportion is to architecture what loca-

Here's to You, Mrs. Blimpington

There's a pit in the Meigses' backyard where they once intended to install a hot tub; they're of the hot tub generation. But they never got around to ordering one. In the driveway, side by side, are two of the reasons. One is a sailboat, a Florida-built Captiva 240, resting on its trailer and ready to be hauled off to Mexico or the California coast. Ask Jim Meigs what the family likes to do for fun, and he says, "Sailing, sailing, sailing."

Also in the drive, stolid beside the boat's graceful hull, is an impressive playhouse—large and hand-built by Jim Meigs, gray-shingled and handsome like the houses Colleen Meigs recalls from her girlhood summers on Nantucket. The playhouse belongs to daughter Elizabeth who, one day as Jim was designing it as a surprise six years ago, wandered into the studio and asked: "Who's that house for, Daddy?" Meigs thought fast and blurted, "It's for Mrs. Blimpington."

"Oh, Mrs. Blimpington sure is lucky!"

Months later, Elizabeth looked out the dining-room window and saw the playhouse—enormous, elaborately shingled and painted, standing in the driveway with a big red bow on it. That's when she discovered she was Mrs. Blimpington.

If the sailboat embodied the Meigses' sense of youthful freedom, the playhouse symbolized their maturing sense of family. As for the hot tub, they haven't given it much thought for years. "Communal bathing just isn't in our vocabulary anymore," Jim says.

Pembroke the pooch, Mrs. Blimpington's pal.

Hola, Linda Ronstadt

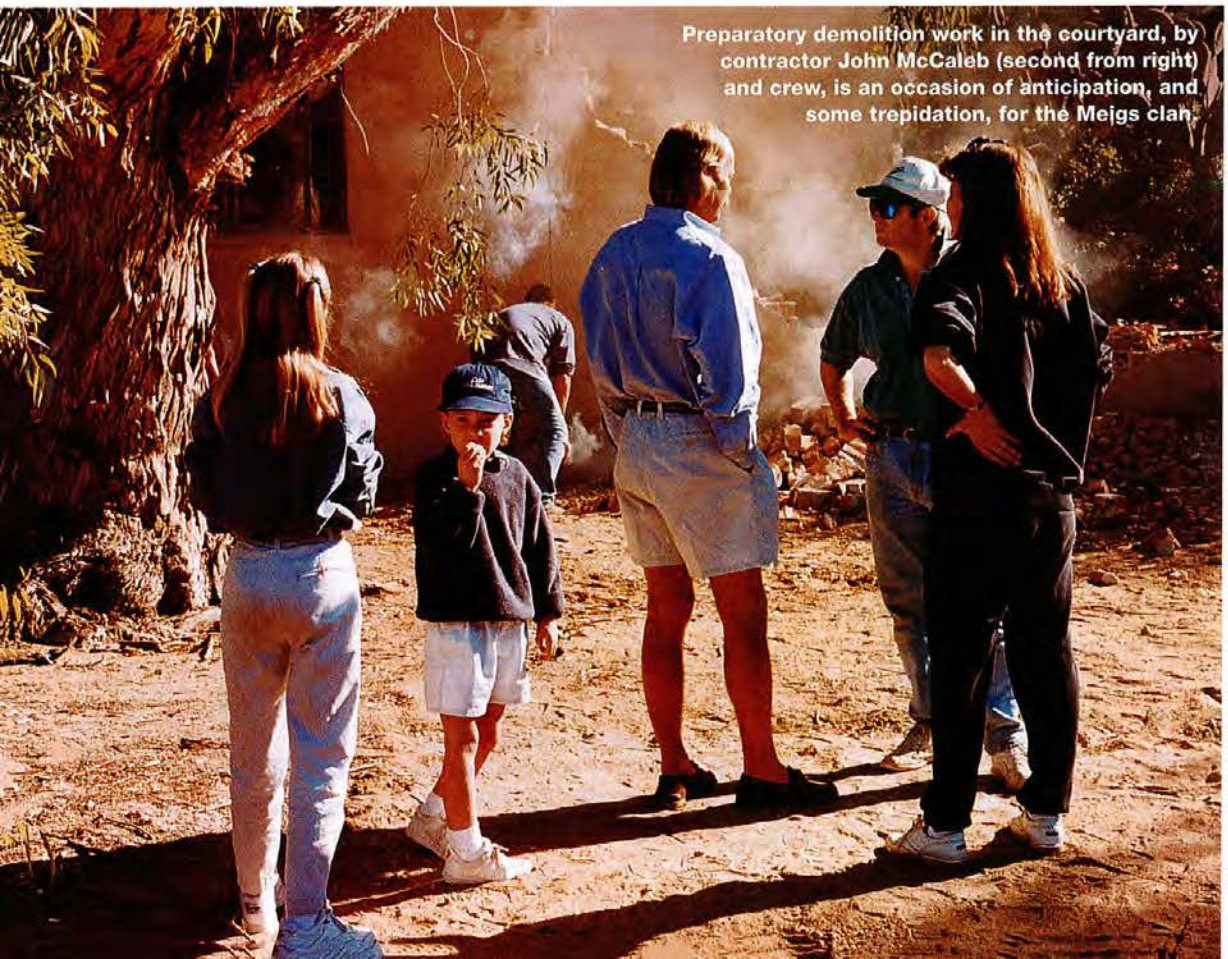
It was the year before the onset of the Great Depression, and Tucson developers had begun to see that the Southwest, promoted as something happier than a haven for the sick, might attract a well—and well-off—clientele. They were right. One of their projects was Colonia Solana ("sunny colony"), laid out in 1928 by Stephen Child, a Boston landscape architect and protege of pioneering land planner Frederick Law Olmstead. The lots were large, at least an acre, and the villas, as they were called, each cost $10,000 or more. In the end 122 were built, mostly Spanish Colonial Revival, but two are Pueblo Revival (one is the Meigses'). Linda Ronstadt, a Tucson native, has a house blocks away.

Child's design preserved the desert landscape, his streets curving to follow the most conspicuous natural feature, Arroyo Chico, a sweeping stream bed that is dry except for the flooding that comes with seasonal downpours. Today, the arroyo is lined with mesquite, acacia and wildflowers—100 documented species of plants, visited by 101 species of birds as well as dozens of strollers, joggers and birdwatchers. Instead of culverts to carry floodwater under the streets, Child created "Arizona dips": The streets simply dive into the gullies and out the other side, again preserving nature's topography. The paved streets are narrow and curbless, like country lanes. Driving along them, it's hard to believe one is in the virtual geographic center of a city of more than half a million people.

tion is to real estate." The problem was how to pack 1990s living into a 1930s space; Jim wanted a bedroom that was appropriate to the scale of the house, which was built when rooms were smaller. Colleen envisioned a room of more generous size. It was partly to help find a compromise that the couple hired an architect, Alexandra Hayes (see story, page 64). From his own professional experience, Jim knew how useful it can be to homeowners to have an unemotional mediator. And he knew Hayes was tactful, as well as a gifted designer. With her help, the Meigses found a solution, the first of many.

The kitchen presented another challenge. It was too small, but there was, once again, the problem of proportion. Pueblo houses didn't have big country kitchens with skylights and food-preparation islands. How to enlarge the kitchen, add a 1990s outdoor-living component and accommodate Colleen's idea of how it should all look? The challenge, Jim said, was to create "a radical departure but make it believable."

At the south end, a non-load-bearing wall separated the kitchen from a utility room. Removing the wall would almost double the kitchen space. There would be room for a stainless steel Viking range, dishwasher and refrigerator and plenty of cabinets. Instead of conventional upper and lower cabinets, the couple asked craftsman James Vosnos to build only lower cabinets in most of the kitchen, with an additional full cabinet wall. They asked him to build them all of mesquite, a slow-growing, hard, twisty and beautiful local material that was becoming rare because of indiscriminate gathering for barbecue firewood. When finished, Vosnos's work would resemble furniture against the white walls—the same look Colleen loved in their living room. And Meigs had persuaded plasterer Gilbert Chavez to come out of retirement to plaster all the interior walls, including those in the kitchen, to match the rest of the house.



Preparatory demolition work in the courtyard, by contractor John McCaleb (second from right) and crew, is an occasion of anticipation, and some trepidation, for the Meigs clan.

But what about the kitchen's outdoor component? Tucsonans spend a lot of time outside, and the Meigses wanted the perfect place to entertain. "It has to feel like part of the original house," Jim said, "but relate the inside to the outside, which is a more recent concept."

Just outside the kitchen was a little patio with a low wall, a gate and a partial roof. It was adjacent to both kitchen and courtyard and, because it was original, its proportions were perfect. It would be the outdoor portion of the kitchen, with poured-in-place concrete countertops and a new beehive fireplace in the corner. Installing French doors

A wall in the courtyard is reduced to rubble to make room for the new master suite.

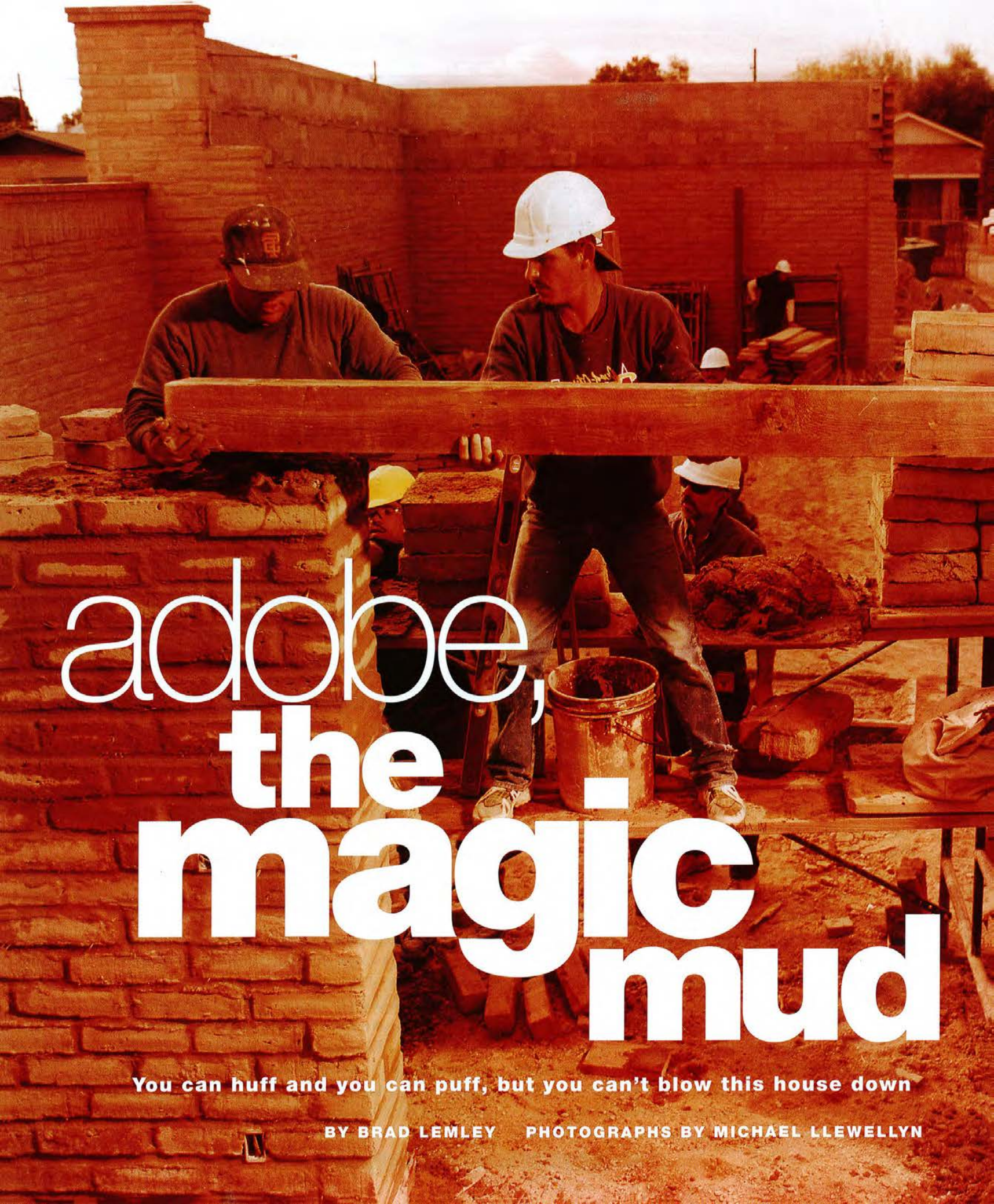
between the patio and the indoor kitchen would create the perfect indoor-outdoor space for cooking, dining and entertaining.

Another room illustrated how the use of space changes as social habits and technology evolve. Many Southwestern houses have what's known as an "Arizona room," a roofed, partly walled porch, mostly open to the outdoors and often set in the cup of a U-shaped house. The Meigses' Arizona room had been enclosed, possibly in the 1960s, with aluminum windows and paneling that looked, Meigs said, like "trailer siding." When the couple moved in, they tore out the windows and siding, raised and tiled the floor, added big tempered glass windows, built in planters, bookcases and a beehive fireplace and stuccoed the walls. With TV and VCR added, it became a media room where the family spent many a desert evening warmed by the fire.

But today, in Meigs's view the fireplace seems too big and the tile floor and bookcases more Spanish than Pueblo, so the plan is to jackhammer out the tile and make a new floor of a traditional Arizona-room material: tinted poured concrete. The walls adjacent to the fireplace will be furred out and plastered, thus reducing the fireplace's scale, with niches in the plaster replacing the heavy, dark bookcases. Thus, Meigs says, he'll be correcting a previous owner's mistake as well as a few of his own.

Early plans called for a new garage, which was vetoed on the grounds of cost. But they would move the laundry inside from the garage; update the mechanicals (by installing an energy-saving, gas-fired "chiller" with only three moving parts, which would cool the house using a water-ammonia mix); catch up on maintenance (repair the roof and electric); and give the place a total facelift. That left finishing off the courtyard, which would be fairly straightforward: poured concrete underfoot, glue-laminated beams overhead (the eight-by-eights Jim had used on the front porch 12 years before were hard to find now) and a bit of green turf around the fountain for a touch, in this arid zone, of genuine lushness. "The house will have a cool interior, a cultivated courtyard and a wall separating it from the dry, severe environment outside," Steve Thomas observed. "It will be a true desert house."

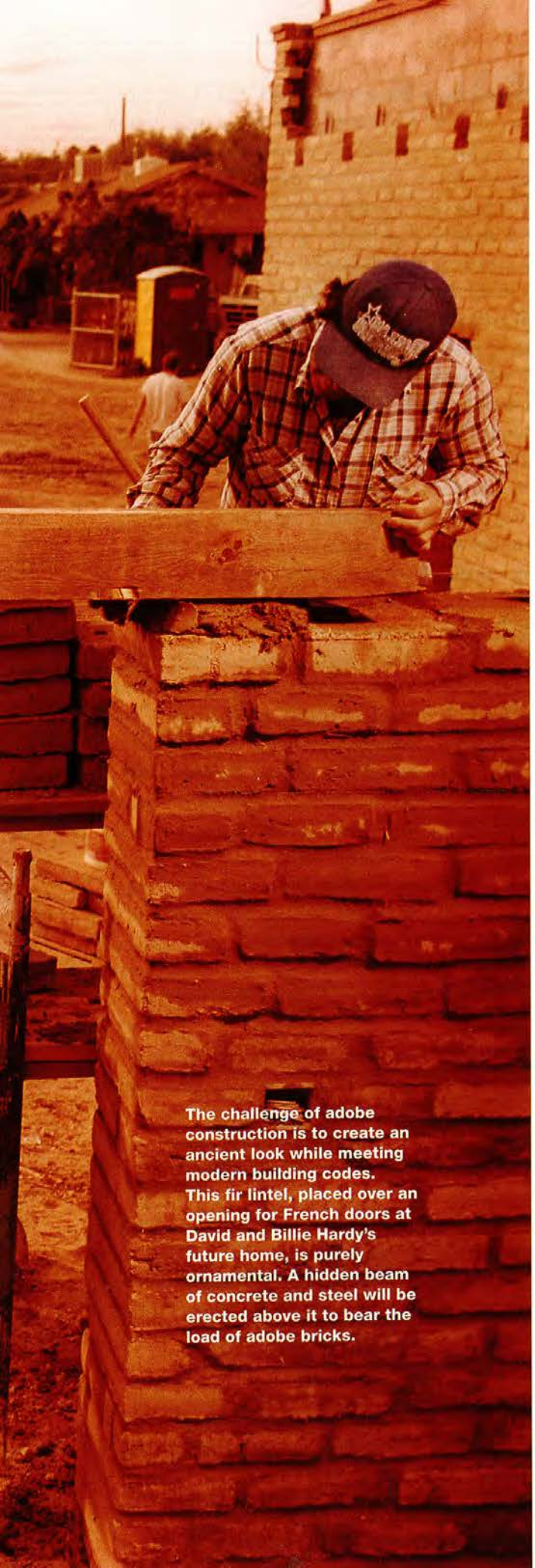
♦ *See Directory,* on page 116, *for details and sources*



adobe, the magic mud

You can huff and you can puff, but you can't blow this house down

BY BRAD LEMLEY PHOTOGRAPHS BY MICHAEL LLEWELLYN



The challenge of adobe construction is to create an ancient look while meeting modern building codes. This fir lintel, placed over an opening for French doors at David and Billie Hardy's future home, is purely ornamental. A hidden beam of concrete and steel will be erected above it to bear the load of adobe bricks.

THE WALL, MASSIVE AND IMPASSIVE AGAINST the endless Arizona sky, could be part of a Zuni plains dwelling, circa 1500. Sixteen-inch-thick, dun-colored adobe bricks and mortar rippled with bits of wheat straw give it an air of venerable, dignified strength. There's just one small anomaly: an inset metal box about a foot above the ground, packed with coiled blue wire. "That's a high-speed computer line," says general contractor Michael Keith. "The client is a writer, and he needs a state-of-the-art connection to the Internet."

This wall is part of the future Tucson home of David and Billie Hardy, and it bridges the couple's desires neatly. While David, an anesthesiologist and author of medical-journal articles, needs high technology, Billie, an ardent preservationist, says she wants the home "to look like it's been here for a hundred years." She's done that by selecting an old architectural style, Sonoran, featuring a fortress-like exterior, an interior courtyard and a wide central hallway called a *zaguan*. Adobe—heavy, gritty and real—is central to her vision: "Look at those blocks; aren't they gorgeous? The appeal is warmth, simplicity...It's just good old dirt."

The Hardys' house, in Tucson's Barrio Historico district, is a prime example of how a new generation of builders who work with adobe is successfully melding this ancient building material with advanced electrical, plumbing and climate-control systems to create hybrid structures. An adobe revival that began in the Southwest in the late 1960s appears to be gathering momentum. "Adobe makes sense in the modern world," says Bob Vint, the Hardys' architect.

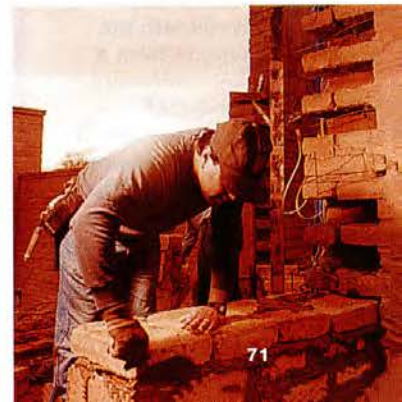
A big factor in the resurgence of adobe has been the modern quest for energy efficiency. Ironically, these mud bricks are terrible insulators—a foot-thick block rates just R-4, about the same as one inch of cellulose insulation. But "there's more to energy efficiency than high R values," Keith says. While an R-30 polyicynene-foam-stuffed wall seals out outdoor temperature

BRICK BY BRICK

Masonry contractor Eric Means lays the first course of adobe bricks on a concrete block stem wall, 8 inches high. The adobe is elevated to prevent water erosion.

Adobe bricks vary in size and require lots of mortar, which is applied with short-handed shovels, not trowels.

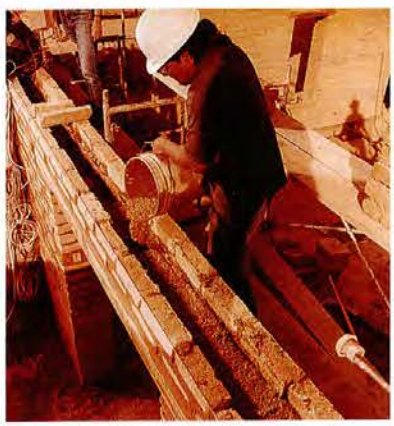
A mason sets the bricks, above, then wiggles them back and forth to squeeze out gaps in the mortar, below.



To insure the structure will be load-bearing, workers place two lengths of 4-inch-wide, ¼-inch-thick angle iron above the wooden lintel.

Small adobe veneer bricks are laid on either side of the angle irons. This creates a form for pouring and concealing the concrete beam.

Means sets one of two pieces of ⅝-inch-diameter reinforcing steel bar (known as No. 5 rebar) inside the veneer bricks. The rebar sits on small pieces of concrete block, which in turn rest on a piece of black builder's paper. The paper acts as a bond breaker to prevent the expansion and contraction of the wooden beam from disturbing the concrete above it.



Buckets of concrete are poured into the cavity to form a steel-reinforced, 8-by-8-inch concrete beam. A similar continuous beam (minus the angle iron) is poured at the top of every wall in the house.

variations, adobe moderates them. Because it's so dense, adobe heats up and cools down much more slowly than the surrounding air, so the bricks stay fairly close to the average outdoor temperature during a 24-hour cycle.

"While outside you've got a swing from 70 to 110 degrees over 24 hours, inside you're going from 80 to 90. That's a big break in cooling bills," Keith says. He believes a desert home that makes intelligent use of adobe's heat-moderating mass could keep year-round indoor temperatures between 75 and 82 degrees with no additional heating or cooling. Indeed, he's designing such a home for himself.

Houses made from stacks of sun-dried bricks of mud and straw have dotted desert landscapes worldwide for thousands of years. Exodus 5:6-18 details how the Israelites, captive in Egypt, were flogged for failing to meet their production quota of straw-reinforced bricks (Yahweh responded by visiting frog, mosquito, hail and locust plagues on Pharaoh).

Historically, adobe bricks were made on site—simple, if exhausting, work. The method: Dig a shallow depression in the shape of the house-to-be, fill it with water and straw, stir. Shovel the mud into wooden brick-forms. Repeat a few hundred back-breaking times and you wind up with an adobe house complete with cellar. But today, even zealous adobe fans regard such labor as too historically accurate and are content to purchase bricks and hire laborers to place them.

A major drawback of adobe used to be a tendency to revert to runny mud when wet. So asphalt-impregnated, water-shedding adobe bricks have been popular since the mid-1940s. More recently, cement-stabilized versions have been catching on, and that's what the Hardys chose. Unlike asphalted bricks, which have a dark hue, "this looks like the original adobe you find in this area," Billie Hardy says.

A purist might argue that such fortified bricks aren't really adobe. But typically, these additives comprise 6 to 8 percent of the brick's volume—that's about one third the percentage of cement in concrete blocks. Although adding cement to an adobe doubles its compressive strength, the stabilized bricks remain fairly crumbly compared with fired ones. The masons on this job cut small bricks by simply whacking them with the edge of a trowel.

And although they won't melt, they will absorb water. To prevent flaking during Tucson's occasional subfreezing mornings, the exterior walls must be protected by large overhangs, or coated every five years with a breathable water repellent such as modified stearate.

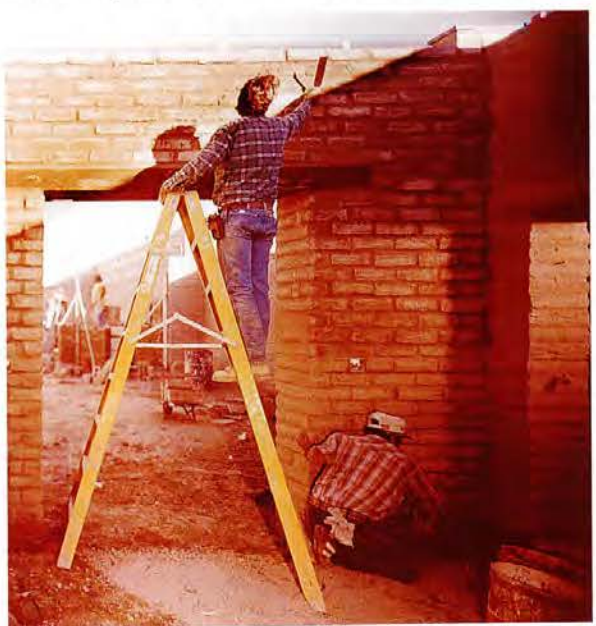
Because the raw material—mostly desert earth—is literally dirt cheap, the bricks cost somewhat less than the lumber, drywall, insulation and siding of typical frame construction. The building process itself is often cheaper as well, particularly if, like the Hardys, you choose not to plaster over the bricks. "When the workers lay the wall, they are doing the structure, interior and exterior finish in one operation. You don't have different crews coming back day after day," Vint says. The Hardy house will come in at $95 per square foot, up to 30 percent less than equivalent custom-designed frame homes.

Much of the cost of building with adobe is incurred in hauling the requisite tonnage of bricks to the building site and wrestling them into place. The walls of a 2,000-square-foot wood-framed home weigh about 10 tons; those of an equivalent adobe dwelling weigh about 336 tons. That weight, Vint says, means adobe structures are best confined to one story. But it's this mass that energizes adobe aficionados. It even inspires large, leather-skinned construction guys to rhapsodize without prodding. "I have an emotional attachment to solid walls, as opposed to walls that you bump into and it sounds like you're hitting a drum," says Eric Means, head of the masonry crew.

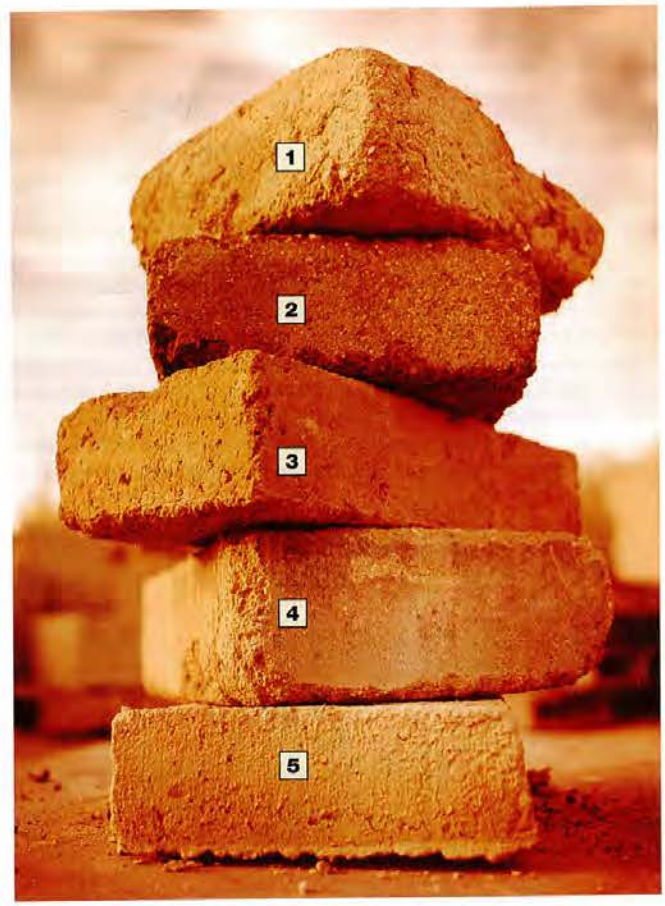
In modern adobe work, the walls are even more solid than they seem. Traditionally, the foundations of adobe homes were simple trenches filled with rubble, and lintels (the structural support over doors and windows) were plain wooden beams. But to meet code, in the Hardys' new house masons poured oversize concrete foundations and laced these Spartan walls with an invisible network of massive reinforcement. The weathered, mortise-pocked fir lintels (recycled from renovated and demolished Tucson homes) are purely decorative. The real support is supplied by a formidable array of angle irons, steel bars and concrete just above the wood, all hidden by a veneer of four-inch-wide adobe bricks. "We've been saying the military will want to lease the house for a bomb shelter in case of terrorist attack," says Billie.

Still, building an adobe home in the '90s requires adapting to its ancient work rhythms. Variability of brick sizes requires vast quantities of mortar to be mixed on site; an adobe wall is about 20 percent mortar. The ubiquitous shout among the dozen Spanish-speaking workers on this site: *"Mas mezcla!"* ("More mix!"). The act of hoisting a 32-pound adobe brick and easing it into place isn't much quicker than it was in the days of the captive Hebrews. And there is the endless repositioning of scaffolds so that the masons can place the bricks at a comfortable—or, at least, not crippling—height.

"At the end of the day, them suckers get heavy," says Bob Worl, a mason for 30 years, flashing a gold-toothed grin. "I'm getting too old for this. I've been saying that for 20 years." But, he adds, surveying a day's work, "It is beautiful stuff."



Workers strike the mortar joints—make them smoothly concave—by pressing against them with a piece of 1¼-inch-diameter PVC tubing.



BUILDING BLOCKS

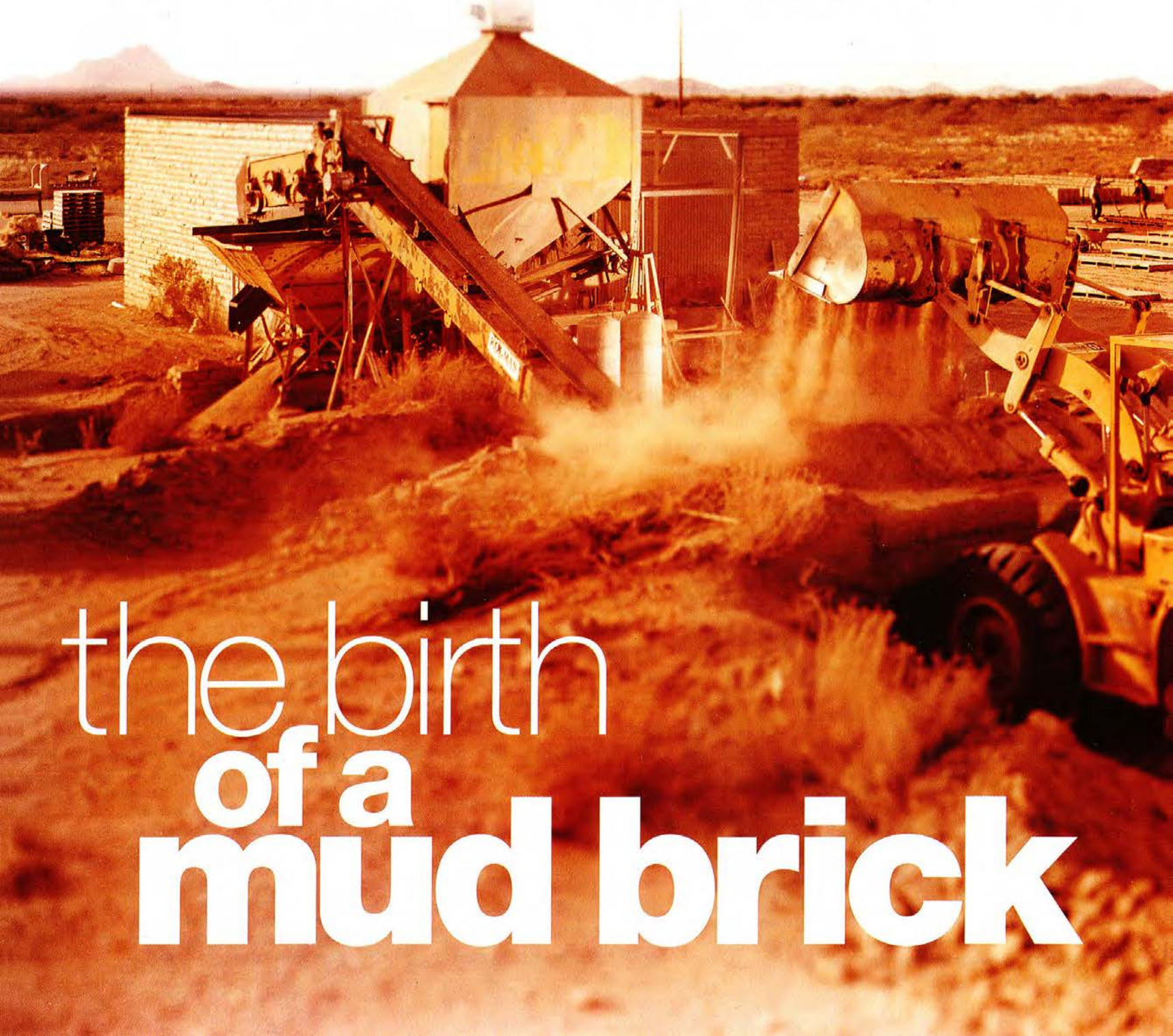
Native Americans living in adobe dwellings responded to the material's tendency to melt in rainstorms by slapping on an occasional new coat of adobe plaster. But modern-day homeowners can't be expected to forgo *Seinfeld* to make scoop-and-smear repairs, so a variety of additives and manufacturing processes have been devised to make adobe more durable. The five dominant types of adobe in use today are, from top:
1. Plain, nonstabilized, mud-and-straw adobe, taken from a home-renovation project in Tucson's Barrio Historico district.
2. Asphalt-stabilized adobe. These have from 5 to 15 percent asphalt emulsion to help resist water.
3. Burnt adobe. Raw adobe bricks are cooked in kilns or formed into igloo shapes around hot fires. They are usually laid up with a cement-lime mortar, like regular bricks.
4. Pressed-block adobe. Mud and cement are fed into a hydraulic compressor, which spits out instantly usable finished block.
5. Cement-stabilized adobe. Although these absorb water, they are more resistant to erosion than most types of adobe.

Tucson Adobe West is a modest, three-person operation among the acacia and prickly pear about 14 miles northwest of Tucson. But it proceeds with impressive dispatch, cranking out 1,000 cement-stabilized adobe bricks a day.

The process begins with a front-end loader, which scoops the tan earth down to about five feet—the deeper soil is "too gravelly," says company president John Acton. The soil is dumped onto a vibrating screen that removes any stones larger than three-eighths of an inch. Next, the screened soil moves on a conveyor belt under a feeder nozzle, which spits out a measured injection of portland cement. The cement-soil mixture then drops into a mixer mounted on the front of a forklift, and the operator adds water and straw. The recipe for adobe, by volume: 85 percent screened soil, 7 percent wheat straw and 8 percent cement, combined with enough water (from 5 to 10 gallons per 12 cubic feet of mix) to make it stiff but pourable. Each constituent has a purpose. The soil provides bulk. The cement gives erosion resistance. And the straw, purchased from a feed store and chopped into four-inch segments, does several things: prolongs the drying time (the more slowly cement dries, the stronger it is), imparts some tensile strength, boosts the R factor a trifle and breaks up soil lumps in the mixing process.

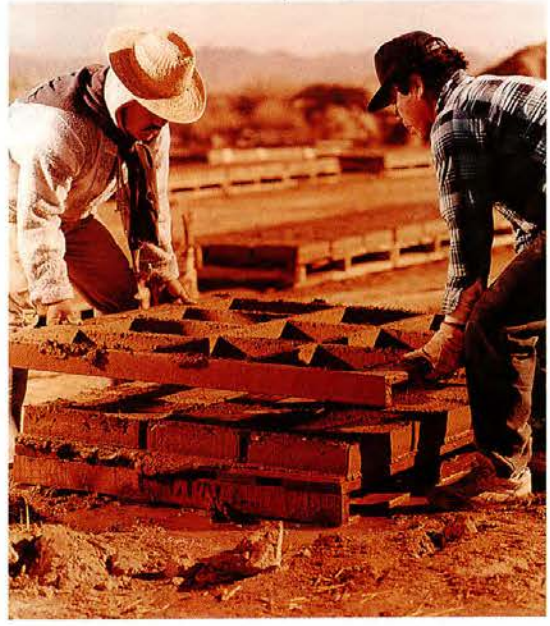
The mixed adobe is then driven to a metal form that has been dusted with powdery soil for the same reason you'd flour a cake pan—to keep the form from adhering. All bricks are cast, one atop another, right on forklift pallets. "The key to keeping costs down is to avoid moving the adobe by hand," Acton says. These bricks sell for 98 cents each.

The mix is dumped and screeded to create 30 bricks at a time. Each standard brick mold measures 3 by 11 by 15 inches. In construction, these dimensions will fill out with mortar to approximately 4 by 12 by 16 inches, which is compatible with a wide variety of window and door openings. Just a few minutes after they do the pouring, workers lift off the forms and the bricks dry; they can be laid up in a wall within a week.



the birth of a mud brick

Adobe bricks are made directly on pallets to avoid the labor of moving them by hand. Step one: A freshly mixed batch of soil, cement, straw and water is dumped into a metal form.



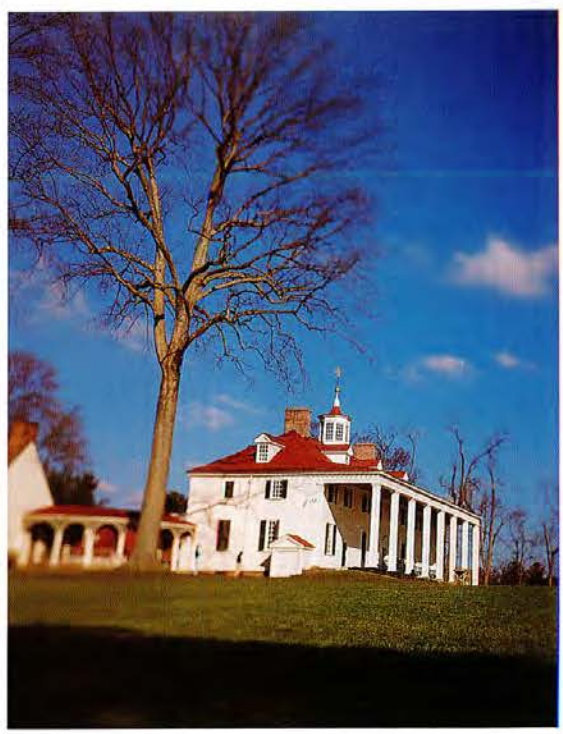
After screeding—drawing a metal bar across the top of the form to remove excess mix—workers gently lift off the form.

Bricks cure in the dry desert air for at least a week. Then these pallets, each bearing 2,500 pounds, will be forklifted onto trucks and taken to construction sites.

See Directory, on page 116, *for details and sources*

OUR FATHER'S HOUSE

At Mount Vernon, one encounters the real George Washington—soldier, statesman and handyman



Mount Vernon from the east lawn: The high columned piazza, often cited as one of George Washington's most innovative architectural ideas, is as beguiling a gathering place in our time as it was in his. ABOVE: **A plaster bas-relief of George Washington, dating from 1784, is on display in his study.**

the great american house

MOUNT VERNON WAS more than George Washington's home; it was his project. From the time the Virginia property came into his hands in 1754, when he was a bold and desperately ambitious young major in the British army, until his death two weeks shy of the millennium in 1799, by which time he was the embodiment of American grandeur and rectitude, he never stopped tinkering with the place. For much of his life, Washington was away from home on thunderously urgent business, and so he directed most of the work on Mount Vernon from a certain Olympian remove. But his correspondence is so filled with appraising references to wallpaper, nails, paint, hinges, locks, putty and glass that the man who emerges from it seems as much a frustrated handyman as the presiding figure of his age.

Even when things were at their bleakest, when his new country was falling apart before his eyes, Washington never lost interest in his fixer-upper on the Potomac. In September 1776, in one of the first crucial engagements of the Revolutionary War, the Colonial army suffered a humiliating rout on Manhattan Island, fleeing in panic from the invading British and Hessian forces as Washington rode among his troops on horseback trying futilely to beat them back into action with his riding whip.

"If I were to wish the bitterest curse to an enemy on this side of the grave," he wrote to Lund Washington, the cousin who managed Mount Vernon in his absence, "I should put him in my stead with my feelings." But in the same letter, penned in a dark hour when his cause seemed hopeless and he felt his reputation sagging into disgrace, Washington was still issuing instructions for work on his dream house. "The chimney in the new room should be exactly in the middle of it," he instructed Lund, with

BY STEPHEN HARRIGAN PHOTOGRAPHS BY SIMON WATSON

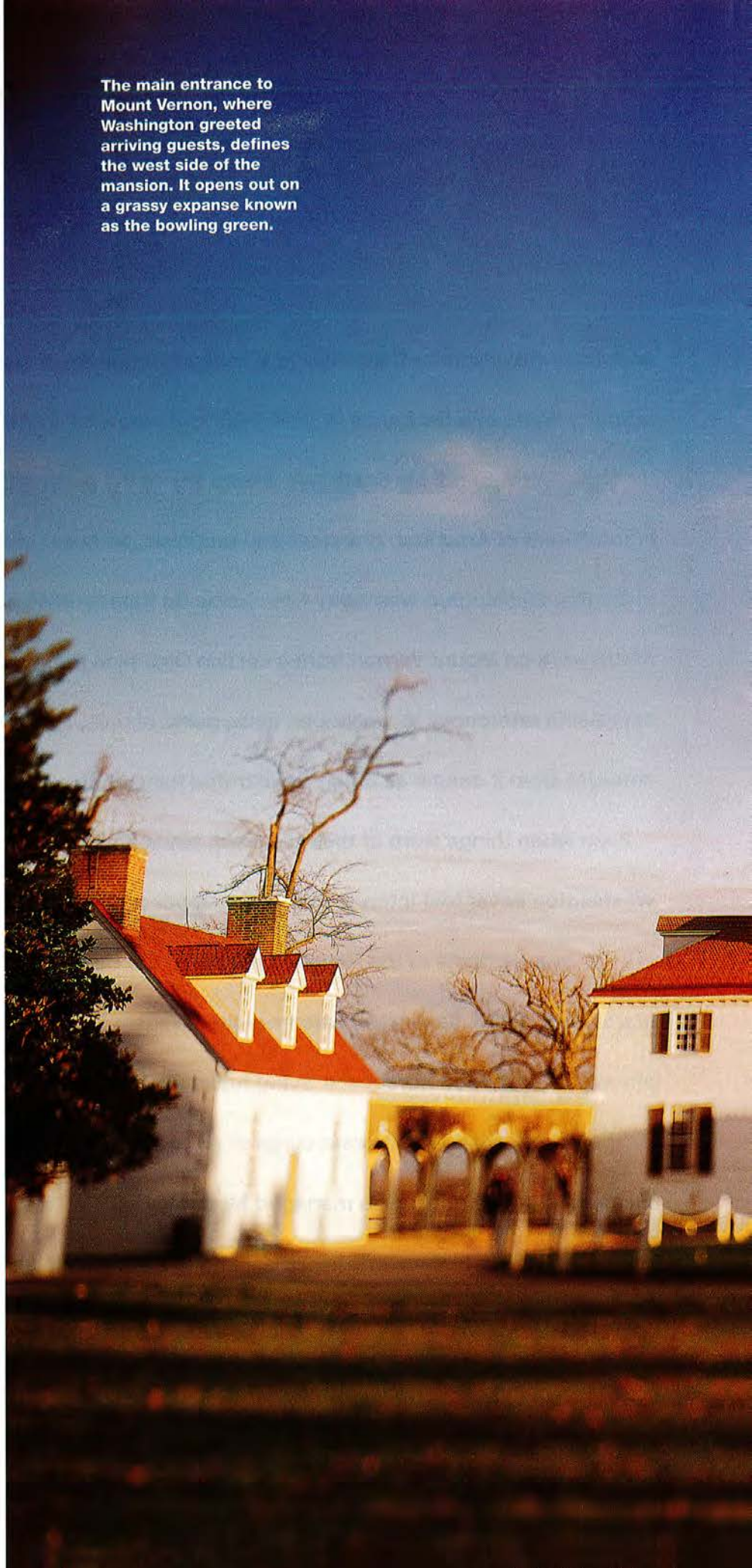
a whiplash change of tone and topic, "doors and everything else to be exactly answerable and uniform—in short I would have the whole executed in a masterly manner."

The homegrown Palladian mansion that Washington continually remodeled on his 8,000-acre estate sits on a high bluff above the Potomac. Although it is now just 11 miles downriver from D.C.'s National Airport, Washington's "Home House" still manages to impart a formidable sense of remoteness and serenity. And if you're fortunate enough to have the place to yourself, as I did one recent evening thanks to the hospitality of the Mount Vernon staff, Washington seems no more remote a presence than the fireflies on the sloping lawn or the swaying branches of the ages-old pecan tree that towers above the southern wing of the mansion.

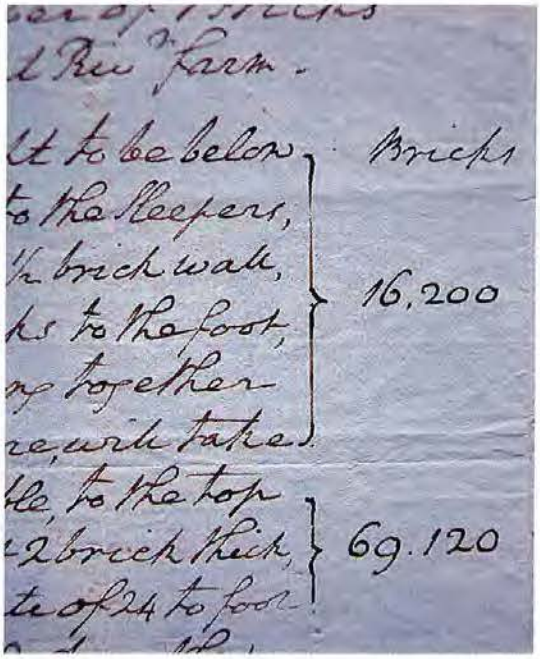
I was sitting that night on the piazza, the commodious high-ceilinged ground-level porch that faces the river and runs from one end of the house to the other. It is a beguilingly informal and versatile space that George and Martha Washington often used as an open-air dining room. An extensive veranda like this—which has since become a mainstay of North American domestic architecture—might seem to us an obvious way of taking advantage of Mount Vernon's splendid location, but at the time the piazza was built nothing of the sort had yet been seen in England or the New World. The supremely practical George Washington simply thought it up on his own.

From the piazza, I looked out over the lawn in the fading light. A gentle grassy slope led down to a sharp precipice planted with trees; my eye coasted over the leafy canopies of this "hanging wood," past the deer park below and on out to the immemorial Potomac. The only hint of the present century was the steady electric light of a single boat and the reverberating yammer of its engine.

When George Washington's father built his compact and unassuming house here in (it is believed) 1735, it had faced unambiguously east, toward the river and England. In the first of his two major remodeling projects, Washington raised the elevation from one and a half to two and a half stories and subtly



The main entrance to Mount Vernon, where Washington greeted arriving guests, defines the west side of the mansion. It opens out on a grassy expanse known as the bowling green.



In a letter, written May 24, 1795, George Washington calculated the number of bricks needed for each section of a new barn.

reoriented the house, placing the formal entrance on the west and thus shielding the serene Potomac side from the constant bustle of arriving and departing traffic.

Washington made dozens of such major alterations, eventually turning his father's humble frontier home into an imposing but never intimidating mansion with multiple dining rooms and parlors, eight bedchambers, a study and a cluster of outbuildings, known as dependencies, elegantly bound to the main house by colonnaded passageways.

He never claimed to be an architect—he once wrote that, although he knew "rules of Architecture" existed, he did not know what they were—but the structures and cultivated spaces of Mount Vernon are indisputable expressions of his mind and will. A few of his building sketches survive, and they are plain and clear and sometimes highly inventive. "Washington was his own architect and builder," wrote his wife's grandson, George Washington Parke Custis, "laying off everything himself. The buildings, gardens and grounds all rose to ornament and usefulness under his fostering hand."

George Washington spent his whole adult life constructing Mount Vernon, and to a degree it is a simulacrum of his own complex and ever-evolving personality. It is, for example, a monument to privacy and containment. On the outside, there is no frippery, no ostentation, no architectural flourish that does not serve a sensible need or afford a practical pleasure. Inside, however, in the dining rooms and parlors, one finds a hint of the flamboyant, obsequious, temperamental and colossally vain inner self that it was Washington's life's work to tame. The walls in these rooms are painted with insistent, theatrical colors—glowering Prussian blue and several eye-popping shades of verdigris green—that are as vibrant as the outer walls are austere. It is too much to argue that these riotous hues constitute an eruption from Washington's suppressed libido, but they do serve to remind us that the grave, sober leader who publicly disdained pomp and made a show of turning away acclaim also spent a good deal of effort designing his own uniforms and obsessively plotting his worldly advancement.

Still, it is the public Washington—even-tempered, even-handed, magisterial—who dominates Mount Vernon, just as he dominates history. During the eight years he was away fighting the revolution, he almost never left the army, coming home only for a total of 10 days, but with an almost godlike omniscience he oversaw the placing of every board and the hammering of every nail. "What are you going about next?" he wrote to Lund in 1781. "Have you any prospect of getting paint and Oyl? Are you going to repair the Pavement of the Piazza? Is anything doing, or like to be done with respect to the Wall at the edge of the Hill in front of the House? Have you made good the decayed Trees at the ends of the House, in the Hedges, &ca. Have you made any attempts to reclaim more Land for meadow? &ca. &ca."

It was an endless, expensive, constantly expanding project, made possible only by the hundreds of slaves that Washington

His House, **Our House**

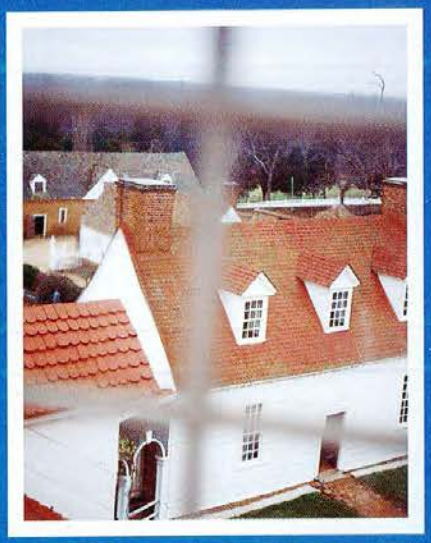
New York architect Robert A.M. Stern, who has designed dream houses as big or bigger than Mount Vernon, once labeled the white manse on the Potomac River "the most widely emulated building in America." Indeed, the vast majority of the nation's single-family houses owe a lot to George Washington's precedent-setting example.

A wide range of design elements derived from Mount Vernon are now ubiquitous. Classicist architect Allan Greenberg points to the quintessentially American circular drive that skirts the front door and accentuates the "strong-boned" qualities of the house Washington built. Mount Vernon Ladies' Association curator Christine Meadows sees its optimistic spirit throughout suburbia in quaint cupolas added to rooftops.

On those same roofs you might find rounded wood shingles, which, like those at Mount Vernon, are "painted red to look like flat clay tile," says John G. Waite, an architectural historian. He frequently sees copies of the mansion's wood-paneled interiors and of the decorative plaster ceiling in the small dining room. The most obvious feature Americans have borrowed from Washington's residence, he says, is the full-facade porch.

Although more than 200 years old, Mount Vernon continues to be an idea house. Two decades ago, curators concluded that the dull paint scrapings salvaged from the Colonial era were once quite vivid. At first, no one believed "that Washington lived with those bright colors," says Meadows. But both chemical and spectrographic analyses agreed with 18th-century pigment orders in the association's archives, so in 1979 the mansion's two dining rooms were reintroduced in different shades of verdigris green. Since then, hundreds of visitors have requested the paint formulas.

LETTER COURTESY THE MOUNT VERNON LADIES ASSOCIATION



The cupola, built in 1778, served as a natural air-conditioning system by drawing hot air from the interior of the house. In 1787 Washington added a weathervane, a dove of peace made of hammered copper. The cupola looked down on the kitchen (inset), which was separated from the main house as a fire-prevention measure.

Modern-day visitors to Mount Vernon can sit on the east lawn looking out over Washington's "hanging wood" toward the Potomac River.

and his wife owned. Most of these slaves were field hands, but some were skilled carpenters and housewrights. Washington's conscience was troubled, though not tortured, by slavery. He wished to see it disappear "by slow, sure and imperceptible degrees," but in the meantime he needed all that free labor—all those skilled hands wielding froes and beetles and adzes and draw knives—to shape his timbers, to cut his cypress shingles, to mix his plaster and fire his bricks and to bevel and rusticate the pine planks that covered the mansion, giving the appearance of cut stone.

It was not just the mansion that was constantly being repaired and expanded but the whole plantation, with its stables, slaves' quarters, storehouses, kitchens, coach houses and laundry yards. There was even an innovative "dung repository" for compost. One of the plantation's most intriguing structures was a two-story treading barn. The 16-sided structure of this visionary barn approximated a circle. Inside, a horse could walk around and around the circumference of the second story, flailing wheat with its hooves. As the grain was separated from the chaff, it drifted down to the collecting floor below through gaps in the planking. The barn fell into ruin and disappeared sometime near the end of the 19th century. But when I visited Mount Vernon, a massive and expensive replication project was under way, requiring the pit-sawing of 500 logs, the molding of 40,000 bricks and the splitting by hand of 15,000 cypress shingles.

I spent an hour or so inspecting the framework of the unfinished barn and watching workers bevel pit-sawn planks with drawing knives. Then I went on a walking tour of the grounds, poking my head in all the outbuildings and strolling through the two remarkable gardens—one for growing fruits and vegetables, one for ornamental flowers—that flank the bowling green extending from the west face of the mansion. It was an intoxicating creation, not just the plants but the beautiful terraced brick walls enclosing them. Even the ancestral privies, with their white domes and spacious summer-house feel, were part of Washington's binding vision: the studied harmony of structure and open space that reigned over the entire Mount Vernon grounds.

"I am now I believe fixed at this seat," Washington wrote after his marriage to Martha in 1759, "with an agreeable Consort for Life and hope to find more happiness in retirement than I ever experienced amidst a wide and bustling World."

Washington was still in his twenties when he announced his retirement, but neither the bustling world nor his own bustling nature could tolerate his living a quiet and inconsequential life as a country squire. His years of peace at Mount Vernon were chronically interrupted by bouts of war and political turmoil and by the careful tending his reputation demanded. In the end, that reputation almost totally obscured him. "Washington," Abraham Lincoln once declaimed, "is the mightiest name on earth."

During Washington's latter years, when he finally managed to retreat from public life, hundreds of people stopped in at Mount Vernon annually to take advantage of his hospitality. He was a convivial yet somewhat elusive host, joining his guests for meals but frequently slipping away to his bedroom and private study, or to make his rounds of the plantation.

"I am not only retired from all public employments," he wrote Lafayette, "but I am retiring within myself... I will move gently down the stream of life, until I sleep with my Fathers."

George Washington sleeps with his fathers today in a brick tomb built to his specifications on a wooded slope between the mansion and the river. In a sense, it was Mount Vernon that killed him. With a throat already raw, he had insisted upon going out on a cold and drizzly December day to putter around, eager to mark some trees for removal so that the view of the river from the piazza would be improved.

He went to bed in good spirits that night but woke in the early hours of the morning with a violent inflammation of the throat that slowly squeezed off his breath.

"I find I am going," he said.

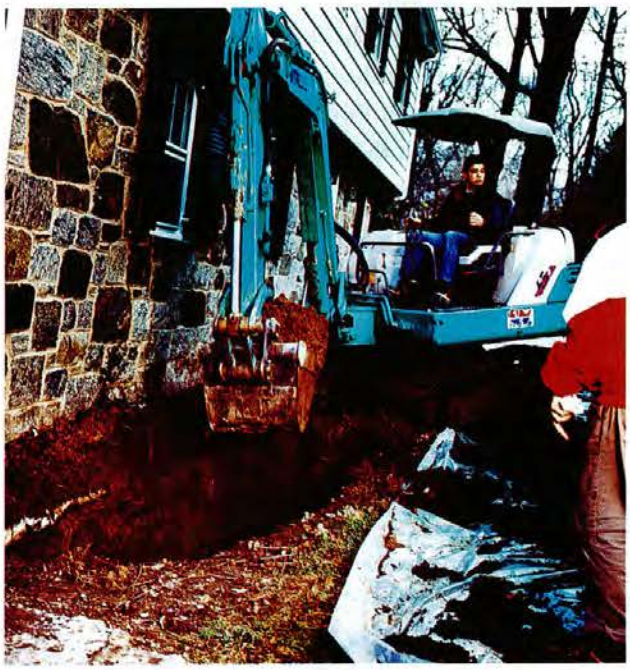
He was 67. The bedchamber he shared with Martha, and in which he died, is one of the stops on the mansion tour. Visitors are not allowed in the room, but they can look in through the door just long enough to take in the spartan details until it is time to give the next person in line a turn. When I was on the tour I lingered there as long as I politely could, admiring the rustic pine floor, the plain white wallpaper that Martha preferred to George's verdigris, the spacious linen closets. When I turned my eyes to the bed on which Washington had died, I felt an unexpected spasm of emotion, as if after spending a day at Mount Vernon I had actually come to know the figure who had once lain there slowly suffocating.

George and Martha Washington's bedchamber: Near the bed are Washington's pewter bedpan and the instruments used to bleed him in his last illness.

"I die hard, but I am not afraid to go," Washington gasped toward the end of his long last day. It was a grim and premature passage, though one would like to hope he took some comfort in the fact that he was dying in a room he himself had built, that he was passing into history within the shelter of his own creation.

♦ *See Directory,* on page 116, *for details and sources*

Betty McMoran loved the way her house tucked into a Connecticut hillside—until the foundation started absorbing runoff water.



Careful to avoid smashing the stone facade or ripping into lines for water and natural gas, waterproofing expert Dean Maiorano maneuvers an excavator across the front of McMoran's house and digs a trough down to the footings.

Water, Water,

Wet basement headaches can be cured, with a little common sense and a willingness to dig deep.

BY CURTIS RIST PHOTOGRAPHS BY BERND AUERS

IF SHE TRIES VERY HARD, PINKY MARKEY OF GREENWICH, CONNECTICUT, can think back to a time when her basement made her happy. Her husband, Terry, set up a workshop and an exercise room down there. Her two children all but disappeared into the playroom, which the previous owners—"nice people who swore it never leaked," recalls Markey—had paneled in walnut. But soon after moving in 10 years ago, she walked downstairs barefoot after a spring rain and stepped onto a cold, soggy carpet.

It was just a little water at first, but with each storm the tide rose steadily higher in the basement. The Markeys installed an electric sump pump, which kept things relatively dry until last October, when a Nor'easter struck the coast. At six inches, the rains were bad, and the winds were powerful enough to topple a giant white oak on the family's front lawn. When the tree fell, it ripped apart power lines across the street, leaving the Markeys—and their sump pump—without power for five days. Downstairs, water hit the two-foot mark. "Everything was floating," Markey says. "All the kids' toys were wiped out. The pool table—slate, of course—was shot. The exercise equipment, gone." Not to mention the furnace and the water heater. In all, the damage came to $35,000. Worse, the Markeys' insurance agent told them none of it would be covered, because their basement, like most basements in this country, was not covered for floods. "I always wondered why people

In order to drain all the water that might leak inside the house, the exterior perimeter drain must be placed next to the footings, below the basement floor. To reach this level, workers jackhammer a trench through 6 inches of ledge rock that couldn't be budged with the excavator.

everywhere

Instead of using foundation tar, a worker seals the exposed wall by quickly smearing on a layer of 60-mil-thick fibered cement, similar to roofing cement.

totally freaked when it came to water in their basements," Markey says. "Now I know."

Among homeowners, few things can match the aggravation caused by a wet basement. And there's no comfort in company: According to the American Society of Home Inspectors, 60 percent of all houses in the nation have foundation leaks, and the number climbs to 90 percent for houses built with cinderblocks. Water is a home's greatest enemy. Accumulating in the basement even in tiny amounts, it can warp floorboards, rust the life out of appliances and utilities and turn finished rooms into mildewy caves. Just as bad is the cost, in time and money, of trying to find the leaks and fix them. Water seepage "is like cancer of the house," says Tom Maiorano, president of U.S. Basement Waterproofing, a business he runs in Pleasantville, New York, with his sons Dean and Ron. "It shows up in one little spot, and before you know it, you've got a big problem."

Even crawl spaces and poured slab foundations are susceptible to water damage. If drained improperly, they can trap moisture and leak. Hidden from view, the problem is easy to ignore until it's too late. John Annunziata, a licensed home inspector in Westchester County, near New York City, slid around one wet crawl space recently only to discover that "you could grab the beams with your hand and squeeze them like a sponge because they had deteriorated."

As frustrating as basement and crawl-space leaks are, many can be fixed with minor effort. "In a lot of cases, the problems occur because the site isn't right," says *This Old House* master carpenter Norm Abram. This condition can be corrected, he says, "by helping the natural drainage away from the foundation." As a test, *This Old House* contractor Tom Silva suggests putting a ball on the ground next to the foundation. If it rolls away from the house, the slope is fine. "If it rolls toward the foundation, you're in trouble," he says. To fix the problem, Tom suggests clearing away plantings and gently building up the soil to slope away from the foundation, with a grade of at least one inch per four feet. (To protect against rot and insects, however, the soil should be kept at least eight inches away from wood siding.)

The foundation coating makes the walls dampproof, not waterproof. For extra protection, the crew affixes a 22-mil-thick plastic rubberized sheet that stops water from penetrating unseen cracks.

Downspouts can also be a source of trouble. Some end right at the foundation, where, during rainstorms, pools of runoff water can seep through cracks in the walls. Simply rerouting the water by extending the downspout a few feet away from the house can help. For bigger problems, the downspouts can be connected to a pipe buried 18 inches deep that uses gravity to drain water farther away from the foundation.

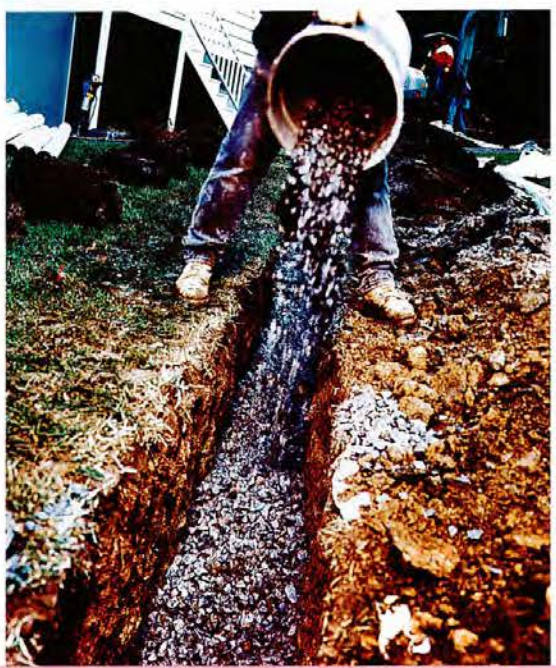
But not every problem has such an easy fix. At certain times of the year, the rising water table can force itself into basements through a phenomenon known as hydrostatic pressure, which nothing can stop. "I've seen it

After a corrugated black drainpipe is laid in the trough, gravel is spread on top to keep the pipe from plugging up with dirt. On the walls, sheets of 1-inch foam insulation are glued onto the rubberized sheet to prevent tearing.

actually squirting up through basement floors and into the air," Tom says. In these cases, no amount of patching, regrading or drainage pipe will help. "You've got to find where the water's coming from and get it out of there."

During the same Nor'easter that deluged Pinky Markey's basement, her neighbor Betty McMoran found her own basement filling with water for the first time since the house was built in 1956. It was hardly a deluge: A carpet-cleaning company sucked up just five gallons of water. But McMoran depends on rent from a tenant in her basement apartment—a tenant she was likely to lose if the flooding continued. "When I saw that water, I knew it was only going to get worse," she says.

During an inspection, Tom Maiorano quickly found the problem: McMoran's house had been built into a rocky hillside, and runoff water drained directly against the front foundation wall. To complicate things, a puddle of water near the front door turned out to be a spring, which kept the ground saturated year-round. "The miracle is that this was her first leak," he says.



Both the footing drain and the downspout drain are fed by gravity into pipes buried in a trench dug off to the side of the house.

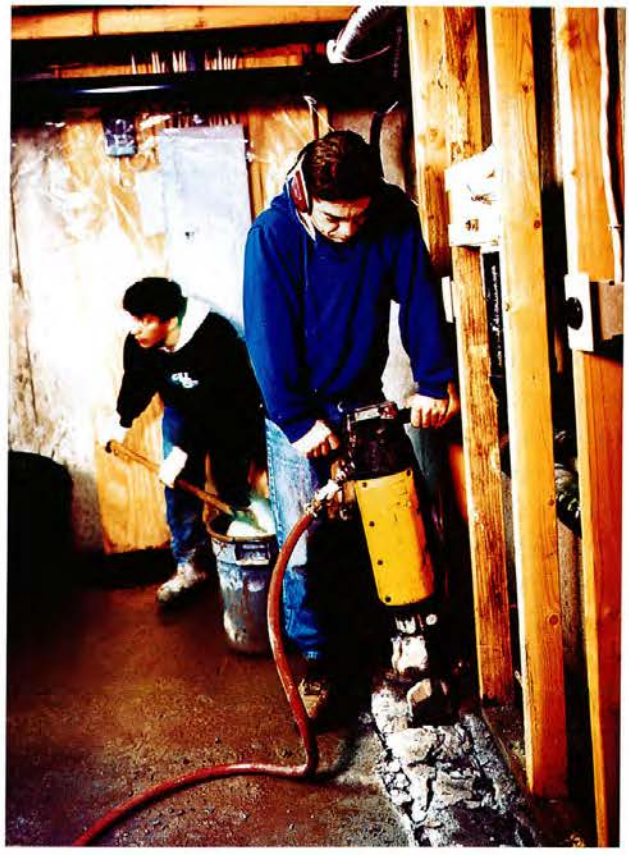
When regrading is not the answer, Maiorano suggests building either an interior or an exterior perimeter drain to stop leakage. McMoran chose the exterior system, because she didn't want to rip up the carpet and floors in her finished basement. "I wanted the mess outside," she says. First, work crews excavated around the front of the house down to the footings. They laid a drainage pipe in gravel to draw water away to a deep runoff trench dug to one side of the yard. As a precaution, the foundation walls were waterproofed not just with a 60-mil coating of tar, but with a 22-mil rubberized sheet and an inch of foam insulation as well. "It's a lot of material," Maiorano says, "but there's no other way to make sure it works." Finished in three days, the new drains and the waterproofing cost McMoran $7,950, but the expense seemed worth it when the next storm arrived. "It rained last night, and guess what—no water!" she says with delight. "I ran down about eight times to check."

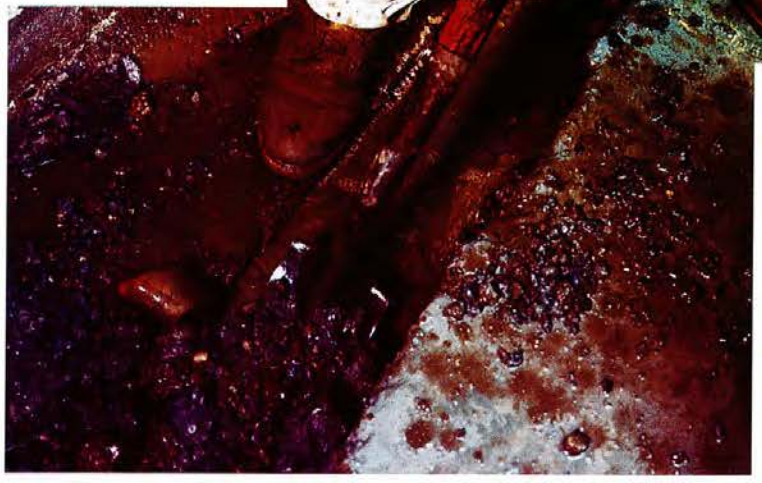
After the trench is backfilled to the halfway point, a second drainpipe is installed to catch runoff from the downspouts.

McMoran may now be free of water worries, but her friend Pinky Markey still finds herself mired. In the weeks since the Nor'easter, she has had some good news. The insurance company finally declared her basement disaster "an act of God" and covered everything. But to prevent another flood, the Markeys must build an exterior perimeter drain around their entire house. The estimated cost, which will not be covered by insurance, is $25,000. Not surprisingly, Markham lately finds herself yearning for a basement-free life. "I want to do the Henry David Thoreau thing," she says. "Give me some woods, and give me a cabin. We humans can survive in the simplest of environments, as long as it's warm." And dry.

Inside Job

During a rainstorm at their new house in Brewster, New York, David Angley and his family found their downstairs rec room filling with water. "There was nothing we could do but stack up the furniture, roll up the carpets and start pumping it out," he says. An inspection revealed the problem: The house's exterior footing drains had been damaged during construction. They could be replaced, but a cheaper solution lay indoors: running a drainpipe along the basement wall. For $4,000, a crew jackhammered a trench into the basement floor, top left, then dug it out so four-inch corrugated piping with slits on all sides would lie





below the concrete slab, middle. Interior systems require a gravity feed or a sump pump, which is installed in a shallow well, bottom left. Once the pipe is placed in the trench and covered with gravel, below, a plastic vapor barrier, bottom right, is laid on top and then patched with cement. "We've had lots of rain since," Angley says, "but it's been dry as a bone."

♦ *See Directory,* on page 116, *for details and sources*

Tom Silva's Quick Fix

Basement leaks come in as many varieties as homeowners themselves. But for the ones you can actually see—water literally dripping in through a crack in the foundation wall—Tom Silva recommends a temporary fix: Patch the crack with hydraulic cement, a product that expands rather than shrinks as it hardens. The first step is to chisel out the crack to a depth of about a quarter inch. "You have to have a place on each side for the cement to bond to," Tom says. Hydraulic cements come in two types, those that set in five minutes and those that take 15 minutes. (Use the faster-setting cement.) Working quickly, push the cement in with a small trowel, then smooth it out. "I've stopped water running in through a crack in a matter of minutes," he says. The key is in the preparatory chiseling. "If you don't do that, you'll be wasting your money."

Avoiding a Ripoff

Waterproofing a basement is tricky, but finding a reputable contractor for a big job can be even trickier. To ferret out the flim-flam guys, says Tom Maiorano, check with local building inspectors, real-estate agents and the American Society of Home Inspectors, and ask the following questions of friends and neighbors who have had work done:

- **Does your basement still leak? Some contractors fix one water problem, only to create another.**
- **Is the work guaranteed? You should get a 25-year transferable guarantee against leaks.**
- **Was your house left in good condition? There's no point in fixing a leak if the cost is a ruined yard or a basement in shambles.**

bob dix

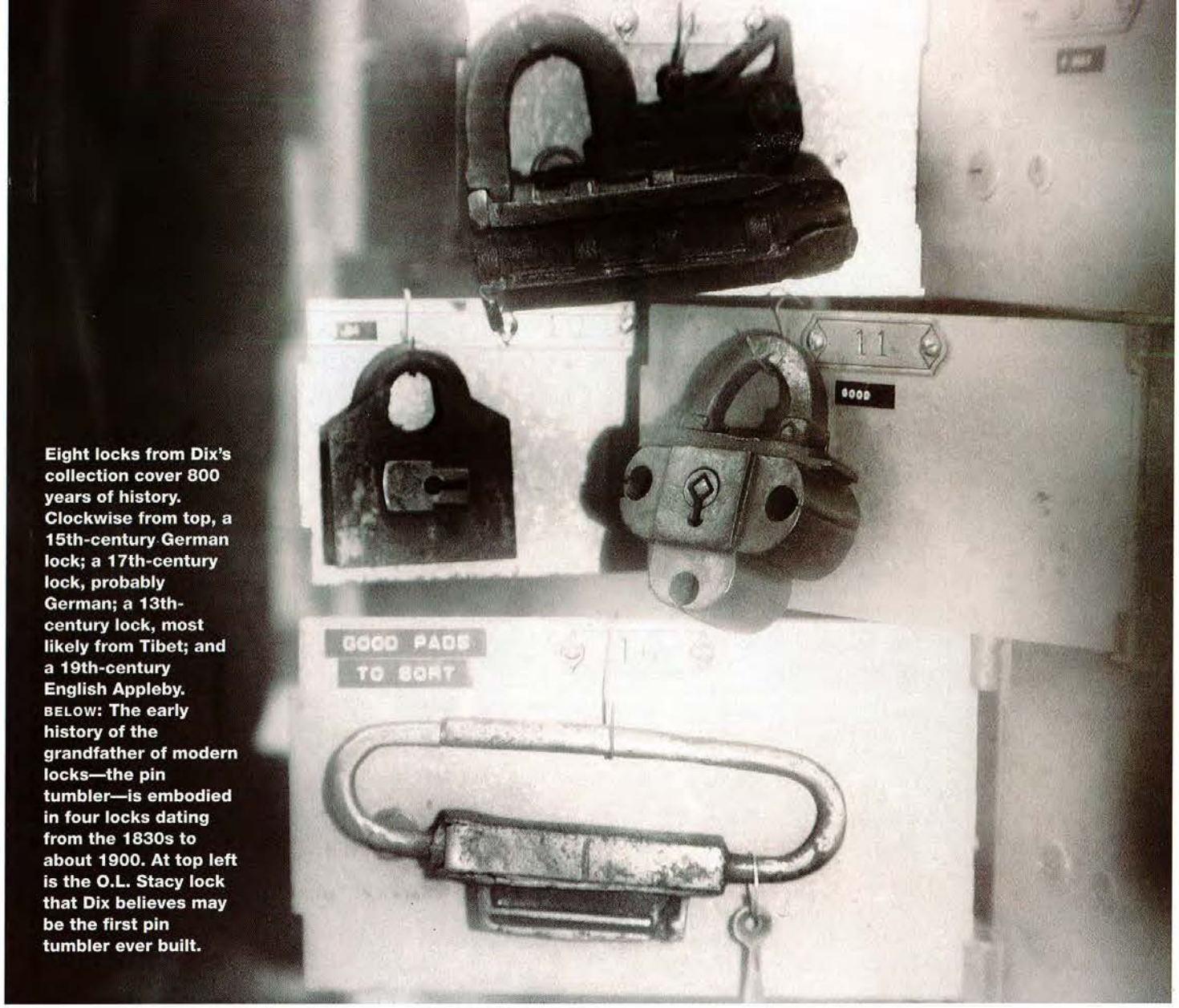
A master locksmith time-travels through the looking glass to solve historical mysteries

BY WALT HARRINGTON

Late at night, as ever, Bob Dix is hunched over a long workbench in a small room in a corner of his basement. A white cloth, unfolded before him, is the soft bed for a palm-size, battered, filthy and lifeless padlock built by hand during the Civil War. Dix is a bear of a man with a strong, resounding voice and manner, but he handles his artifact with the delicacy of a jeweler. He leans to his work, Mozart's K.424 Duo in B-Flat for violin and viola floating lightly in the air, an otoscope his father the doctor used 50 years ago held to his right eye, the lock lifted to within inches. The lock is four and a half inches long, three inches wide, half an inch deep and weighs eight ounces. Its shape

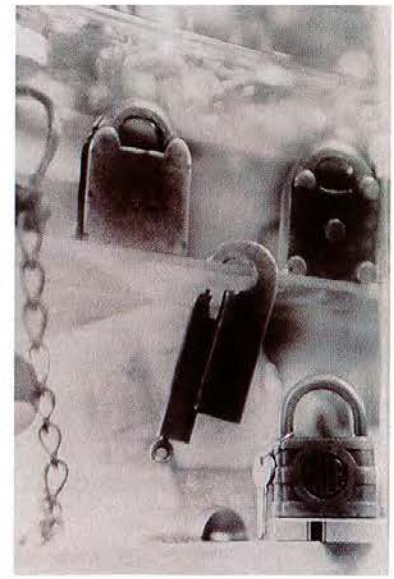
PHOTOGRAPHS BY RAYMOND MEEKS

One of the many showcases in Dix's basement museum features locks manufactured between 1900 and 1950 by Fraim, a company originally located in Lancaster, Pennsylvania.
OPPOSITE: Using an otoscope, Dix enters the 1830s world of miniature mechanisms in a padlock.



Eight locks from Dix's collection cover 800 years of history. Clockwise from top, a 15th-century German lock; a 17th-century lock, probably German; a 13th-century lock, most likely from Tibet; and a 19th-century English Appleby. BELOW: The early history of the grandfather of modern locks—the pin tumbler—is embodied in four locks dating from the 1830s to about 1900. At top left is the O.L. Stacy lock that Dix believes may be the first pin tumbler ever built.

is reminiscent of a Valentine's Day heart or, for the less romantic, a heel that has fallen off a big man's boot. It has the coarse touch of sandpaper. But through the looking glass, the microscopic asperities of this corroded brass lock become for Dix a panorama of historical imaginings.



"Boy, this is classic fire damage. It was hanging on a door and the building caught fire. Something fell on it, and the key broke off and the case got wrinkled in the pressure and the heat. I think that's the whole scenario. Thank God it didn't melt. Maybe it was in the Civil War. Maybe it was buried and dug out later. Heaven only knows."

The lock is returned to its bed, the otoscope laid aside. The 51-year-old man, who is one of the finest locksmiths in the United States, straightens in his chair, purses his lips and raises his brow, taking a moment to savor what he is about to do. "This lock hasn't been opened in nearly a hundred and fifty years. It's like opening an Egyptian tomb." One of Dix's friends bought the lock—unworkable and with its key broken off in the keyhole—in a New Orleans antique shop. Stamped on the shackle was "S. Andrews," revealing it had been built in the Perth Amboy, New Jersey, locksmith shop of Solomon Andrews. The friend paid $40. When Dix is done, some collector will likely buy this one-of-a-kind relic for $1,200—30 times its cost.

Dix reaches for a miniature drill, bit size .07, stations it above the first of nine 3/16-inch-wide rivets that secure the lock's case, then fingers and releases the trigger and lowers the drill, letting it bite into the rivet's head only on the down side of the motor's whining run. If the bit were to

Dix cuts a key for an English lock from about 1850 on a Segal key machine patented in 1919. His shop is filled with old equipment that is far more precise than modern models.

Among the rarities in Dix's basement are several one-of-a-kind locks made by 19th-century American manufacturers long out of business.

slip off the rounded rivet with the drill under power, it would mine a twirl of brass from the case, which would leave a gouge another locksmith, another traveler in this niche of human history, might someday ponder in the way Bob Dix ponders just how this padlock came to be damaged in a fire. He unfurls his arms like an orchestra conductor and motions to walls that are the backdrop for a cavernous art gallery of locks, some glinting bright brass and steel, others hanging dull and ashen, locks 2,000 years old, locks still in the factory wrap.

"Everything here is a story."

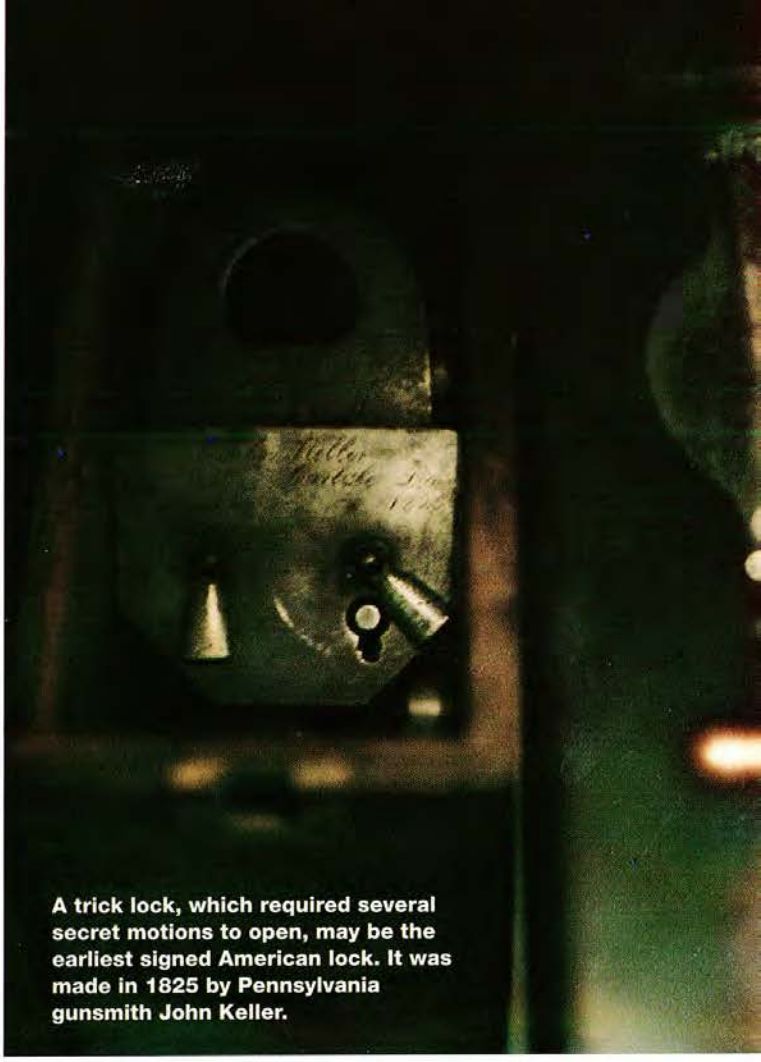
Seven thousand stories are stored in Dix's Mentor, Ohio, basement, which houses probably the world's largest collection of locks. Each reveals a sliver of history. A lock from the Dark Ages is made in the unadorned, utilitarian style of the era. A later lock, beautifully etched, shows the emerging artistry of the Renaissance. The simple mechanisms of antique European locks contrast with the intricate, clockmaker styles of 19th-century American locksmiths. The 1,100 "logo locks" include the trade names of business giants long dead to altered times: Hudson Motor Car Co., Cadillac Cleveland Tank, Belle Isle Creamery. And the pride of the collection: the signed O.L. Stacy lock Dix believes was the first pin tumbler ever built and the precursor to the revolutionary line of locks launched in the 19th century by Linus Yale Jr. The pin tumbler allowed infinite master keying and made possible the billions of locks that today secure houses, cars, hotel rooms and offices.

"Locks are talking to you," Dix says, as he gigs his drill again and it whines, digging into another rivet. "They are living pieces of history." When the drill stops, he sweeps away the brass chaff with his finger and examines his work through the otoscope. "Okay, that one's good."

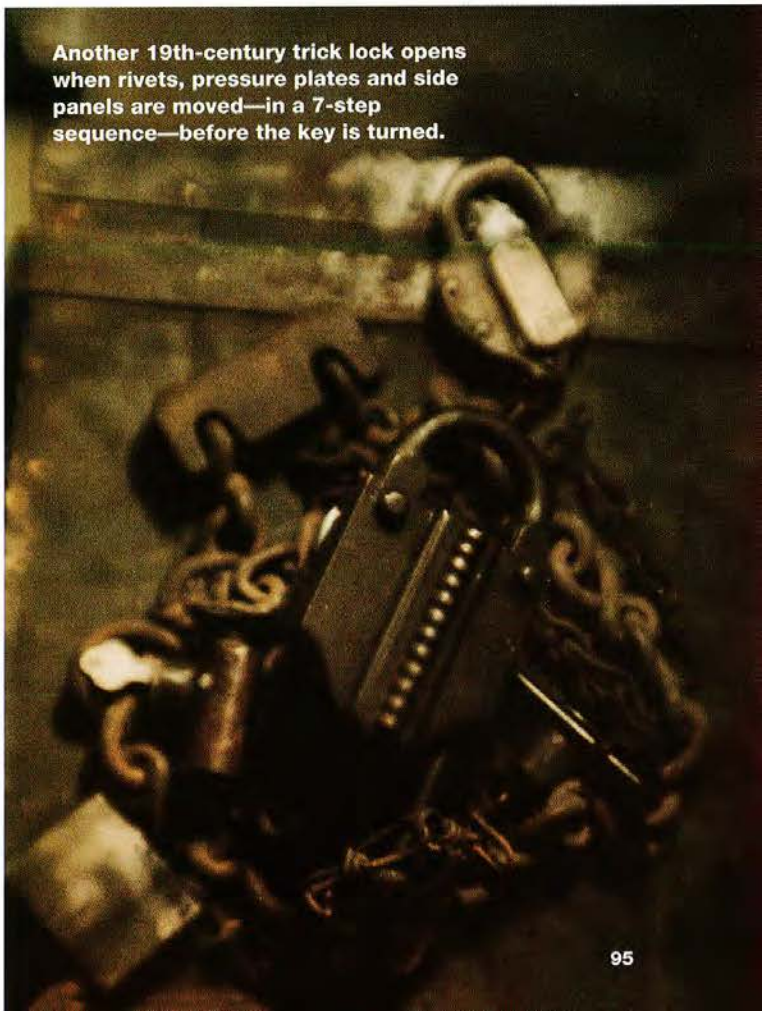
Solomon Andrews was a New Jersey dentist who also made locks. Dix has smaller Andrews locks, strong steel locks, good locks. This brass lock was cheap, made for an emerging mass market. Dix knows that the men who made this junk lock would think him crazy for spending 30 hours restoring it. But to Dix, it's like a cracked dish unearthed from a vanished culture. He'll restore it, as he has thousands of others, not for the money but so it will not disappear. He shakes the lock and it rains rust.

"What's coming out is making me nervous. I don't know how much mechanism is left. The important thing is the levers. Do I have to make the levers? I will if they lost too much strength in the fire. I'm really anxious to see what's inside. I have never heard of anyone finding an original Solomon Andrews key."

Bob Dix was 8 when his grandmother bought him his first lock, an inexpensive Slaymaker. Dix took it apart and put it back together. He was always taking things apart—radios, TVs, telephones, the family clocks. By the time he was 12, he'd go shopping with his mother in downtown Cleveland, and she'd drop him off at the locksmith shop of "old man Sackman," who'd let young Dix work on simple locks. He began collecting locks. After college, he took a job with Lubrizol Corp., the giant petroleum-additive company near Cleveland. He has worked there 29 years and today is in charge of automating the company's testing labs. But all those years, night after night, he has gone



A trick lock, which required several secret motions to open, may be the earliest signed American lock. It was made in 1825 by Pennsylvania gunsmith John Keller.



Another 19th-century trick lock opens when rivets, pressure plates and side panels are moved—in a 7-step sequence—before the key is turned.

The Hunchback is among Dix's collection of 19th-century American story locks. The arm extending up to the figure's mouth is the shackle.

down to his basement cavern and unfolded his white cloth.

"Hmm, which rivet is holding it?" he says, as he lightly squeezes the handles of the reverse-pressure pliers he has inserted inside the edge of the Andrews lock, where the shackle's toe enters, hoping to loosen its front from its back. He has drilled his tiny holes in the rivets that hold the front and the back of the case together, because he wants to save as many rivets as he can. If they are sturdy enough, he'll later insert a tiny screw in the top of each one. The screw-turns will snap off with pressure and leave a protruding tip atop the rivet that he will then round off to perfectly match the exterior tip of the original rivets.

After drilling his holes, Dix files off the rivets' rounded tops, leaving only a leaf-thin lip to hold them in place. Then, with a tiny jeweler's screwdriver, he chisels off the lips, leaving nothing but corrosion to hold the case together. "Let's put a nice, even force." He gently squeezes his pliers—pop. "Not since the Civil War," he whispers, and lifts off the lid of the tomb. "Oh, my goodness. There's the mechanism."

He does a quick inventory. Four, maybe five of the nine rivets are rusted beyond redemption. The lock was definitely in a fire, its back distorted from melting. But it wasn't buried, no dirt. The remnant of the lock's broken key is brass, meaning it could be the original key, the first Solomon Andrews key he has ever discovered. Strange, but the leading edge of the key was cut at a 30-degree angle, something Dix has never seen. The lock's works are ingeniously simple: four wishbone springs that served as both levers and bolts, supplying pressure to open the lock and pressure to close it. But Dix can't yet tell how it worked.

"I have to sit here and figure it out."

Never has Dix touched a lock he hasn't figured out. He can put his lock-picking tools in a keyhole, and in a matter of moments the lock is open. After 43 years of working with locks, he actually visualizes how the mechanism must be built to fit into a certain size case. He can feel the tumbler's language through his fingertips. He once opened a pair of Houdini handcuffs in 20 minutes. He once rebuilt a famous 150-year-old F. Harn trick lock that had lost its entire innards. He stared at that empty lock—a puzzle frame without pieces—for three years. One day, in a flash, he saw the only combination of space and mechanism that would fit. The collector for whom Dix was rebuilding the lock refused to take it back, so awed was he by the achievement. "It's your lock now," he said.

Dix doesn't just sit down and do these things. He'll carry a lock in his pocket for days or weeks, take it out and flip it in his hand while studying a computer program at work or watching the History Channel at home. He doesn't think about opening the lock. He lets what he calls his subconscious mull the answer. "It's like it comes in a waking dream." He once left an antique Pyes lock, a lock nearly impossible to pick, sitting on his workbench for six months. Then, as he was watching a movie with his wife, he had an urge to go look at the lock. He walked downstairs, opened it in 10 seconds and returned to the movie.

"I hadn't been able to open it before, and I bet I couldn't open it now. It was very strange." He laughs uncomfortably. "The Zen, if you will. It's like, well, you're at another plane with this lock, which sounds crazy for somebody in chemistry and computer science to say. But I see it. There

are times I fit a key, and I know where to make the cuts in that key, and I can't explain how I know. It's got to be coming from experience and intuition. But it's strange. I lose track of time. My wife gets mad at me. It can be two or three in the morning, I don't even know it.

"Unless you experience it, it's hard to describe. If you try to talk to somebody who doesn't understand, they think you're nuts. You don't talk about the state of mind you need to be in to do this work." It's the same state of mind Dix believes the best people in any field must also reach. The greatest musicians aren't only technically proficient, Dix knows, but also reach an intuitive plane with their music. So too great athletes, actors, writers, artists, scientists. Einstein knew the same *facts* as other physicists, but he looked at the puzzle's empty frame and saw the only way the pieces of time, space and matter could fit. "It's a mind-set," Dix says. Craftsmen—supposedly simple, practical, hands-on people—are thought to be outside this intuitive realm, but Dix knows they are not. "It's spooky stuff, but that's how it goes."

In Dix's opinion the clock-like precision of this multiple trick lock, dating from about 1845, makes it perhaps the finest example of American workmanship in a single lock.

Jean-Marie Ledair's Sonata, Op. 3, No. 4 in F is floating lightly in the air. Dix has for hours now soaked the pieces of the Andrews lock in an ultrasonic bath that creates millions of tiny exploding bubbles that clean the corrosion. He has polished the case and shackle to a burnished antique brass, giving it the smooth feel of a waxed oak plank. With tweezers, he has carefully removed the lever bolts, all but three of the rivets and the broken end of the only known Solomon Andrews key in existence. He has decided he may anneal some of the levers to reimpart spring action lost to the fire, but he won't need to make new ones, which is a relief. He has spent hours gently tapping the back of the lock's case between a brass hammer and a brass drift, encouraging the case to take its original form, forget its fire-induced wrinkles.

In this lock, Dix has begun to discern a story. He has decided the lock was an early effort to build a cheap, profitable mass-market product that was doomed from the start. "It was really a crummy lock." The unusual 30-degree cut on the leading edge of the key probably was an effort to compensate for a design flaw in the lock mechanism that would have kept it from opening with a standard key. Dix imagines Andrews saying, "What are we gonna do?" For the locksmith whose intuition flashed on the angled cut, Dix has great respect. But he suspects this faulty lock design was quickly abandoned.

A century and a half worth of grit and corrosion was removed from the Solomon Andrews lock.

Dix has yet to put the puzzle's pieces back in their frame. He must first make the new rivets on his lathe, cut a new key from the angled artifact and chemically treat the lock to create a deep brown patina that will evoke an elegantly aged character respectful of its antiquity. Then Bob Dix will perform one final act before he closes the case for good: He will etch his name inside the lock of Solomon Andrews and become forever a piece of its story.

TIPS FROM THE LOCK DOC

- **Don't bother spending a lot on high-security knob locks for your home, Dix advises, because most intruders aren't going to pick your lock anyway. They're going to kick in your door. "Put your money in the dead bolt," he says. The dead bolt should extend into a steel-reinforced receptacle—the strike—held in place with at least two-inch steel screws. Also, the usually short screws that hold the knob-lock assembly in the door should be replaced with two-inch steel screws. If you have a door with glass in it, consider a double dead-bolt cylinder that is turned from the inside with a key that can be removed when you leave the house.**
- **For added home security, Dix suggests inexpensive, automatic, motion-sensitive flood lights in critical areas around your house.**
- **For a garden shed door, he recommends any standard pin-tumbler padlock. Those made of brass are not likely to quickly corrode.**
- **For bicycle security, Dix says, use a large U-shaped shackle lock and be sure to secure the frame and the wheels together to a stationary object. The main idea is to slow thieves down. "These people don't want to be standing there," he says.**

See Directory, on page 116, for details and sources

the menace of mold and mildew

Confronting a biological hazard that can be harmful to your house and your health

BY SUSAN BENESCH

PHOTOGRAPHS BY JOHN KERNICK

TOTTERING WITH DIZZINESS AND DRAINED BY FREQUENT MIGRAINE headaches, Debra Bowman felt her life falling apart after she moved into a new house on a placid cul-de-sac in Seminole, Florida, 10 years ago. At 33, she had to ask her mother for assistance with grocery shopping. "I couldn't walk straight down the aisle. I'd go from side to side. I remember being at a tennis luncheon and being so dizzy I thought I would fall down. I had to hold onto the table." Her son's swim team asked for help at a meet. Bowman tried but got too tired to stay to the finish. She went to one doctor, then another. "I took antihistamines, decongestants, steroids, steroid nasal spray, antibiotics, cough medicines. And when it was really bad, they'd even give me steroid shots in the office."

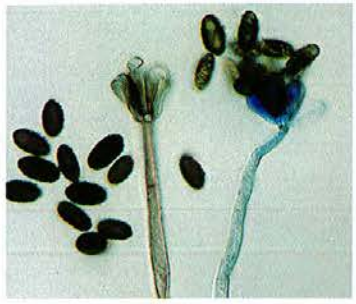
Told she was suffering from an allergic reaction, Bowman assumed her lifelong hay fever had taken a drastic turn for the worse. So she stayed inside as much as possible, kept the windows shut and bought expensive filters recommended by an air-conditioning manufacturer. Nothing helped. Then, two years ago, during a two-week vacation in New England, Bowman felt wonderful—no headaches, no sneezing, no sinus trouble. She dreaded returning to Florida. When car trouble forced her to stop for a while 20 miles from home, she was surprised that she still felt great. The next day she walked through her own front door, and within half an hour her headaches and miseries were back.

Finally Bowman realized the problem wasn't Florida, it was the house. An indoor-air-quality technician solved the mystery when he popped open an air-conditioning air handler and revealed mold so thick it looked like carpeting. Within minutes, the technician felt sick too.

When three workmen came to vacuum the ducts and hose down the air handler, Bowman's husband, Ray, was stunned that they wore white moon-suits, as if they were working on a nuclear reactor. "Suddenly you go, 'Holy Toledo, we've been living in this.'"

Like most people, the Bowmans thought of mold as blue spots on bread or black stains on tile grout around the bathtub—a minor household nui-

Like a nightmare sprung to life, the mold farm in a closet and bathroom of this 1885 farmhouse in Kinston, North Carolina, shows what can happen when maintenance problems are ignored. While the house was boarded up for 12 years, the roof began to leak. The new homeowners fixed the leaks. Now they struggle to eradicate the mold.



PHOTOGRAPHS BY MICRO COATINGS TECHNOLOGIES, ATLANTA, GA

Molds from the North Carolina farmhouse (pictured on previous page) reveal some of their secrets under a microscope. After the roof of the house was repaired, the musty smells disappeared. But when an air-quality expert went in at *This Old House* magazine's request, he found the air was still loaded with live mold spores—up to 25 times more than in the air outside. In one bedroom, where rainwater had poured in, he found the most toxic mold, *Stachybotrys atra*, above. It was growing on paper, right, that peeled from the drenched ceiling.

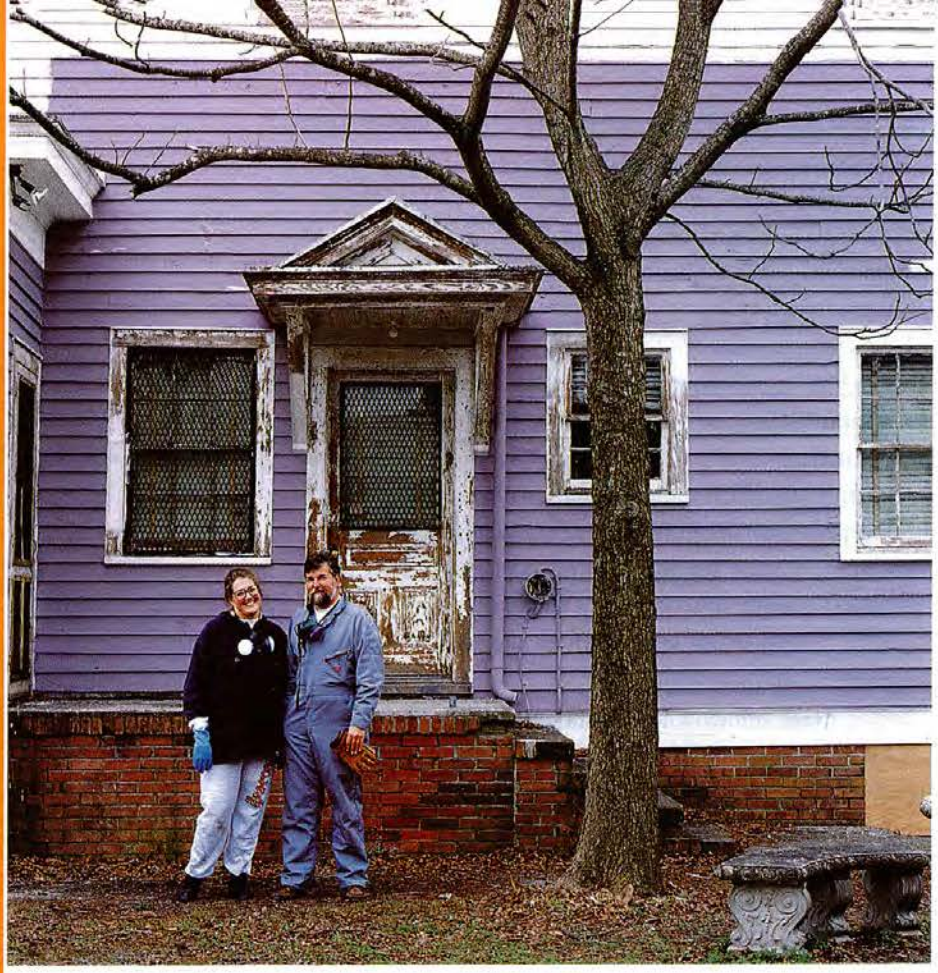
voracious**fungi**

Mold and mildew are interchangeable names for thousands of species of filamentous fungi. Clusters of spores perched on the ends of tiny stalks may be brown, black, green, blue, pink or white. Some look fuzzy, others slimy. The spores are the fruit of a mature mold whose weblike body, or mycelium, extends into porous surfaces much as tree roots extend into the earth.

Both the mycelia and spores may contain compounds that make people sick, but spores pose the biggest health concern because they are far more likely to be inhaled. They are only 1 to 10 microns long (5 million would fit on the head of a pin), so they float easily and invisibly in air.

Molds grow at temperatures between 32 and 95 degrees Fahrenheit, but many species do best in the 70s and 80s, the most common household temperatures. They require either water or a relative humidity above 60 percent. Most dead organic materials can supply food—mold is one of nature's primary recycling agents. Even the oil in a fingerprint will do. Molds can digest the cellulose in paper but not the celluloses in wood. Thus, although they grow on and discolor paint and wood surfaces, they do not rot wood.

As a byproduct of digestion, molds release volatile organic compounds such as aldehydes, alcohols and ketones. These give molds their musty odors. If a mold stops growing, digestion stops and so does the smell. But the mold is only dormant, ready to resume feeding when conditions are suitable.



The mold-infested farmhouse in Kinston, North Carolina, was a 6,000-square-foot wedding present to Carol Tokarski from her new husband, Rick Strickland. "I fix the mechanicals," he says cheerily, "she does the cosmetics." Tokarski used bleach for the cleanup because mold did not penetrate the hard surface of the plaster walls. With drywall, however, scrubbing with bleach will not help if mold has penetrated the outer layer of paper.

sance no more dangerous than cobwebs. Yet many of the parasitic fungi commonly known as mold can be a serious health hazard. As they feed on paper and other common materials in homes, molds produce compounds that may cause strong allergic reactions in 15 percent of the population. Some molds also produce poisonous compounds that can make anyone sick.

"Mold contamination is of far greater consequence than is generally recognized," says Jeffrey C. May, a home inspector in Massachusetts who estimates that one in every 10 houses he has examined in the past several years was moldy enough to make its occupants sick: "In fact, mold could be the source of interior pollutants with the most widespread impact on health."

In extreme cases, mold might even be deadly. In the early 1980s, all four family members and a maid in a suburban Chicago house reported flu-like symptoms, skin rashes and fatigue. Doctors were baffled until the family discovered mold an inch thick in air ducts and on a ceiling under a roof leak. When chemists injected samples from those molds, including one called *Stachybotrys atra,* into five rats and five mice, the animals died within 24 hours. The family's symptoms improved after the house was cleared of mold, says Bruce Jarvis, a University of Maryland chemistry professor who worked on the case.

Three years ago, pediatricians in Cleveland were startled when several babies developed a rare form of bleeding in the lungs. Since then, 29 babies in the city have been diagnosed with the same symptom and nine have died. Nearly all lived in old, poorly maintained houses with water damage from roof leaks or flooded basements and, as a result, large amounts of *Stachybotrys atra* mold. Dorr Dearborn, a pediatric pulmonologist who treated most of the babies, says mold is the most likely cause of the deaths. Nevertheless, some mold specialists maintain that a lethal dose of spores would be enormous, more than anyone is likely to inhale in a home. But even the most skeptical among them say there is a clear correlation between dampness or mold in houses and respiratory disease.

Many people assume modern houses are protected against mold, but often it's just the opposite. Until the 1973 oil embargo and the subsequent emphasis on energy-efficient construction, many houses were so drafty that moisture generated

follow your nose

The best tools for detecting mold are keen senses. "We could do most of our work with a flashlight and a nose," says Michael Lawdermilk, an indoor-air-quality specialist for Palm Beach County, Florida. Even if mold is growing behind a wall, odors can be detected because spores flow out through electrical outlets and wall cracks.

To identify the source of the mold, look for water that may be coming from plumbing leaks, plugged gutters and moist soil heaped against walls. For roof leaks, check in the attic with a flashlight, especially along the eaves and at joints under flashing. Rusty nails can be a clue.

Once leaks are ruled out, consider airborne moisture. In hot, humid climates, outside air is the primary source. If an air conditioner is used during the day, windows should be closed at night even if the temperature is pleasant. In colder, drier climates, humidity often comes from within the house. Try simple cures, such as cooking with lids on pots and opening curtains on cold winter days so wooden muntins between window panes can dry. In the bathroom, leave the door open after a shower and take towels elsewhere to dry. Exhaust fans can also help, especially in bathrooms and the kitchen. Make sure they vent to the outside, not into the attic. The top-of-the-line venting solution is an air-to-air heat exchanger, a device that allows stale indoor air escaping through one pipe to preheat fresh air coming in through a neighboring pipe. A whole-house model costs $900 to $3,000.

In some cases, it may pay to buy a portable dehumidifier. Most retail for less than $200. The water reservoir should be emptied regularly or mold and bacteria may grow in the tub. A $40 hygrometer, a device that measures relative humidity, can help determine how to adjust the dehumidifier so that it keeps the relative humidity below 60 percent. If a hygrometer indicates the relative humidity is above 60 percent, try raising the thermostat on the air conditioner a few degrees to decrease the relative humidity.

inside could escape. "When the building was nothing but plaster, you could boil spaghetti all day long, you could take a shower all day long," says Richard Trethewey, *This Old House*'s expert on indoor air quality. "But the modern home—the home built from 1975 on—is a tight thermos bottle. Whatever humidity we create can't escape. That's why the mold problems tend to come."

In the hot, humid Southeast, homes used to have ceiling fans, windows that could be opened top and bottom and louvered shutters to facilitate moving air, which can evaporate the moisture on which mold depends. Nineteenth-century housekeepers took down furnishings that might become moldy in the steamy summer months, as Mary Telfair of Savannah, Georgia, described to a friend in a letter on May 15, 1837: "Summer has set in with us and we are beginning to uncarpet and uncurtain."

Today, many homeowners mistakenly think they are protected by the dehumidifying power of air conditioning and central heating. But these systems can actually increase mold because cold air cannot hold as much moisture as warm air. Condensation can form where warm air touches a cold surface, such as on the underside of air-conditioned floorboards. "It's just like the outside of a Coke can," says Robert Scarry, a microbiologist at Pure Air Control Services, a Florida indoor-air-quality company.

Her vitality restored, Debra Bowman holds evidence of the mold that once grew in her home's air ducts.

ANDREW KAUFMAN

Few people realize that oversize air conditioners are a key source of trouble. "Historically, the consumer thinks that bigger is better," Trethewey says. "Everyone wants an air conditioner that can cool the house in 10 minutes." But if an air conditioner cools too fast, it circulates—and dehumidifies—only a small percentage of the house's air, then shuts off. This leaves the relative humidity high and often causes condensation inside ducts. If there's dust in the system to serve as food for mold, the fungi can grow unchecked in the very places where their spores are most easily blown through the house. That's what caused Debra Bowman's illness.

Almost as soon as the mold in Bowman's house was cleaned up, she felt transformed. "I wasn't stopped up. I wasn't dizzy. All my symptoms were gone. It's unbelievable. My life has totally changed. Before, I'd try to play tennis once a week. Sometimes I'd be so sick I couldn't play. Since we found the mold, I've won tournaments."

Ray Bowman kept a piece of the mold in a clean peanut-butter jar to show visitors. "It's like a little tree," he says, staring at it in wonder. "You never think of mold growing in your home to the extent that it becomes a health hazard."

♦ *See Directory,* on page 116, *for details and sources*

counter**attack**

For mold on a nonporous surface, such as old-fashioned plaster, the cleanup is relatively simple. First, set up a fan so it blows fresh air toward you. (If mold covers more than 10 square feet, tape off doorways in the room with plastic and set a fan in a window to blow air out while you are working.) You'll also need goggles, rubber gloves and a high-efficiency particulate air-purifying (HEPA) respirator equipped with a chlorine cartridge. Using a bleach solution—one ounce ammonia-free detergent, one quart household bleach and three quarts water—wet each moldy spot for at least five seconds. Rinse the surface well and dump the wash water down the drain or toilet. Then use a HEPA vacuum, which can be rented, throughout the affected room. (An ordinary vacuum will stir up lingering spores but won't remove them.)

For mold on a porous surface, such as drywall or carpeting, skip the bleach and remove the material itself. Keep the rest of the house clean by placing contaminated materials in double bags and lifting them out through windows if possible.

If heating or air-conditioning ducts are moldy, make sure the contractor you call is certified by the National Air Duct Cleaners Association. Duct cleaners typically use compressed air, HEPA vacuums and brushes or duct whips. Fiberglass-lined ducts are easily damaged by stiff brushes and very high-pressure compressed air. They should be carefully vacuumed with a soft brush, advises Steven Goselin, vice president of Envirotech, a duct-cleaning company in Cambridge, Massachusetts. If that's not sufficient, the ductwork may have to be replaced.

A professional cleanup crew kills and vacuums away mold from an apartment in New York City. The workers seal off the area with plastic and use a special vacuum that captures the tiniest of mold spores.

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MOLDINGS

First a board takes shape, then the room

Without moldings, a room is raw. They hide the rough seams between floor and walls and around doors and windows, cleaning up the often untidy marriage of different materials. Their profiles—deft combinations of edges, flats and curves—make eye-catching bands of light and shadow that add texture, depth and warmth.

There are thousands of profiles, yet all are made the same way. Smooth, square-edged boards are fed into a powerful machine that whirls thick steel knives at 3,500 rpm, and out comes foot after foot of crisp profile, 20 to 30 feet of it a minute. For such a straightforward process, the results vary remarkably. Like other materials, moldings have their good, better and best.

Good are the pine moldings that fill the racks at home centers and lumberyards. Manufactured in huge quantities, they have relatively spare dimensions and bland profiles. But these are the moldings that most people choose, and they do the job—covering cracks and adding detail—albeit with limited impact.

Stock hardwood moldings are a step up from pine. Also carried by home centers and lumberyards and milled mostly from oak, they offer bigger dimensions and crisper profiles than run-of-the-mill pine.

The best moldings are made of wood that is thicker and wider, with profiles more pronounced and complex. They come from local mills and mail-order suppliers, both of which may have knives for hundreds of profiles. Some will grind new knife sets for custom profiles.

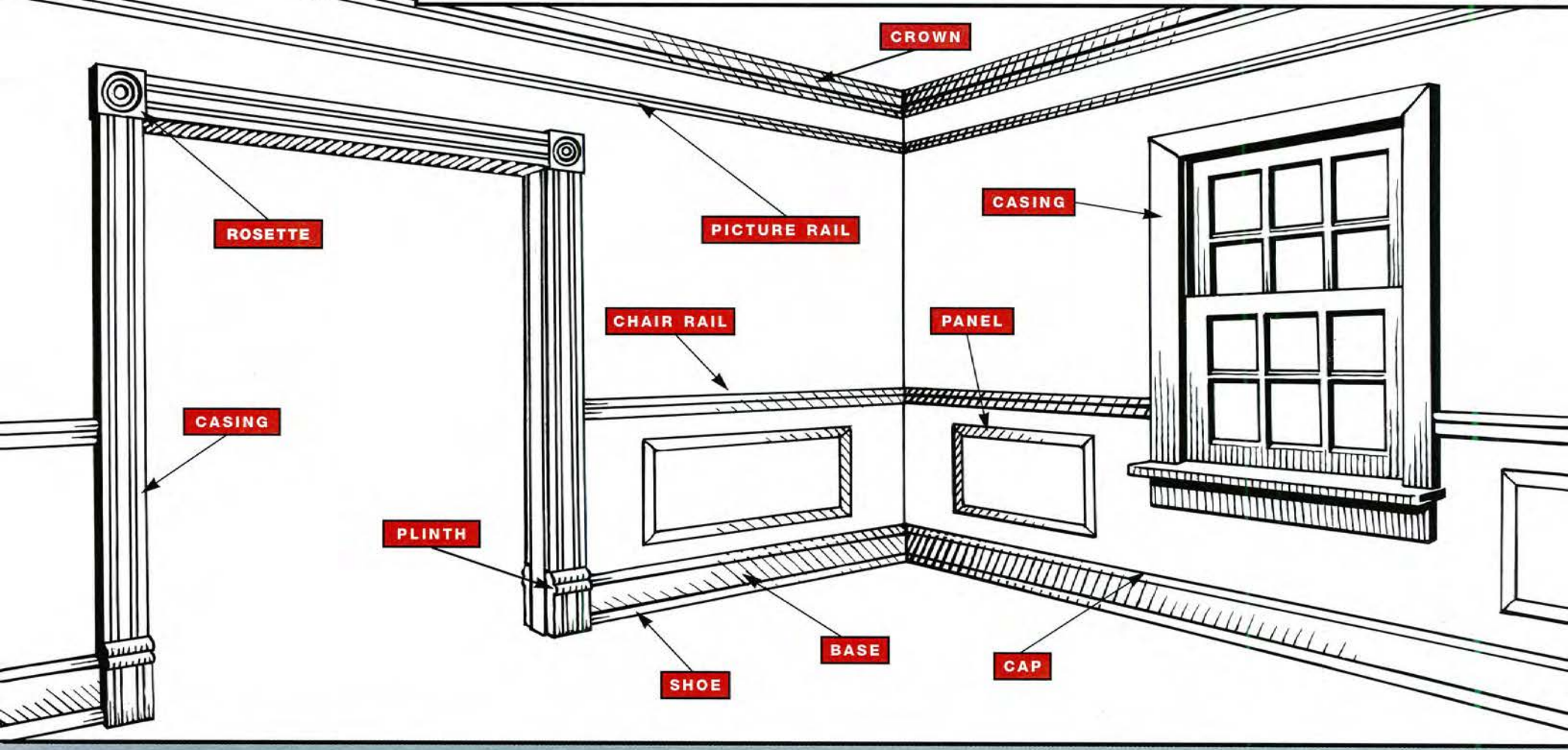
Most top-grade moldings are made of poplar, a hardwood that machines cleanly and doesn't have a strong grain pattern. Poplar, like pine, is meant to be painted. For clear finishes, oak and mahogany are also readily available, and on request a mill will usually run virtually any other hardwood.

Before it's installed, any grade of molding needs about a week, spread out flat on the floor, to acclimate to its new home. This will help to ensure that joints and seams stay tight. Joints should also be glued, and to prevent cupping the backs should be sealed with paint or varnish. The face should always be sanded before painting and between coats. But do it lightly so those crisp profiles don't get dull.

BY JOHN KELSEY PHOTOGRAPH BY MICHEAL MCLAUGHLIN

A MOLDING PRIMER

If profiles were pages, a Book of Moldings would be thousands long. But there would only be a few chapters. The basic types of moldings shown here are generally named for where they go or what they do. Master a couple of dozen more words—like ogee and reed (see other side) and dentil and pilaster (see below)—and you'll be fluent in molding's mini-vocabulary.



BACK RELIEF: A shallow recess in the back of a wide molding that helps it clear irregularities in the wall.
BASEBOARD: Wide trim that covers the seam between the base of a wall and the floor.
CASING: Trim that covers the seam between the wall and a window frame or door jamb.
CHAIR RAIL: Narrow trim that runs horizontally along the wall at the height of a chair back.
COPING: Technique for joining moldings at an inside corner by cutting the end of one piece to fit perfectly over the profile of the other piece; often done with a coping saw (See *This Old House*, September/October 1996).
CORNER BLOCK: A decorative piece that connects two lengths of baseboard at an inside or outside corner; eliminates the need for a miter joint.
CROWN MOLDING: Covers the joint between ceiling and wall; it usually leans out from the wall (see "spring angle").
DENTIL: A decorative detail in crown molding made with little squares of wood glued or nailed along the length of the piece; the word is latin for "little teeth."
IN-THE-WHITE: Molding before it has been painted.
LAND: Narrow flat section between curved elements in a molding; creates a band of light or shadow.
MITER: A corner joint, usually 45 degrees, between two pieces of molding or casing.
NOSING: Wide, flat piece of bullnose molding that separates two complex profiles.
PANEL MOLDING: Small trim that frames a wall panel or simply defines a square or rectangular area on a wall.
PICTURE RAIL: Small molding shaped to catch hooks for picture frames; usually placed just below crown molding.
PILASTER: Molding that simulates a column; often used alongside a formal entry or fireplace.
PLINTH BLOCK: Decorative piece at the base of a door casing that eases the transition to a baseboard.
RETURN: Short piece of molding that finishes a corner, such as at the ends of casing under a windowsill
ROSETTE: A square block that makes the transition between vertical and horizontal casings around a window or door.
SPLICE: A flat joint where two lengths of molding meet; usually made by cutting the ends at a 45-degree angle.
SPRING ANGLE: The angle between crown molding and the wall, usually 45 degrees but sometimes greater.

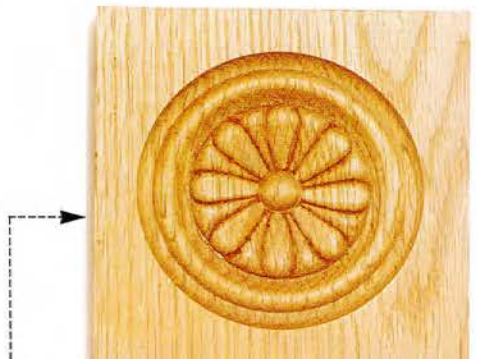
DETACH HERE

CROWN

MOLDINGS

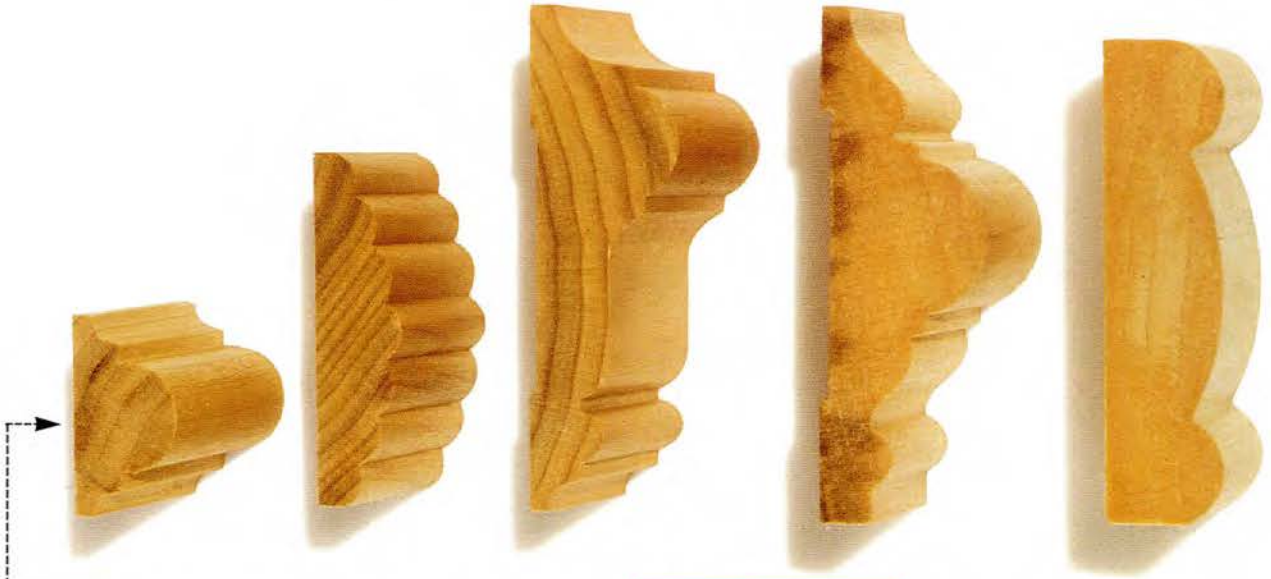
PHOTOGRAPHS BY DARRIN HADDAD ILLUSTRATIONS BY CLANCY GIBSON

PICTURE RAIL

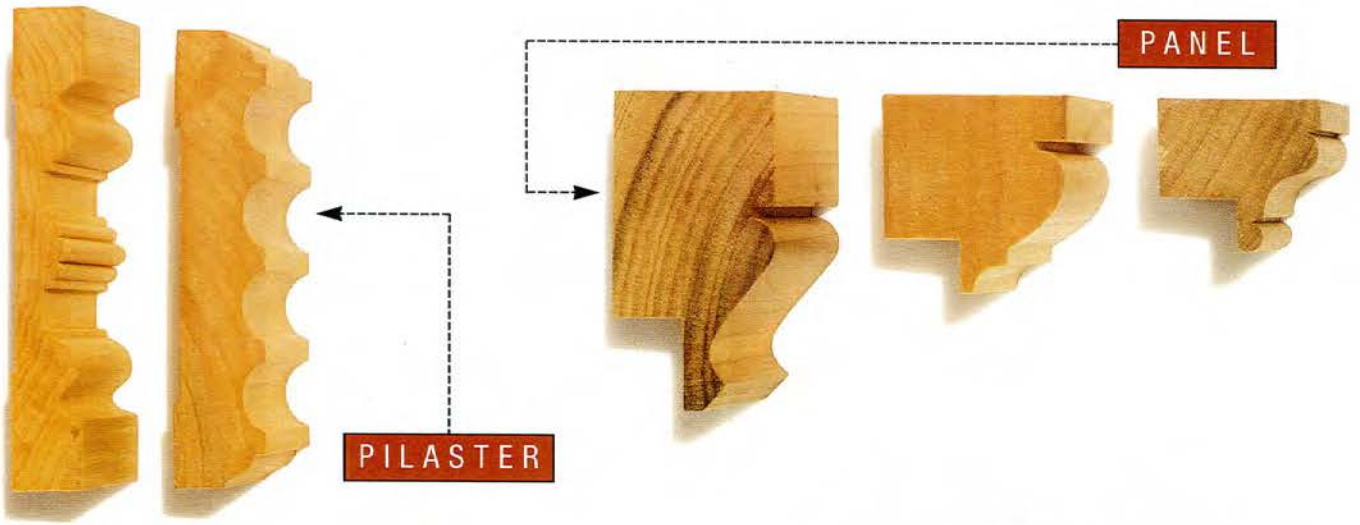


WINDOW AND DOOR CASING

ROSETTE



CHAIR RAIL



PANEL

PILASTER

BASE PARTS

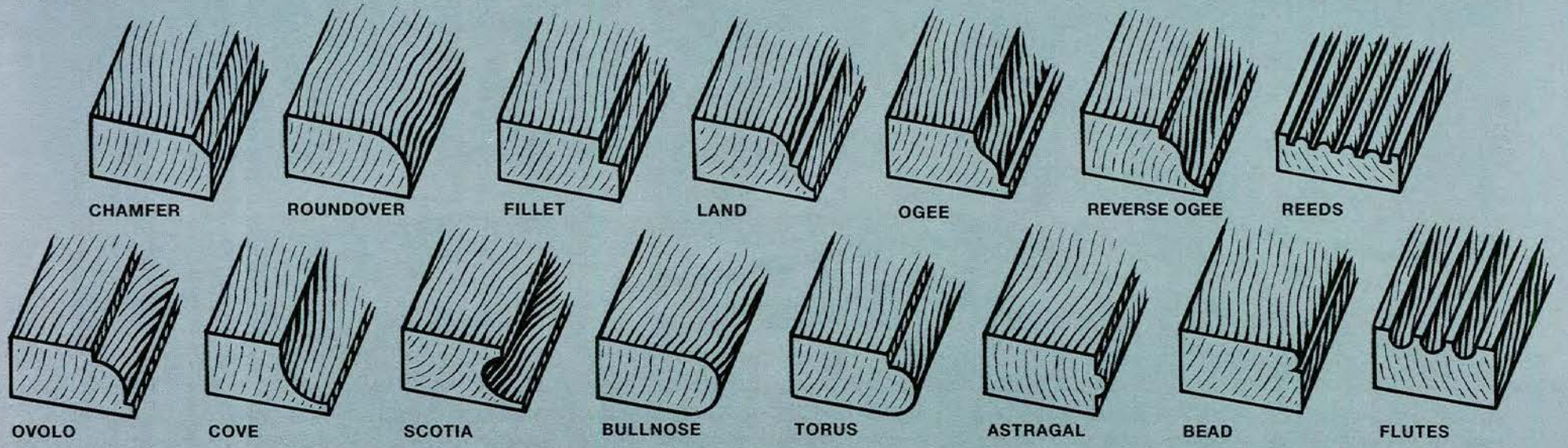
THE PIECES IN THIS COLLECTION, a small sample of the immense variety of moldings, represent a room's worth of applications. Yet single profiles alone do not account for all the possibilities, because moldings can be combined to produce still more shapes. Moldings can also be dissected: Trim carpenters often rip them into strips containing just the part of the profile they need. When placing an order, first find out if the supplier offers only standard lengths or if it will cut—and only charge for—the lengths you want. The best molding is expensive, but it's better to have some left over than to come up short. A mill will gladly run more, but there will be another setup fee, and the new stock might not perfectly match the first shipment.

CROWN moldings are usually tilted, or sprung, from the wall with the deepest and most complex shapes running along the lower edge, which creates shadows and a sense of depth. For a bolder look, crowns can be blocked out from wall and ceiling with flat plates of wood that create additional reveals of light and shadow. **PICTURE RAILS** have a thick, rounded top edge for holding a metal hook. This permits hanging and rearranging pictures without making holes in the wall. Most **CHAIR RAILS** have a pronounced round element, traditionally for keeping chair backs away from walls. The rabbet along the back of **PANEL**

molding is for capping wainscot or framing decorative panels. The top face can be enhanced with other moldings, such as a base cap or shoe. To take advantage of incoming light and minimize bulkiness, traditional-style **CASINGS** are typically thin where they meet a window or door opening and get thicker toward the opposite edge. Victorian styles are often symmetrical and therefore thick at both edges. **ROSETTES** are a Victorian invention meant to speed casing installation by eliminating miter joints. A well-matched rosette would have the same topography as the casing, but would be made with a circular cutter instead of a straight one. **PILASTERS** are wide, symmetrical moldings that are used with special caps and bases to simulate a column. **BASEBOARDS** are always heavier and thicker near the floor and get thinner as they rise up the wall. The **BASE CAP** makes the transition from base to wall. It can be molded on the baseboard, or it can be a separate piece, the better to bend with bows in the wall. The **BASE SHOE** does the same work at the floor, making a tight seam over ups and downs.

Parts of the Profile

All moldings are composed of these basic shapes, 15 visual notes that can be reduced or enlarged, stretched or shrunk to play an infinity of tunes.



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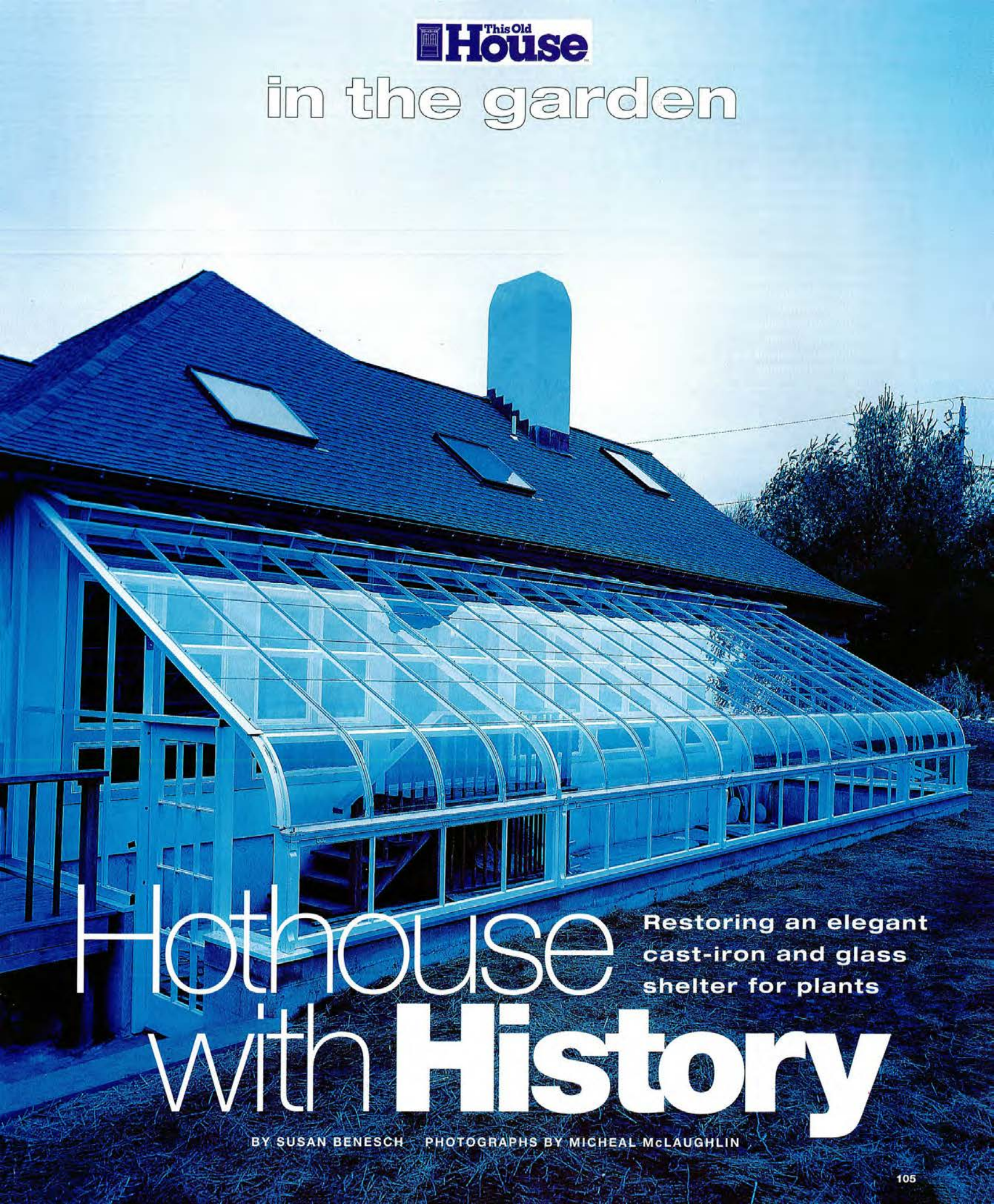


Hothouse with History

Restoring an elegant cast-iron and glass shelter for plants

BY SUSAN BENESCH · PHOTOGRAPHS BY MICHEAL McLAUGHLIN

Working from a ladder that rests in what will be a 14-foot-long exercise pool, Mark Ward bolts a steel rafter to the new wing of the house. Cypress purlins placed crosswise between the rafters will support the glass. When this greenhouse was first built in the 1930s, the glass rose from a masonry wall about 30 inches high. In the greenhouse's new life, most of the wall is set below ground level, allowing access from both the living room and the basement. Plants will grow mainly at the far end, by the front door.

WEARY OF OFFICE WORK, job-retraining expert Susan Shaw set out 15 years ago to design her own new career as a potter and horticulturalist. She put her plan into action in a way that gardeners who buy plants before they prepare the soil can appreciate: The first thing she did was shop for a greenhouse. When a landscaper responded to her ad and offered a disassembled one for $1,500, she was intrigued. She consulted Mark Ward, who has been designing and building greenhouses, sunrooms and skylights, largely from recycled material, for two decades. She told him the parts were made by Lord & Burnham, a New York firm that began manufacturing greenhouses during the Civil War.

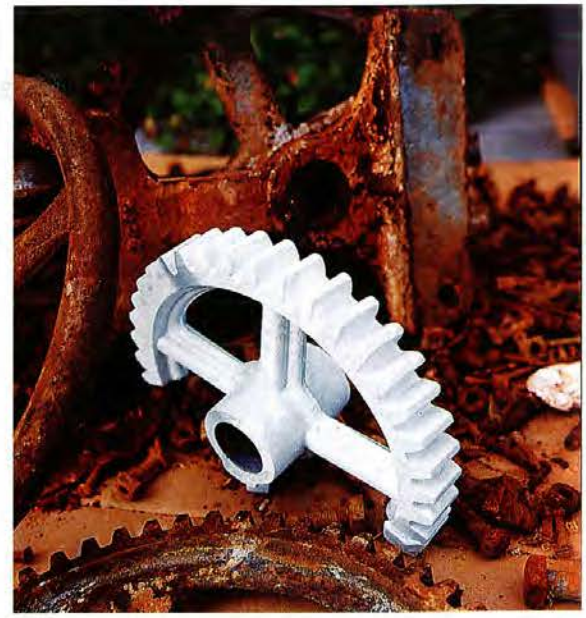
Ward reveres the company's work. "There's an elegance," he says, struggling to explain what is best understood by touching the curving spokes of one of the wheels that operates the greenhouse's side vents. "There are all these wonderful cast-iron bits and cast-iron cranks and shelf brackets. On some level, it's sort of the difference between wooden boats and fiberglass boats. They both do the job, but to some people—to many people—one is more aesthetically pleasing."

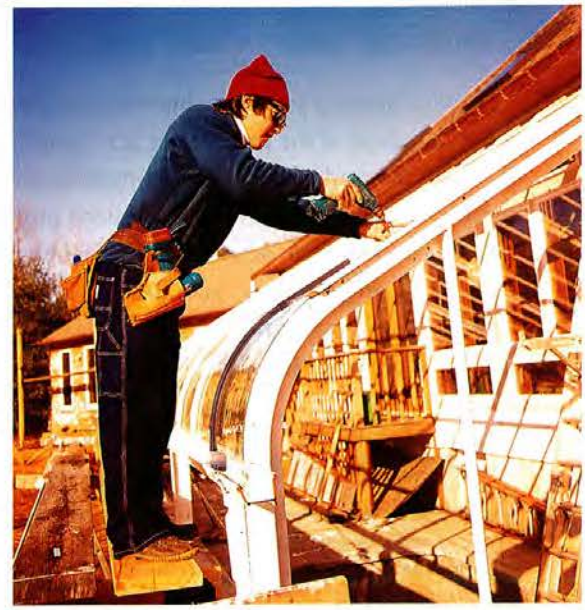
Shaw bought the greenhouse parts and carted them home. She moved the heap of more than a thousand pieces again when she bought land in Wyoming, Rhode Island. While the parts rusted in a pile behind a potting shed, she worked at a garden center, managed several commercial greenhouses of the same 1930s vintage as her own, designed and built a small house on the property and got married. Finally, in March 1994, Shaw and her husband, John Buscaglia, began preparing to expand their house. With Ward's help, they planned to erect the greenhouse as a lean-to connected to a new wing.

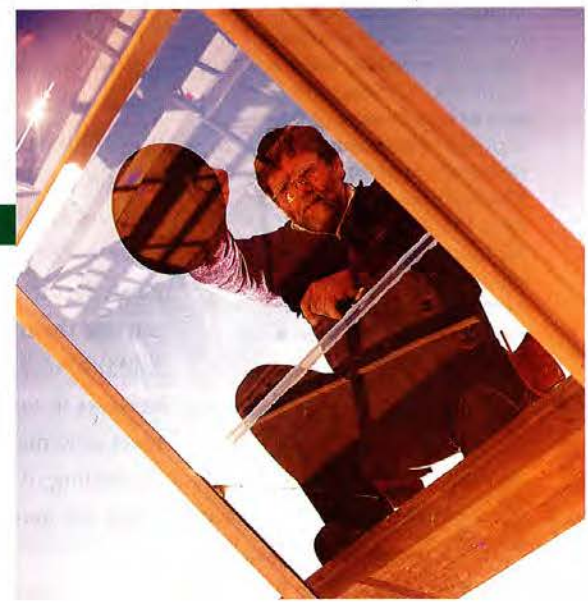
So one day last fall Ward found himself scowling at an old cup-shaped hunk of cast iron. He recognized it as part of a gutter. But to find out which part, he would have to keep staring at it. Although he had salvaged many old Lord & Burnham blueprints, he had none for Shaw's design.

Most of the components were still in remarkably good shape, and Ward was able to discard ones that weren't because the lean-to would be only half the width of the original stand-alone structure. He replaced only the fasteners, which had been sitting in a bucket full of water and were rusted.

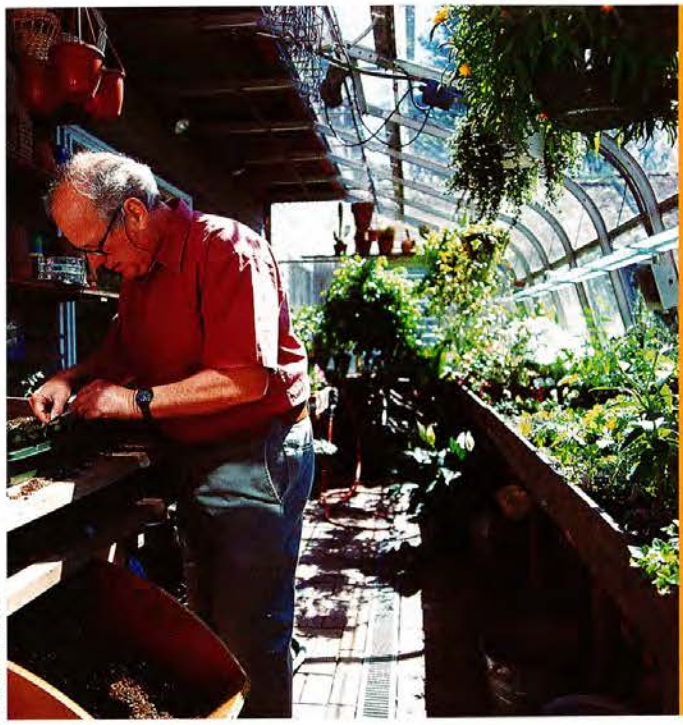
Because Shaw and Buscaglia were building a new wing, they were able to integrate the greenhouse more than is usually possible. Its walls are partially underground, allowing doorways into both the basement and the living room. Between the greenhouse and the new wing is a stretch of nearly continuous windows, some of which open. Air can flow from the outside into the greenhouse through its side vents, then into the house and out again via a central vent at the top of the living room—a scheme intended to help warm the house in the winter and cool it in the summer. Shaw and Buscaglia are counting on the central vent to keep their home from becoming too humid, a common problem when greenhouses open into living spaces.







On this project, the main tasks were to erase years of decay, then jigger the pieces to fit the space. TOP: Sandblasting and industrial latex-acrylic paint renewed a cast-iron gear for operating the vents. MIDDLE: With the curved glass in place, Ward's assistant, John Lam, screws an aluminum bar cap across the top. Greenhouse glass is lapped like shingles on a house, so the bar cap will also provide a base for the pane above. BOTTOM: Ward uses a suction cup to position a top piece. All flat panes are new, tempered for strength and safety. The more fragile curved panes are originals, cleaned to sparkle again.



KELLER & KELLER

RUSS SAYS:

Anyone lucky enough to have a greenhouse should make it easy to use. I have a potting bench with two bins—one for the soil I need when transplanting, and the other for the finer soil I use to start seeds. Pots, labels and fertilizer are within reach. I also have hot and cold water taps. You can't use cold water alone or you'll traumatize your plants. I keep the greenhouse at 60 degrees; when it gets warmer, the vents open. My greenhouse is a lean-to that I built 20 years ago from a Lord & Burnham kit. It faces south, which is what you want. My house shelters it on the north side, and a gentle hill helps buffer it from the wind. That has made a tremendous difference in heating costs. The floor is brick on sand, which also helps; the bricks absorb heat from the sun during the day and release the heat at night. One year I experimented with taping bubble wrap over the glass as winter insulation. It worked, but it was so ugly I took it off. Today, I would probably use double-pane glass, but it's costly.

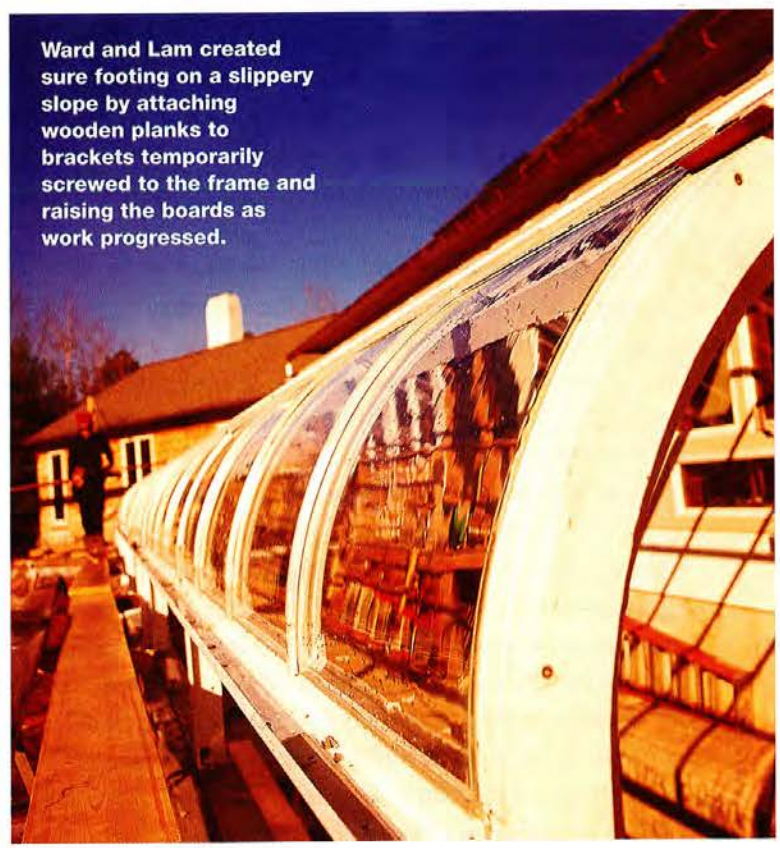
Shaw is devoted to plants, but she also loves to swim, so about one third of the greenhouse is occupied by a small exercise pool. (Instead of the swimmer moving across the water, the water moves across the swimmer: Pumps push water from one end of the pool to the other while the swimmer stays in one place. Shaw and Buscaglia plan to treat the water with ultraviolet radiation rather than chlorine to avoid toxic fumes.) The rest of the greenhouse will be filled with orchids and epiphytes, air plants that grow without soil. Shaw also plans to propagate hybrid daylilies.

Sun spaces

The first step in building a greenhouse is deciding whether you or your plants will take precedence. If you imagine sipping tea in the sunshine on a snowy day, you probably want a sunroom—a room with lots of windows. A glass-roofed greenhouse, designed to coddle plants, often must be kept too humid or cool for lounging. A conservatory falls somewhere in between—larger and lighter than a sunroom, more comfortable than a greenhouse.

Corrugated plastic glazing would diffuse sunlight, providing the best illumination for some plants, but Shaw stuck with glass because plastic will yellow and degrade. She reused panes originally made for the gracefully curving eaves and bought new flat panes so the roof could be tempered to resist breaking. Buying the glass, restoring old parts and putting them all together cost $20,000 to $25,000, about the same as it would to buy and erect new materials. Shaw is delighted with the result. "I like the feeling of things that have been around and have been used, that are made of materials that last and last and last."

In the old Lord & Burnham catalogues that Ward collects, the words "permanent" and "everlasting" are repeated like mantras. "As you look along the ridge of a completed house you can't help but be impressed by the strength and endurance in every inch of it," one description reads. When he finished putting up the steel frame of Shaw's greenhouse, the usually mild-mannered Ward suddenly swung from a rafter, showing off its strength and endurance. "Making something for the future generations," he says, "is part of what I feel like I'm doing."



Ward and Lam created sure footing on a slippery slope by attaching wooden planks to brackets temporarily screwed to the frame and raising the boards as work progressed.

See Directory, on page 116, *for details and sources*

pay dirt

TIMELY TIPS AND USEFUL DISCOVERIES FOR GARDENERS

CARNIVOROUS PLANTS AND ROOT SAW PHOTOGRAPHS BY DARRIN HADDAD; ARBORETUM BY PAM SPAULDING

But will they eat my little sister?

To attract kids to gardening, it's hard to beat the drama of tiny sundew hairs closing on a fly or a bladderwort leaf pulling an ant into a trap. March is a great time to get started because these windowsill plants are waking up after the winter, and they're hungry. One meal each month is enough, says Marilee Maertz at California Carnivores, a grower that ships mail-order. Its greenhouse in Forestville, California, is open to visitors. But the rule is BYOB—bring your own bug.

Corny cure

To keep crabgrass and other weed seeds from sprouting, many gardeners apply a pre-emergent herbicide in early spring, about the time forsythia blooms. But a sprinkling of corn gluten meal, the protein left after syrup is extracted from the kernels, works too, Iowa State University researcher Nick Christians has discovered. Sold as A-maizing Lawn, the powder fertilizes as it decomposes. Enough to treat 100 square feet costs $1.60, about twice the price of a conventional herbicide.

From ruin, glorious trees

Communities stripped of trees by hurricanes Fran and Bertha might want to copy what newspaper photographer Michael Hayman did after a similar disaster 10 years ago. He turned his town of Seneca Gardens, Kentucky, into an arboretum. He wrote to tree experts throughout the country for suggestions, and they responded by donating so many seedlings that Hayman and a partner started a five-acre nursery to grow the trees to transplant size. Among the 350 uncommon varieties he received: "Heritage" river birch, *Betula nigra,* (at right with Hayman and his yellow lab retriever, Dakota); Dragon's-eye pine, *Pinus thunbergii,* with vivid yellow and green needles; and Daimyo oak, *Quercus dentata,* with foot-long leaves.

the big thaw

Gardeners itching for an early spring may actually get their wish, reports the Scripps Institute of Oceanography in La Jolla, California. Atmospheric chemists analyzing variations in carbon dioxide concentrations over Alaska and Hawaii found evidence that the growing season of the world's plants has increased by about a week since 1975. The likely cause? Increased burning of fossil fuels such as gasoline, which release carbon dioxide and other gases that raise global temperatures. The same study suggests that bragging gardeners may be taking too much credit for the size of recent harvests. Because carbon dioxide is a main component of photosynthesis, the higher concentration seems to be causing greater plant growth worldwide. "It's sort of like the earth is breathing harder," says researcher Tim Whorf. To corroborate the findings, NOAA satellites are scanning the earth for signs of increased "greenness."

A match for rude roots

Similar to a drywall saw but thicker, this new tool can punch through soil, then slice through tree roots or sod. The teeth can cut on the pull stroke, when the blade is less likely to scrape against a rock.

See Directory, on page 116, for details and sources

One Wheel or Two?

Taking the challenge out of chores

THE TYPICAL GARDEN runs on wheels. For every plant that grows, it seems, there are rocks to move, fertilizer to lug, tools to cart and waste to trundle away. If horticulture predated the wheel, it wasn't by very long.

The word "wheelbarrow" has been in the English language at least since the 14th century, and ancestors of the homely one-wheel cart must surely have rolled down Roman roads. But nowadays, wheelbarrows are only part of the traffic on our garden paths. One wheel or two, plastic or metal, tanklike or collapsible, a bewildering array of carriers is available.

"Ideally, you need three hand-pushed vehicles around the garden," says Russ Morash. First, there's the traditional single-wheel wheelbarrow. "It's unstable, it's tough on your back, and you can't tilt it down to pick up heavy objects," he says. "But it still can't be beat when you have a narrow path to negotiate."

Another must-have in Russ's fleet is a two-wheel garden cart, the kind with bicycle-type wheels and sides of exterior-grade plywood. "These are great for hauling bulky debris," he says, "and they're the only carts I've found that can tote two full-size trash barrels out to the curb."

Some two-wheelers marry the best features of the wheelbarrow and the garden cart. One offers the option of tucking both wheels together inside the frame for a twin-wheel wheelbarrow effect, or spacing them farther apart for greater stability. Another is a big plastic two-wheel tip cart. It can carry a heavy, dense load such as sand or gravel and then tip forward for emptying without the hazards of a one-wheel balancing act. One model even sports fat, pneumatic lawn-tractor tires, an advantage with punishing loads. The manufacturer claims it can haul up to 700 pounds—more than you'd want to thread down a path between the tomatoes and the squash.

The last of the big three is something that rarely comes to mind for garden chores: a two-wheel hand truck, the kind teamsters use for hoisting refrigerators and beer barrels. With its easy fulcrum and low center of gravity, a hand truck can transport fence sections, heavy tools, bags of lime or cement, big rocks or just about any item that would be tough to muscle off the ground and into a carrier. Here, too, pneumatic tires are best.

If storage space is tight, consider a folding carrier, but be careful: Sometimes manufacturers make too many compromises, producing carts that are compact but don't open and close properly. Another option is to store large carts outside, upside down.

What if you only have room for one set of garden wheels? Make that "wheel," Russ says. "If I could have only one carrier, I'd make it a wheelbarrow, if for no other reason than that there are places where you just can't maneuver a two-wheel cart. But it would have to be big enough—a capacity of at least a third of a cubic yard. A too-small wheelbarrow is of no use. You're always overloading it, and it's always tipping."

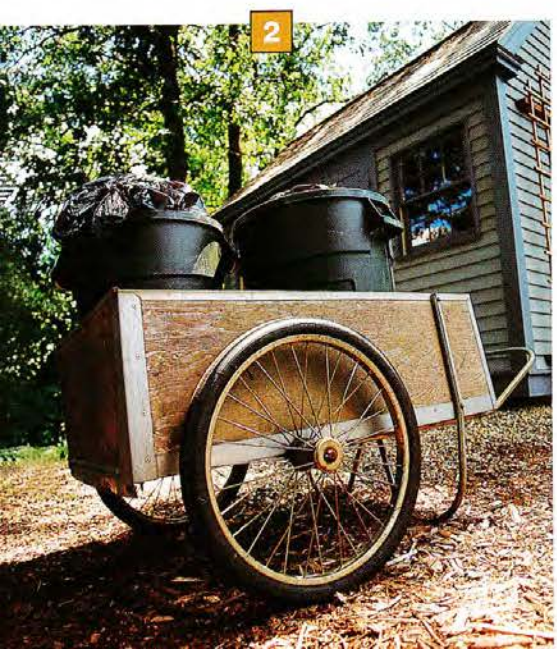
Specialty Carts

1. A hand truck eases the toughest part of moving a heavy rock: lifting it.
2. For hauling bulky items, a plywood-sided cart with bicycle-type tires is the best option. It tips forward to make loading and unloading easier.
3. This aluminum fold-up model is similar to the plywood cart, but we discovered it suffers from a high center of gravity and poor weight distribution; when loaded, it flipped over as we let go of the handle.
4. Although it's made of plastic, we liked this dock cart, which also folds. It's suitable for carrying only light loads, but it's handy and well-balanced.

BY WILLIAM G. SCHELLER PHOTOGRAPHS BY KELLER & KELLER

The best general-purpose carrier is a standard wheelbarrow, Russ says. He suggests buying a wheelbarrow with replaceable oak handles and a polypropylene tray. Plastic doesn't rust—important because garden carriers should be tough enough to be stored outside if necessary. Tube-type pneumatic tires are good because the tube can be topped up with a hand pump, patched or even replaced.

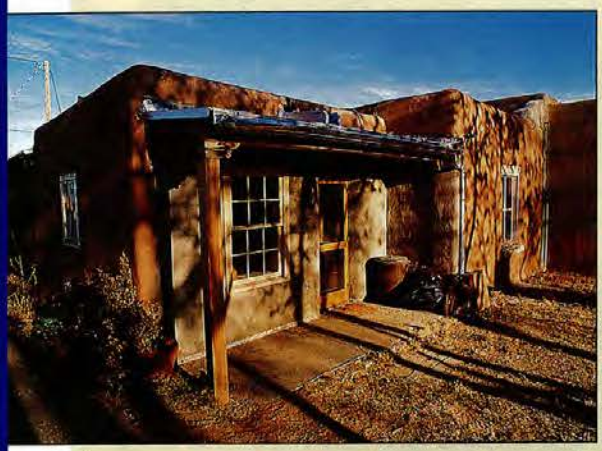
See *Directory*, on page 116, *for details and sources*



This Old House CLASSICS

From Santa Fe to Jamaica Plain

The crew leaves the desert for a project in its own backyard



The new portale of the finished Santa Fe project.

Week 24 (March 1-2)

Workers arrive to spray a four-inch layer of polyurethane foam on the roof for insulation and waterproofing. Plumbing and heating expert Richard Trethewey supervises the installation of a radiant-floor system—and a warm radiant wall next to the whirlpool in the master bath.

Week 25 (March 8-9)

Steve Thomas visits the Arizona flagstone quarry that provided the flooring for the project house. Back in Santa Fe, a stone mason hand-shapes the slabs and fits the pieces in place. In his workshop (set up in the owners' painting studio), Norm Abram builds pine face frames for the kitchen cabinets.

Week 26 (March 15-16)

All but the finishing touches remain. Outside, workers cover the bare adobe walls with a plaster-and-acrylic stucco. Inside, Richard gives the heating and cooling equipment a final check. As a mariachi band arrives to play for friends and neighbors, Steve Thomas closes out his first season as host of *This Old House*.

Week 1 (March 22-23)

A New Season Begins

This Old House's 12th year kicks off in Jamaica Plain, in the city of Boston, for the renovation of a rundown but classic triple-decker. The property, abandoned and foreclosed on by the city, is destined to become a new home for three low- and moderate-income families.

Week 2 (March 29-30)

To no one's surprise, the house is filled with lead paint, and specialists are called in to remove it. Outfitted in protective bodysuits and wearing respirators, they scrape the walls and strip the door and window trim. What can't be salvaged is carefully wrapped up and discarded. Norm checks out the rotten gutters, which will be replaced.

Week 3 (April 5-6)

As contractor Abel Lopes's crew tears off the clapboard siding, a truck arrives to fill the walls with cellulose insulation. Richard Trethewey reviews the energy plan, which includes putting in a new baseboard heating system and replacing all the windows.

Week 4 (April 12-13)

New vinyl siding is up, and most of the windows are installed. Norm starts making balusters for the three-story porch, which will be completely rebuilt. Homeowner Hazel Briceno meets with a designer to work out plans for the trio of new kitchens.

Week 5 (April 19-20)

While Norm continues restoring the porches, Steve gets a lesson from the pros in drywalling. Then the show travels to a Canadian gypsum mine and a New Hampshire factory that turns the gypsum into drywall.

NEXT EPISODES Weeks 6-14

The Jamaica Plain project continues with landscaping, plumbing, kitchen installation, plastering, door hanging and more, plus visits to a pipe factory in North Carolina and a modular house manufacturer in Japan.

Norm and Steve with Jamaica Plain homeowner Hazel Briceno.

RICHARD HOWARD/WGBH AND MARTY SNORTUM

Vintage* This Old House *episodes will be rebroadcast every week on these commercial stations around the nation.

ALABAMA
Birmingham
WNAL-TV*

ALASKA
Anchorage
KIMO-TV
Sat. 5:30pm
Fairbanks
KATN-TV
Sun. 5pm
Juneau
KJUD-TV*

ARIZONA
Phoenix
KPHO-TV
Sat. 10am
Tucson
KTTU-TV
Sat. 9am

CALIFORNIA
Chico
KRCR-TV
Sun. 5pm
Eureka
KAEF-TV
Sun. 5pm
Fresno
KJEO-TV*
Los Angeles
KABC-TV
Sun. 7:30am
Monterey
KCCN-TV
Sun. 10:30am
Sacramento
KPWB-TV
Sun. 7am
San Diego
KGTV-TV
Sat. 4pm
San Francisco
KPIX-TV
Sun. 10am
Santa Barbara
KSBY-TV
Sun. 3pm

COLORADO
Colorado Springs
KRDO-TV
Sun. 11:30am
Denver
KCNC-TV
Sun. 10:30am
Grand Junction
KJCT-TV
Sun. 11:30am

CONNECTICUT
Hartford
WFSB-TV
Sun. 12:30pm

DISTRICT OF COLUMBIA
WUSA-TV
Sat. 6am

FLORIDA
Fort Myers
WTVK-TV
Sat. 11:30am
Jacksonville
WTLV-TV
Sat. 7:30am
Miami
WPLG-TV
Sun. 8:30am
Orlando
WFTV-TV
Sat. 5am
Sarasota
WWSB-TV
Sun. 11:30am
Tampa
WFTS-TV
Sun. 10am
West Palm Beach
WPEC-TV
Sun. 11am

GEORGIA
Albany
WGVP-TV
Sat. 10:30am
Atlanta
WXIA-TV
Sun. 6:30am
Macon
WMAZ-TV
Sat. 11am
Savannah
WTOC-TV
Sun. 5pm

HAWAII
Honolulu
KHNL-TV
Sat. 4:30pm

IDAHO
Boise
KIVI-TV
Sun. 10:30am

ILLINOIS
Champaign
WICS-TV
Sat. 7:30am
Chicago
WBBM-TV*
Rockford
WTVO-TV
Sat. 6pm
Springfield
WICS-TV
Sat. 7:30am

INDIANA
Evansville
WTVW-TV
Sun. 9:30am
Indianapolis
WNDY-TV
Sat. 11:30am
South Bend
WHME-TV
Sat. 1:30pm

IOWA
Cedar Rapids
KWWL-TV*
Ottumwa
KYOU-TV
Sat. 2:30pm

KANSAS
Wichita
KSNW-TV
Sun. 6:30am

KENTUCKY
Bowling Green
WBKO-TV
Sun. 6:30am
Lexington
WTVQ-TV
Thu. noon
Louisville
WHAS-TV
Sat. 6:30am
Paducah
KBSI-TV
Sat. noon

LOUISIANA
Baton Rouge
WAFB-TV
Sun. noon
New Orleans
WNOL-TV*
Shreveport
KTVS-TV
Sun. 6am

MAINE
Bangor
WVII-TV
Sun. noon
Portland
WPXT-TV
Sun. 10am

MARYLAND
Baltimore
WMAR-TV
Sun. 7am

MASSACHUSETTS
Boston
WFXT-TV
Sun. 11am

MICHIGAN
Detroit
WDIV-TV*
Flint
WNEM-TV
Sun. 5am
Grand Rapids
WOOD/WOTV-TV*

MINNESOTA
Minneapolis
KSTP-TV
Sat. 9am
Rochester
KAAL-TV
Sat. 6pm

MISSISSIPPI
Columbus
WCBI-TV
Sun. 5pm
Jackson
WLBT-TV
Sun. 6:30am

MISSOURI
Columbia
KRCG-TV
Sun. 10am
Kansas City
KMBC-TV
Sat. 6am
St. Louis
KNLC-TV*

This Old House is a production of WGBH Boston

Creating the *Classics*

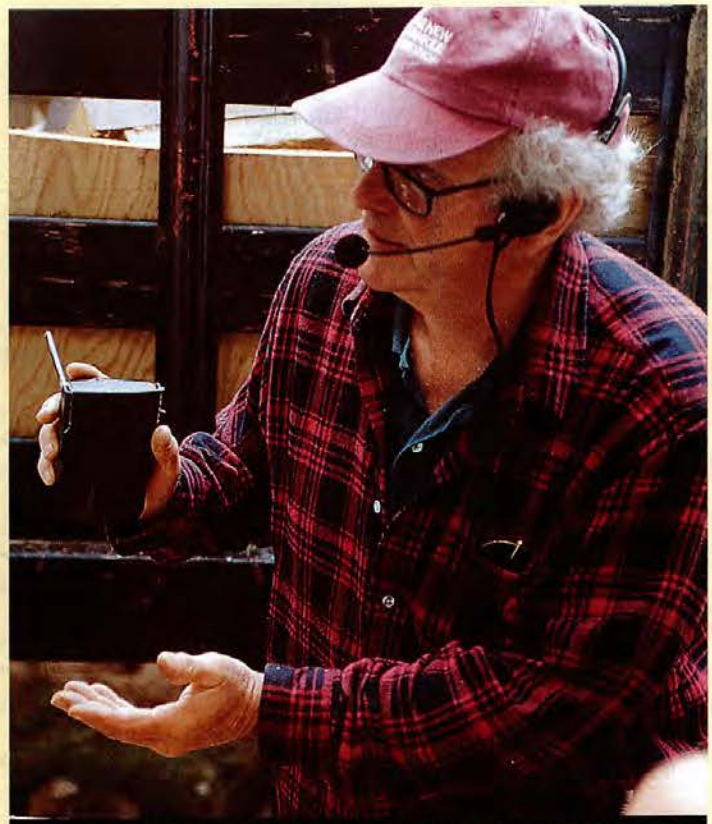
The director renovates his work

EDITED BY LAURA GOLDSTEIN

It's rare that an artist gets to go back and tinker with his work years after it was first exhibited and sold, but that's exactly what Russ Morash, creator and director of *This Old House,* is doing these days. It all began with the debut last fall of *This Old House Classics,* favorite shows from past seasons that are being rebroadcast on commercial television. Russ is thrilled that the old projects are airing again, but there's a hitch: Because they were originally made for public TV, the episodes are too long to fit a half-hour format that includes commercial breaks. So it's Russ's job to find and edit out expendable footage. And with the luxury of this second go-round, he also gets to polish the shows by cutting garbled lines, smoothing abrupt transitions and speeding up slow sequences.

"It's quite a challenge," Russ says as he pops an episode from the Jamaica Plain project into his cassette deck. "These are shows that I haven't seen in eight or nine years. Now I see things I wish I hadn't done and things that look good and are going to be difficult to edit." The trick is to remove several snippets while preserving the show's original continuity. "It's sort of like working on a jigsaw puzzle."

In the segment he's working on, Steve visits a model prefab house in Nara, Japan. Before showing us around, he passes through the sales office, where agents are busy taking orders. The scene gets Steve from one place to another, but it's not particularly interesting. So with a few clicks of his computer mouse, Russ "dissolves" him from the outside of the building to the inside, saving precious seconds.



"I'm not a computer head, but I love the tool," says director Russ Morash of his new editing gear. "I can move through a half hour of material as quickly as I can move the mouse."

Back when the show was made, "it would have taken days and a whole room full of the most expensive equipment to produce that simple effect," Russ says. Now all it takes is the software loaded onto his home-office computer, which allows him to instantly manipulate a digitized version of the original tape. "In the bad old days, you'd sit there with a stopwatch, and you'd evaluate and evaluate and evaluate the show to decide what to take out. And you'd try to keep track of the mathematics on a piece of paper." Today the machine does all his calculating for him, and if he makes a mistake, he can fix it without a lot of laborious refiguring. "As an old dinosaur, that's the part I really appreciate."

A few more clicks, and he's gotten the show right where he wants it. And he's positive that no one will be able to tell where he trimmed. "It's like a good haircut," he says. "You don't want it to look like you just had one."

RICHARD HOWARD/WGBH

NEBRASKA
Lincoln
KHAS-TV
Sat. 5pm
Omaha
KETV-TV
Sat. 12:30pm

NEVADA
Las Vegas
KTNV-TV*
Reno
KREN-TV*

NEW MEXICO
Albuquerque
KOB-TV
Sat. 4pm

NEW YORK
Binghamton
WBNG-TV
Sat. 7:30am
Buffalo
WIVB-TV*
New York
WCBS-TV
Sun. 7:30am
Syracuse
WTVH-TV
Sun. 11:30am
Watertown
WWNY-TV
Sat. 7:30am

NORTH CAROLINA
Charlotte
WBTV-TV
Sun. 1:30pm
Greensboro
WGHP-TV
Sun. 8am
Greenville
WLOS/WFBC-TV*
Raleigh
WTVD-TV
Sun. 10am

OHIO
Cincinnati
WCPO-TV
Sun. 6am
Cleveland
WEWS-TV
Sat. 4:30am
Columbus
WSYX-TV*
Dayton
WRGT-TV
Sun. 11am
Toledo
WTVG-TV
Sun. 9:30am
Wheeling
WTRF-TV*
Youngstown
WFMJ-TV
Sun. 10am

OKLAHOMA
Oklahoma City
KOCO-TV
Sat. 10am
Tulsa
KJRH-TV
Sat. 10:30am

OREGON
Eugene
KEZI-TV
Sun. 5pm
Medford
KOBI/KOTI-TV
Sun. 4pm
Portland
KOIN-TV
Sun. 10:30am

PENNSYLVANIA
Erie
WUET-TV
Sat. 6:30am
Harrisburg
WPMT-TV
Sat. 10:30pm
Philadelphia
WCAU-TV
Sun. 11:30am
Wilkes Barre
WYOU-TV
Sat. 12:30pm

RHODE ISLAND
Providence
WLNE-TV*

SOUTH CAROLINA
Charleston
WCSC-TV*
Florence
WWMB-TV
Sun. noon
Greenville
WLOS-TV*
Myrtle Beach
WPDE/WWNB-TV*

SOUTH DAKOTA
Sioux Falls
KDLT-TV
Sun. 9am

TENNESSEE
Chattanooga
WDEF-TV
Sun. 7am
Knoxville
WATE-TV
Sun. 5:30am
Memphis
WPTY/WLMT-TV
Sun. 11:30am
Nashville
WKRN-TV
Sat. 6am

TEXAS
Amarillo
KFDA-TV
Sat. 5pm
Beaumont
KBMT-TV
Sun. 6:30am
Corpus Christi
KIII-TV
Sat. 5pm
Dallas
KXAS/KXTX-TV
Sat. 5pm
El Paso
KZIA-TV
Sun. 8am
Houston
KTRK-TV
Sun. 11am
Lubbock
KLBK-TV
Sun. 5pm
Nacogdoches
KLSB-TV*
Tyler
KETK-TV
Sat. 5pm
Waco
KXXV-TV
Sun. 10:30am

UTAH
Salt Lake City
KTVX-TV
Sun. 8am

VERMONT
Burlington
WCAX-TV
Sun. 11am

VIRGINIA
Norfolk
WVEC-TV
Sun. 11am
Richmond
WAWB-TV
Sat. 5pm
Roanoke
WSLS-TV
Sat. 6:30am

WASHINGTON
Seattle
KIRO-TV
Sat. 10:30am
Spokane
KXLY-TV
Sun. 9:30am

WEST VIRGINIA
Bluefield
WOAY-TV*
Charleston
WCHS-TV*
Clarksburg
WDTV-TV
Sat. 6:30pm
Parkersburg
WTAP-TV*
Wheeling
WTRF-TV*

WISCONSIN
Green Bay
WGBA-TV
Sun. 7am
La Crosse
WEAU-TV
Sun. 9am
Madison
WMTV-TV
Sat. 5pm
Milwaukee
WTMJ-TV
Sun. 10:30am
Wausaw
WJFW-TV
Sun. 10:30am

*CHECK YOUR LOCAL LISTINGS

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

This Old House™

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

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
Fri. 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

St. 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

This Old House is a production of WGBH Boston

St. 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
WJ PM-TV
Sat. 1:30 pm

Greenville
WNTV-TV
Sat. 1:30 pm

Greenwood
WNEH-TV
Sat. 1:30 pm

Rock Hill
WNSC-TV
Sat. 1:30 pm

Spartanburg
WRET-TV
Sat. 1:30 pm

Sumter
WRJA-TV
Sat. 1:30 pm

SOUTH DAKOTA

Aberdeen
KDSD-TV
Sat. 4:30 pm

Brookings
KESD-TV
Sat. 4:30 pm

Eagle Butte
KPSD-TV
Sat. 3:30 pm

Lowry
KQSD-TV
Sat. 4:30 pm

Martin
KZSD-TV
Sat. 3:30 pm

Pierre
KTSD-TV
Sat. 4:30 pm

Rapid City
KBHE-TV
Sat. 3:30 pm

Sioux Falls
KCSD-TV
Sat. 4:30 pm

Vermillion
KUSD-TV
Sat. 4:30 pm

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

Lubbock
KTXT-TV
Sat. 12:30 pm

Odessa
KOCV-TV
Sun. 12:30 pm

San Antonio
KLRN-TV
Sat. 5:30 pm

Waco
KCTF-TV
Mon. 12:30 pm
Sat. 9 am and 6:30 pm

UTAH

Provo
KBYU-TV
Sat. 9:30 am and 12:30 pm

Salt Lake City
KUED-TV
Sat. 8 am and 5 pm

VERMONT

Burlington
WETK-TV
Thu. 8 pm, Sat. 11 am

Rutland
WVER-TV
Thu. 8 pm, Sat. 11 am

Saint Johnsbury
WVTB-TV
Thu. 8 pm, Sat. 11 am

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

VIRGINIA

Charlottesville
WHTJ-TV
Sat. 8:30 am

Falls Church
WNVT-TV
Sun. 3 pm

Harrisonburg
WVPT-TV
Sat. 1:30 pm

Marion
WMSY-TV
Sat. 1:30 pm

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

Tacoma
KBTC-TV
Thu. 6:30 pm
Sat. 12:30 pm and 6 pm

Yakima
KYVE-TV
Sun. 5 pm

WEST VIRGINIA

Beckley
WSWP-TV
Sat. 1:30 pm

Huntington
WPBY-TV
Sat. 1:30 pm

Morgantown
WNPB-TV
Sat. 1:30 pm

WISCONSIN

Green Bay
WPNE-TV
Wed. 7 pm, Sun. 4 pm

La Crosse
WHLA-TV
Wed. 7 pm, Sun. 4 pm

Madison
WHA-TV
Wed. 7 pm, Sun. 4 pm

Menomonie
WHWC-TV
Wed. 7 pm, Sun. 4 pm

Milwaukee
WMVS-TV
Thu. 7:30 pm, Sat. 8 am

Park Falls
WLEF-TV
Wed. 7 pm, Sun. 4 pm

Wausau
WHRM-TV
Wed. 7 pm, Sun. 4 pm

WYOMING

Riverton
KCWC-TV
Sat. noon and 5 pm

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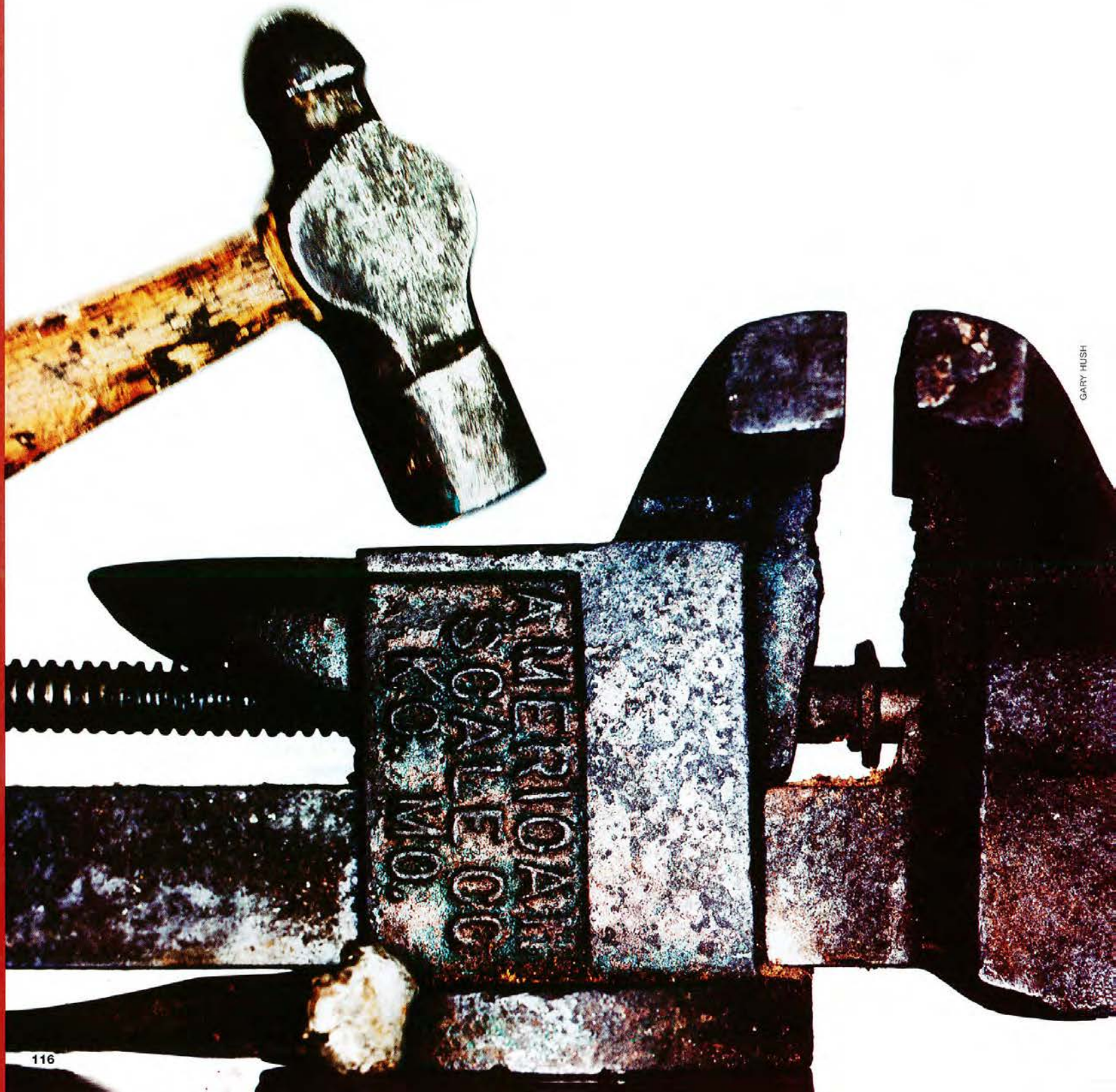
The Glidden Company

Ace Hardware Company

Directory

A resource guide for the home and garden



GARY HUSH

Directory

EXTRAS *pp. 24-31*

p. 24—Hand cleaners: Permatex Fast Orange Natural Citrus Hand Cleaner: 64-oz. pump container, $10.90; *Loctite Corp., 1001 Trout Brook Crossing, Rocky Hill, CT 06067; 860-571-5225.* Goo Gone Grease-Cutting Hand Soap: 8-oz. bottle, $2.99; *Magic American Corp., 23700 Mercantile Rd., Cleveland, OH 44122; 800-321-6330.* Hand Cleaner Wipes: $4.99 for 50; *Dexus, 2825 W. 31st St., Chicago, IL 60623; 888-293-3987.* Invisible Glove protective hand cream: 5 oz. tube, $3.99; *Blue Magic Inc., 23070 Miles Rd., Cleveland, OH 44128; 800-729-1816.* Lava hand soap: 4-oz. bar, $1; *Block Drug Co. Inc., 257 Cornelison Ave., Jersey City, NJ 07302; 201-434-3000.* Creme Hand Cleaner: 3-lb jar, $3.60; *Gojo Ind., Box 891, Akron, OH 44309-0991; 800-321-9647.* Surgical scrub brushes: $1 ea. or $5 per doz.; *Lee Valley Tools Ltd., 12 E. River St., Ogdensburg, NY 13669; 800-871-8158.* **For more information:** National Institute for Occupational Safety & Health, *4676 Columbia Pkwy., Mail Stop R-10, Cincinnati, OH 45226; 800-356-4674.*

p. 25—Staircase: Joe Fishback, Fishback Designs, *2283 Weslan Dr., Austell, GA 30001; 770-948-8473.* **VRM:** Jim Breen, public affairs, *Prudential Real Estate Affiliates, 3200 Park Center Dr., 14th fl., Costa Mesa, CA 92626; 800-666-6634.* Stephen Krawse, broker, *Century 21 Stephens Associates, 3108 Rte. 10, Denville, NJ 07834; 201-361-7700.*

p. 26—Tower lookout: *How to Rent a Fire Lookout in the Pacific Northwest,* by Tim Foley and Tish Steinfeld, 206 pp., 1996, $12.95; *Wilderness Press, 2440 Bancroft Way, Berkeley, CA 94704; 800-443-7227.* **Russian blocks:** (nine other theme sets also available), set #50-6632, $40; *T.C. Timber Co., Habermaass Corp., 4407 Jordan Rd., Box 42, Skaneateles, NY 13152; 800-468-6873.*

p. 27—Waterproof notebook: Rite in the Rain, also available as #88K90.01, 6 by 4 in., $3.95; #88K90.02, 8½ by 11 in., $12.50; *J.L. Darling Corp., 2614 Pacific Hwy. E., Tacoma, WA 98424; 206-922-5000.* **Building miniatures:** The Octagon, *The Museum of the American Architectural Foundation, 1799 New York Ave. NW, Washington, DC 20006-5292; 202-638-3221. Souvenir Buildings/Miniature Monuments from the Collection of Ace Architects,* by Margaret Majua and David Weingarten, 128 pp., 1996, $19.95; *Harry N. Abrams Inc., 100 Fifth Ave., New York, NY 10011; 212-206-7715 (in NY), 800-345-1359.* **Additional vintage tool Web sites:** The Electric Neanderthal, *www.cs.cmu.edu/~alf/en/.* FalconWood Old Woodworking Tools, *www.oldtools.com.* **Brown's bottle house:** *Strange Sites: Uncommon Homes and Gardens,* by Jim Christy, 96 pp., 1996, $24.95; *Harbour Publishing Co., Box 219, Madeira Park, BC V0N 2H0; 604-883-2730.* The Glass House, in Boswell, British Columbia, is open daily May through October, other times by appointment, admission $5; *604-223-8372.* **Lava countertops:** Pyro Lave, *imported from France by Amsterdam Corp., 150 E. 58th St., New York, NY 10155; 212-644-1350.*

p. 30—Compact home: Home4Me, 387 *Merrow Rd., Tolland, CT 06084; 860-875-1426.* **Braided stainless hoses:** Fluidmaster, *Box 4264, 1800 Via Burton, Anaheim, CA 92803; 714-774-1444.* Watts Regulator Co. Inc., *815 Chestnut St., North Andover, MA 01845-6098; 508-688-1811.* **Shutoff valves:** In-wall

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Windows & Doors

WEATHER SHIELD

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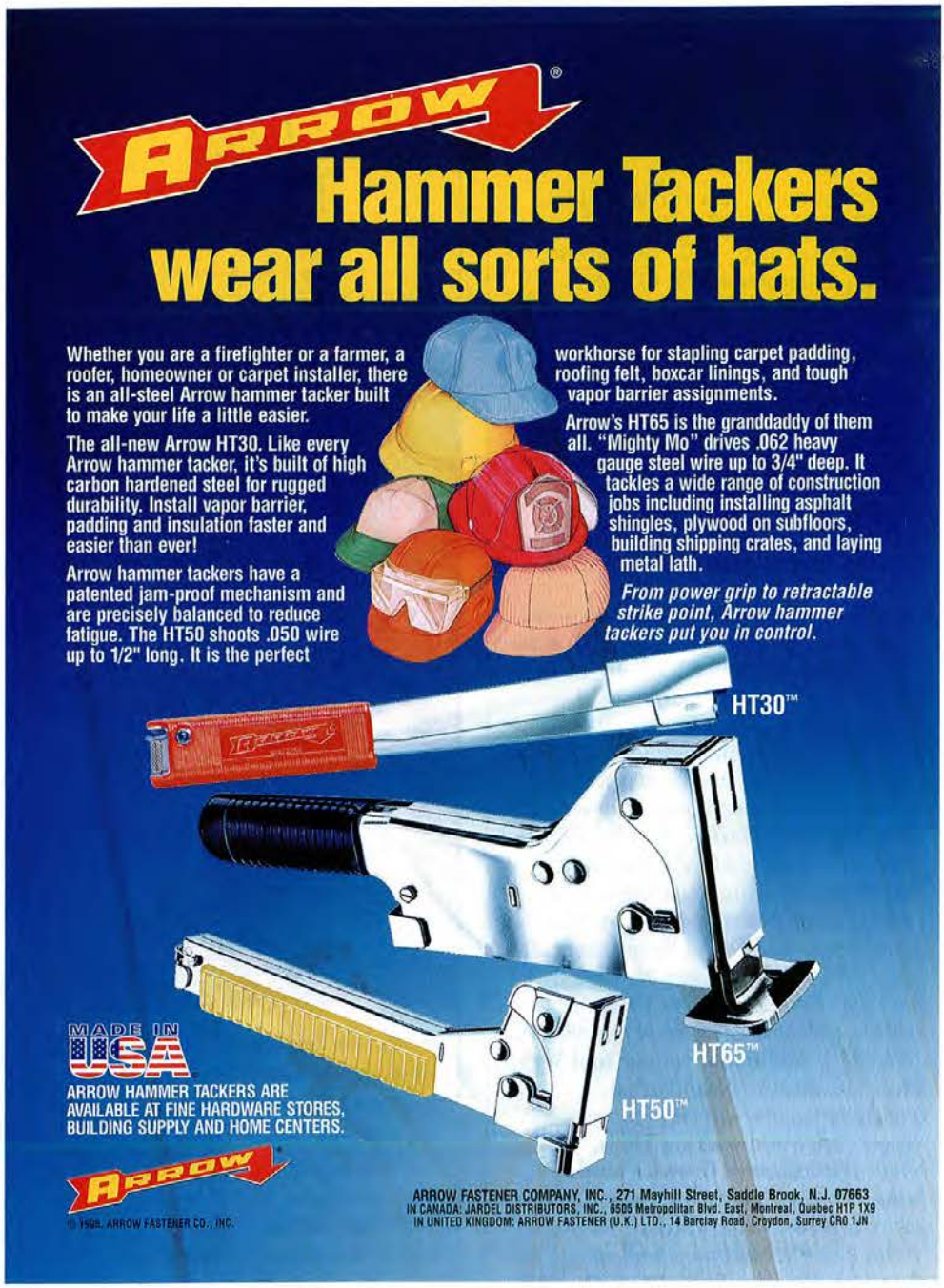


Directory

box, manual single-lever ball valve, $20-$25; *Oatey, 4700 W. 160th St., Box 35906, Cleveland, OH 44135; 800-321-9532.* Electronic models: Intelliflow Series A2, $125 to $140; *Watts Regulator.* **Fan tips:** "Real-time Monitoring/Ventilation for Painters," an 8-minute training video for professional painters, $7 (no credit cards); *Center to Protect Workers' Rights; 111 Massachusetts Ave. NW, Washington, DC 20001; 202-962-8490, informational Web site on painting hazards http://www.cpwr.com.* **Low-e window film:** Courtaulds Performance Film, *Gila Sunshine Div., Box 5068, Martinsville, VA 24115; 800-528-4481.* Madico Inc., *45 Industrial Pkwy., Woburn, MA 01888; 800-225-1926.* Metallized Products, *2544 Terminal Dr. S., St. Petersburg, FL 33712; 800-777-1770.* 3M, *3M Center Building 225-4S-08, St. Paul, MN 55144; 800-328-1684 ext. 228.* **Insurance add-ons:** Emanuel H. George Agency, *27 N. Broadway, Tarrytown, NY 10591; 914-631-1540.* Insurance Information Institute, *110 William St., New York, NY 10038.* National Insurance Consumer Help Line, *800-942-4242.*

p. 31—Power tool repair service: Bob Neff, Woodcraft, *210 Wood County Industrial Park, Box 1686, Parkersburg, WV 26102-1686; 800-225-1153, Web site: www.woodcraft.com.* **Faux rocks:** Concrete rock: up to $272, depending on size; *Urdl's Waterfall Creations Inc., 2010 NW First St., Delray Beach, FL 33445; 407-278-3320.* Satellite dish cover: $199; *Rock, On Inc., 4928 SE Abshier Blvd., Belleview, FL 34420; 800-543-5102.* Light rock: Hill Stone with Par-36 path light, #TS6-LU, $98; *TIC Industries, 15224 E. Stafford St., City of Industry, CA 91744-4418; 800-779-6664.* Speaker rock: Mountain Stone, #TS11-B, $166; *TIC Industries.*

Our thanks to: Gary Chosewood, president, *Rock, On.* **Snips:** *An Ergonomics Guide to Hand Tools, American Industrial Hygiene Association, 2700 Prosperity Ave., Suite 250, Fairfax, VA 22031; 703-849-8888.* **Brownstone:** Portland Brownstone Quarries, *130 Braemar Dr., Cheshire, CT 06410; 203-250-1502.* Brownstone Revival Committee, membership includes newsletter, $35 annually; *Box 577, New York, NY 10113; 718-638-3128, fax 718-638-8257.* **Our thanks to:** Everett H. Ortner, *Brownstone Revival Committee.* Janet Fisher, director of public relations, *Institutional Advancement Office, Pratt Institute, Brooklyn, NY.*

LADDERS *pp. 33-36*

Sectional/tapered ladder: Window cleaner's heavy-duty taper system, wood, five sections, 30-ft., $654; *Putnam Rolling Lad-*

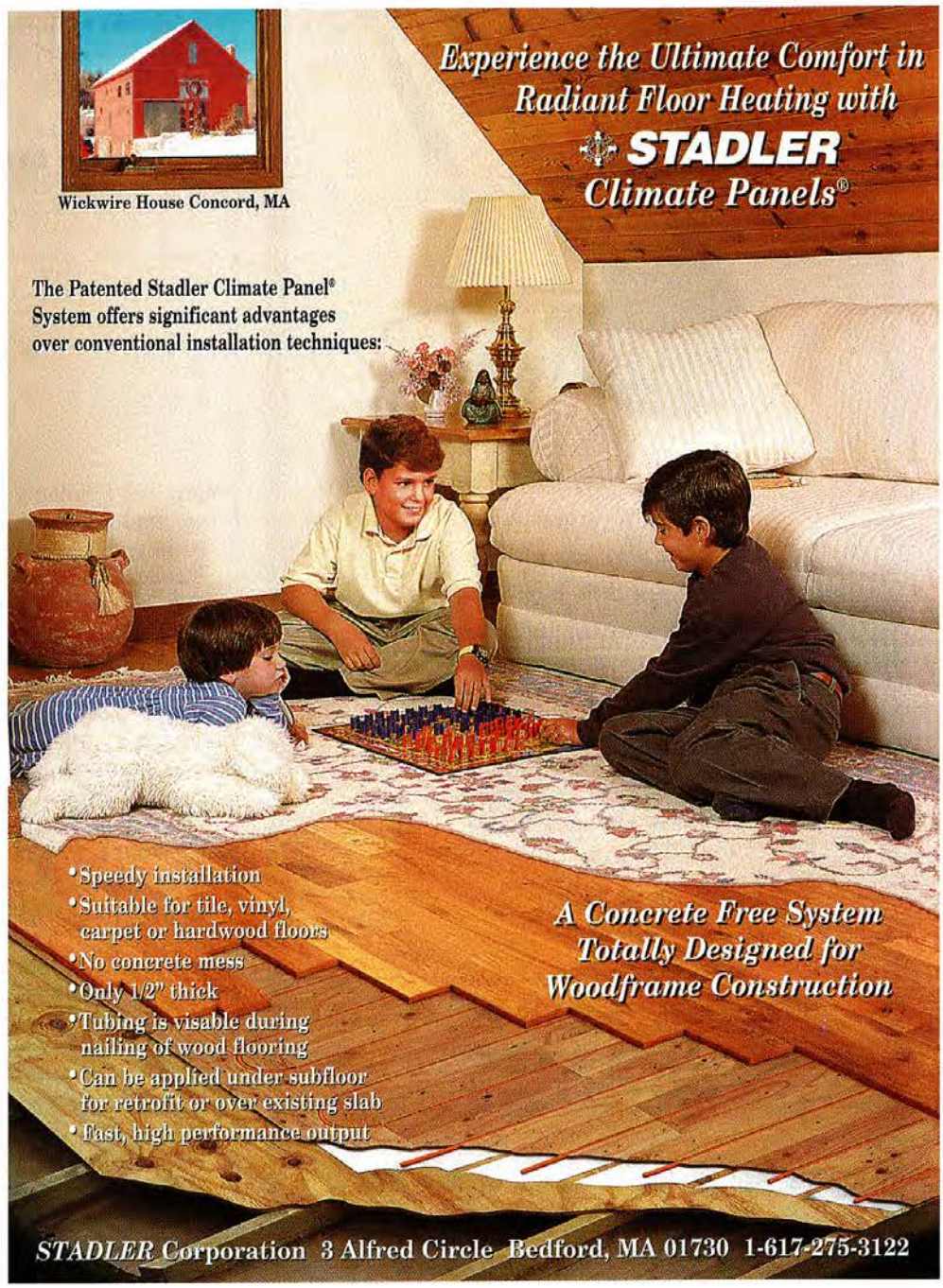
Directory

der Co. Inc., 32 Howard St., New York, NY 10013; 212-226-5147. **Articulated ladder:** Little Giant Ladder System #M-17, 15-ft. aluminum, $459; *Wing Enterprise Inc., 1325 W. Industrial Circle, Springville, UT 84663; 800-453-1192, 800-542-9464 (in Utah).* **Extension ladder:** #D6020-2, 20-ft. fiberglass, $342; *Werner Co., 93 Werner Rd., Greenville, PA 16125-9499; 412-588-8600.* **Telescoping ladder:** Telesteps #Z480, 12½-ft. aluminum, $299; *Professional Equipment, 130 Dale St., West Babylon, NY 11704; 800-334-9291.* **Ladder accessories:** True Grip ladder stand-off #17, $28.69; folding roof hooks #15-2, $38.25 per pair; *Werner Co.* Bumper pads #03K06.02, $8.95 per pair; *Lee Valley Tools Ltd., Box 1780, Ogdensburg, NY 13669-0491; 800-871-8158.* Miracle Step, solid-welded aluminum, $35; *Nowlan Distributing, 1515 S. Coeur D'Alene St. #265, Rathdrum, ID 83858; 208-687-2641.* Shur-foot standard, $130 per set; *Problem Solvers Inc., 48 Purnell Pl., Manchester, CT 06040-5412; 888-748-7366.* Level-Master with steel swivel shoe #80-2, $123.75; *Werner Co.* Handy Junior ladder bracket #4003, $43.30; *Roofing Tools & Equipment Co., 3710 Weaver Rd., Wilson, NC 27893; 800-682-6906.* Stabilizer #96, aluminum, $36.56; *Werner Co.*

Our thanks to: Manhattan Ladder Co., *122 Woodworth Ave., Yonkers, NY 10702; 718-721-3352.*

STUD GUNS *pp. 39-41*

Guns: Model 70, single-pin, single load, *ITW Ramset/Red Head, 1300 N. Michael Dr., Wood Dale, IL 60191; 800-889-7890.* Masterset 1, single-pin, single-load, $450; *Masterset Fastening Systems, 4130 N. Englewood Dr., Indianapolis, IN 46226-5058; 800-736-4078.* #DX-A41 with X-AM72 magazine, $759; *Hilti, 5400 S. 122nd East Ave., Tulsa, OK 74146; 800-879-8000.*



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Pins: #X-EDNI, from ⅝ in. to ⅞ in., steel, $47-$51 per 100; *Hilti.* #X-CR, from 1⅛ in. to 2⅛ in., corrosion-resistant, $115.75-$159.75 per 100; *Hilti.* #X-RE, 1-in. removable fastener, $59 per 100; *Hilti.* **Studs:** #W6-11, ¼-in., zinc-coated, $61-$69 per 100; *Hilti.* **Pin clip:** thin-wall conduit clip with premounted pin, from ½ in. to 1 in., $52-$70 per 100; *Hilti.* **Collated pins:** #X-ZF, standard concrete with boosters, from 1 in. to 2½ in., $415-$470 per 1,000; *Hilti.* **Single-catridge strips:** #00050317, .27 cal. long single, $33; #00004839, .27 cal. short strip cartridge, $31; *Hilti.* **Roof fastener:** #XIR, with oval washer, $165 per 200; *Hilti.*

For more information: Powder Actuated Tool Manufacturers' Institute, *1603 Boonslick Rd., St. Charles, MO 63301-2244; 314-947-6610.*

Our thanks to: Ray Linnell, sales manager, *Renner Tool & Supply Co., 305 Freeport St., Dorchester, MA 02122; 617-436-8045.*

GLASS BLOCK *pp. 44-48*

Note: The following are contractors' prices. All measurements are approximate conversions from metric.

Point (p. 44): 4½ by 4½ by 3⅛ in., $3.50; *Glass Blocks Unlimited Inc., 126 E. 16th St., Costa Mesa, CA 92627-3652; 800-992-9938.* **Decora LX transluscent:** 8 by 8 by 4 in., $5.60; *Pittsburgh Corning Corp., 800 Presque Isle Dr., Pittsburgh, PA 15239; 800-624-2120.* **Vistabrik solid glass:** 8 by 8 by 3 in., $19.50; *Pittsburgh Corning Corp.* **Patterns (left to right):** Weck Regent, 8 by 8 by 4 in., $3.50; *Glashaus Inc., 415 W. Golf Rd., Suite 13, Arlington Heights, IL 60005; 847-640-6910.* Diadem, 8 by 8 by 3 in., $5.75; Star, 10 by 10 by 3 in., $9.25; Mosaic, 8 by 8 by 3 in., $5.75; *International Glass Block Masonry, 1316 E. Slauson Ave., Los Angeles, CA 90011; 213-585-6368.* Argus, 8 by 8 by 4 in., $4; *Pittsburgh Corning Corp.* Weck Spray, 8 by 8 by 4 in., $3.50; *Glashaus Inc.* **Colors (left to right):** Blue frosted, 10 by 10 by 3 in., $13.35; *New High Glass Inc., 12713 SW 125th Ave., Miami, FL 33186; 800-452-7787.* Weck Nubio Green, 8 by 8 by 3 in., $3.40; *Glashaus Inc.* Weck Nubio Goldtone, 8 by 8 by 3 in., $3.40; *Glashaus Inc.* Blue cloud, 8 by 8 by 3 in., $6; *International Glass Block Masonry.* Pink frosted, 8 by 8 by 3 in., $7.90; *New High Glass.* **Shapes (left to right):** Isoceles triangle, 7 by 7 by 10 in., $28; *Glass Blocks Unlimited.* Hedron 8-in. corner, $13.17; *Pittsburgh Corning Corp.* Brick rectangle, 3 by 4 by 7 in., $5.34; *New High Glass.* Weck Nubio, 8-in. corner, $10.95; *Glashaus Inc.* Weck All-bend finished top, 8 in., $8.25; *Glashaus Inc.* EndBlock finished double end, 8 by 8 by 4 in., $13.17; *Pittsburgh Corning Corp.*

Directory

Our thanks to: Norbert Kunz, president, and Warren Wind, vice president, *Glashaus Inc.* Herman Ramos, *Eastern Glass Block Corp.* Chris Patterson, *Strictly Glass Block, 8874 SW 62nd Terrace, Miami, FL 33173; 305-279-6040.*

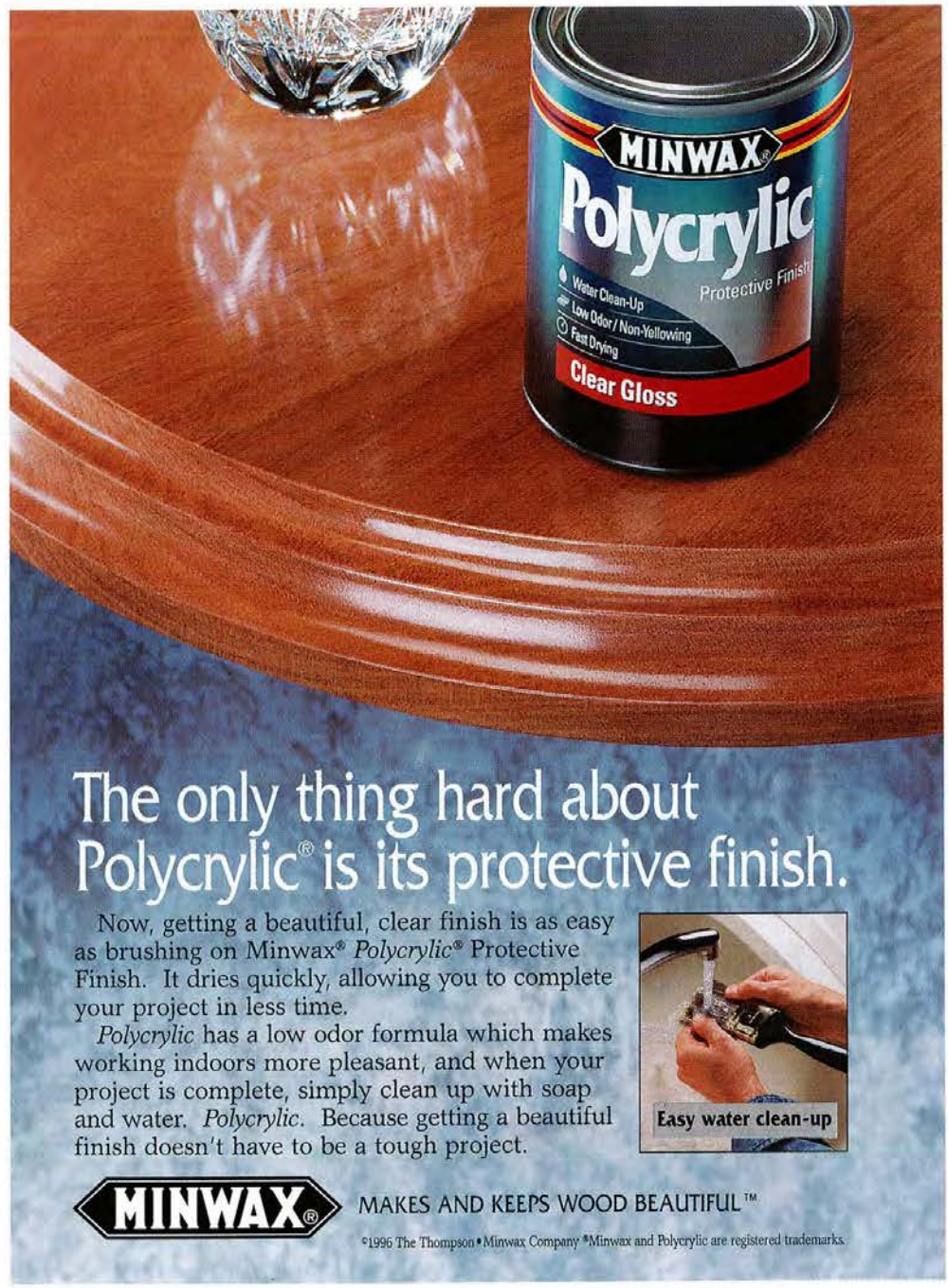
SHINGLING *pp. 51-54*

Cedar: Western red cedar, Eastern white cedar, Alaska yellow cedar, red cedar shake, *Liberty Cedar, 535 Liberty Lane, West Kingston, RI 02829; 800-882-3327.* **Redwood:** *Amarant Wood Products, 4935 Boyd Rd., Box 1008, Arcata, CA 95518; 707-822-4849.*

For more information: Red cedar: Cedar Shake & Shingle Bureau, *515 116th Ave. NE, Suite 275, Bellevue, WA 98004; 206-453-1323.* **White cedar:** *Québec Lumber Manufacturers' Association, 5055 W. Hamel Blvd. Suite 200, Québec, Canada G2E 2G6; 418-872-5610.* **Shingles used on Nantucket project:** *Maibec Industries Inc., 660 Rue Lenoir, Sainte-Foy, Québec, Canada G1X 3W3; 800-363-1930.*

FINANCES *pp. 56-57*

For more information: Loantech, *Box 3635, Gaithersburg, MD 20885; 301-762-7700.* The Mortgage Counselor, *Box 493, Needham, MA 02192; 617-444-1477.* Mortgage Monitor, *American Homeowners Association, 1372 Summer St., Stamford, CT 06905; 800-283-4887.*



RAISING ARIZONA *pp. 62-69*

Architect: Alexandra Hayes, *345 W. Toole Ave., Suite 202, Tucson, AZ 85701; 520-629-9752.*
General contractor: John McCaleb, *McCaleb & Co. Inc., 2100 N. Wilmot Rd., Suite 102, Tucson, AZ 85712; 520-722-2910.*
Our thanks to: Stephen Buchmann, entomologist, *USDA-ARS, Carl Hayden Bee Research Center, 2000 E. Allen Rd., Tucson, AZ 85719; http://gears.tucson.ars.ag.gov/*

Directory

ADOBE *pp. 70-75*

Cement-stabilized adobe blocks: 56-98 cents ea.; *Tucson Adobe West, 15200 W. Avra Valley Rd., Marana, AZ 85653; 520-682-2874.* **Weatherproof coating:** Weather Seal #201-GP, 5 gal., $54.75; *Prosoco Inc., Box 1578, Kansas City, KS 66117; 913-281-2700.*

Further reading: *Adobe: Build It Yourself, 2nd ed.*, by Paul Graham McHenry, 1985, 158 pp., $22.95; *University of Arizona Press, 1230 N. Park Ave., Suite 102, Tucson, AZ 85719; 800-426-3797.*

Our thanks to: Michael Keith, general contractor, *Contemporary West Development Inc., 3955 E. Camino De Palmas, Tucson, AZ 85711; 520-881-6944.* Eric Means, mason and general contractor, *Means Design & Building Corp., 1350 E. Paseo Pavon, Tucson, AZ 85718; 520-297-5111.* Bob Vint, principal architect, *Bob Vint & Associates, 160 S. Scott Ave., Tucson, AZ 85702; 520-882-5232.* Arnold Belasco, *Belasco Electric, 7325 N. Juniper, Tucson, AZ 85741; 520-744-1195.*

MOUNT VERNON *pp. 76-83*

George Washington's Mount Vernon Estate & Gardens, *Box 110, Mount Vernon, VA 22121; 703-799-8607; http://www.mountvernon.org.*

Further reading: *A Field Guide to American Houses,* by Virginia and Lee McAlester, 1984, 525 pp., $21.95; *Alfred A. Knopf, New York; 800-726-0600.*

Our thanks to: The Mount Vernon Ladies' Association and James C. Rees, director, and Sally A. McDonough, manager of media relations, *Mount Vernon Estate and Gardens.*

WET BASEMENT *pp. 84-89*

Waterproofing: U.S. Basement Waterproofing Inc., *59 Pleasantville Rd.,*

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Pleasantville, NY 10570; 800-992-5325. John J. Annunziata, civil engineer, *24 Chesley Rd., White Plains, NY 10605; 914-949-0270.*

Hydraulic cement: Drylock Fast Plug, $11 per 10 lb. bag; *United Gilsonite Labs (UGL), Box 70, Scranton, PA 18501-0070; 800-272-3235;* Waterplug, $12 per 10 lbs., *Harris Specialty Chemicals, 10245 Centurion Pkwy., Jacksonville, FL 32256; 800-327-1570.*

For more information: For a listing of licensed home inspectors in your area and a free pamphlet, "Wet Basements and Crawl Spaces," send a s.a.s.e. to *American Society of Home Inspectors, Box 95588, Palatine, IL 60095-0588; fax 800-290-1959.*

LOCKSMITH *pp. 90-97*

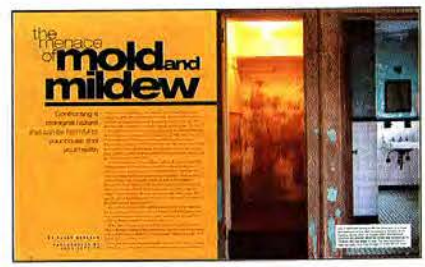
Locksmith: Robert Dix, *8468 Cooper Lane, Mentor, OH 44060.*

For more information: Lock Museum of America Inc., open Tuesday-Sunday, May-October (museum brochure includes book and video mail-order form); *230 Main St., Box 104, Terryville, CT 06786-0104; 860-589-6359.*

Further reading: American Lock Collectors Association Newsletter, $16 annual subscription (6 issues); *36076 Grennada St., Livonia, MI 48154; 313-522-0920. The Padlock Collector,* by Franklin M. Arnall, 6th ed., 1996, $21.95; *The Collector, Box 253, Claremont, CA 91711.*

Our thanks to: Thomas Hennessy, curator, *Lock Museum of America.* Charles W. Chandler, publisher, *American Lock Collectors Association Newsletter.*

MOLD AND MILDEW *pp. 98-103*



HEPA vacuum: Nilfisk #GS-90, $684; *Nilfisk of America Inc., 300 Technology Dr., Malvern, PA 19355; 800-645-3475.* **Mold inspectors:** Pure Air Control Inc., *4911 Creekside Dr., Suite C, Clearwater, FL 34620; 800-422-7873.* Jeffrey C. May, *1522 Cambridge St., Cambridge, MA 02139; 617-354-0152; http://www.cybercom.net/~jmhi.* Micro Ecologies Inc., *141 E. 61st St., 2nd fl., New York, NY 10021; 212-755-3265.* **Air-quality testing:** Air Quality Sciences, *1337 Capital Circle, Atlanta, GA 30067; 800-789-0419.*

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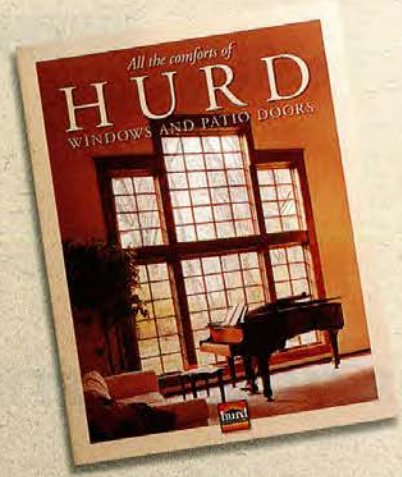

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Microscopic photography: MicroCoating Technologies, *430 Tenth St. NW, Suite N-108, Atlanta, GA 30318; 404-249-7001, fax 404-249-1719.*

For more information: National Air Duct Cleaners Association, *1518 K St. NW, Washington, DC 20005; 202-737-2926; http://www.nadca.com.* The Institute of Food & Agricultural Sciences of the University of Florida Moisture and Mildew Web site, *http://hammock.ifas.ufl.edu/txt/fairs/47212.*

Further reading: "Clean-up Procedures for Mold in Houses," Canada Mortgage & Housing Corp., 1993, 32 pp., $2 (plus $2 shipping and handling); *CHMC Publications, Box 3077, Markham, Ontario, Canada L3R 6G4; 416-282-2950.* "The Inside Story: A Guide to Indoor-Air Quality," *EPA, IAQ Information Clearinghouse, Box 37133, Washington, DC 20013-7133; 800-438-4318.*

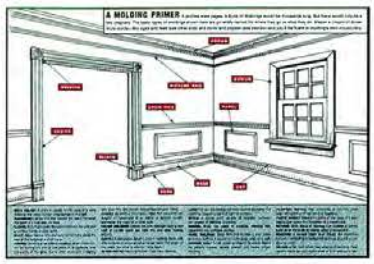
MOLDING POSTER *p. 104*

Molding samples provided by: Center Lumber Co., *85 Fulton St., Box 2242, Paterson, NJ 07509; 201-742-8300, fax 201-742-8303.* Conway Hardwood Products, *37 Gaylord Rd., Gaylordsville, CT 06755; 800-828-9844.*

Mail-order molding suppliers: Forester Molding & Lumber Co. Inc., *152 Hamilton St., Leominster, MA 01453; 508-840-3100.* Tart Custom Millwork, *22145 Shaw Rd., Sterling, VA 20166; 703-450-6464.* The Millwork Store, *Rte. 4, Box 427A, Martinsburg, WV 25401; 800-670-6455; http://www.millworkstore.com.* Carr Lumber & Mfg. Co., *6601 S. Central Ave., Bedford Park, IL 60638-6399; 708-458-4100, fax 708-458-8992.* Maurer & Shepherd Joyners Inc., *122 Naubuc Ave., Glastonbury, CT 06033; 860-633-2383.* Pennsylvania Molding & Millwork Co. Inc., *Box 975, Pottstown, PA 19464;*

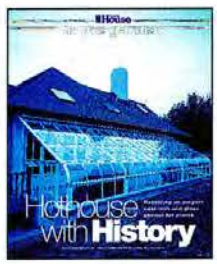
Directory

800-537-9039. Milton W. Bosley Co. Inc., *Box 576, Glen Burnie, MD 21060; 800-638-5010, fax 800-553-0575.* Alexandria Molding, *95 Lochiel St. E., Alexandria, Ontario, Canada K0C 1A0; 800-841-8746.* Select Millwork Co., *383 East D Ave., Kalamazoo, MI 49004; 616-349-7841.*



For more information: Wood Molding & Millwork Producers Association, *Box 25278, Portland, OR 97225; 503-292-9288.*

GREENHOUSE *pp. 105-108*



Greenhouse builder: Mark Ward, Ward Greenhouses, *345 Lexington Rd., Concord, MA 01742; 508-369-1354.*

For more information: Hobby Greenhouse Association, membership includes quarterly newsletter and magazine, seed exchange, discount books, access to experts and library privileges, $15 annual dues; *8 Glen Terrace, Bedford, MA 01730-2048; 617-275-0377.*

Further reading: *Greenhouse Gardener's Companion,* Shane Smith, 1992, 544 pp., $19.95; *Fulcrum Publishing Inc., 350 Indiana St., Suite 350, Golden, CO 80401-5093; 800-992-2908. The Book of the Conservatory,* by Peter Marston, 1992, 176 pp., $19.95; *Weidenfeld & Nicolson, London, England; available from Trafalgar Square, Box 257, N. Pomfret, VT 05053; 800-423-4525.*

PAY DIRT *p. 109*

Carnivorous plants: California Carnivores, *7020 Trenton-Healdsburg Rd., Forestville, CA 95436; 707-838-1630, Web site http://spiderweb.com/carnivore/.*

Corn gluten meal: A-Maizing Lawn, #8832, 50-lb. bag (covers 2,500 square feet), $39.95; *Gardens Alive!, 5100 Schenley Pl., Lawrenceburg, IN 47025; 812-537-8650.* **Conventional pre-emergent herbicide:** Garden Clean, 20-lb. bag (covers 2,500 square feet), $18.95; *Rosedale Nursery, 51 Saw Mill River Rd., Hawthorne, NY 10532; 914-769-1300.*

Neighborhood arboretum: Michael Hayman, *2548 Seneca Dr., Louisville, KY 40205; 502-459-1130.*

Root cutter: Takagi Root Cutter #10-5206, $16; *Takagi Tools Inc., 337-A Figueroa St., Wilmington, CA 90744; 310-513-1113, fax 310-513-2199, E-mail: sharksaw@aol.com.*

Early spring: "Increased Activity of Northern Vegetation Inferred from Atmospheric CO2 Measurements," (a study by the Carbon Dioxide Research Group) by C.D. Keeling, J.F.S. Chin and T.P. Whorf, *Nature, July 11, 1996 (vol. 382); Scripps Institution of Oceanography, La Jolla, CA 92093-0220; 619-534-3624.* "Reporting on Climate Change: Understanding the Science," publication #39013-0000, 1994, 156 pp., $11.95; *National Safety Council, Box 558, Itasca, IL 60143-0558; 800-621-7619.*

GARDEN CARTS *pp. 110-111*

Wheelbarrow: Ames Black Beauty Barrow #495WH, $120.21; *A.M. Leonard Inc., 241 Fox Dr., Box 816, Piqua, OH 45356; 800-543-8955.*

Tilt cart: RubberMaid Standard Tilt Truck #61524WW, plastic, max. cap. 1 cub. yd., 1,000 lbs., $748.12; *Consolidated Plastics Co., 8181 Darrow*

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Rd., Twinsburg, OH 44087; 800-362-1000. Muller's Smart Cart, plastic, max. cap. 600 lbs., $279-$289; *True Engineering Inc., 999 Roosevelt Trail, Windham, ME 04062; 800-366-6026.*

Folding carts: Kart Ahoy, #11200, plastic, max. cap. 2.2 cub. ft., 100 lbs., $41.95; *International Products Co., 4175 22 Mile Rd., Utica, MI 48317; 800-458-6995.* Foldit Utility Cart: aluminum, max. cap. 5.75 cub. ft., 330 lbs., $221; *Tipke Manufacturing Co. Inc., 321 N. Helena St., Spokane, WA 99202; 509-534-5336.*

SAVE THIS OLD HOUSE ***p. 144***

For more information: Wisconsin Barn Preservation Initiative, *646 W. Washington Ave., Madison, WI 53703; 608-255-0348, Web site http://www.uwex.edu/lgc/barns/barns.htm.*

Further reading: *Stories from the Round Barn* by Jacqueline Dougan Jackson, fall 1997, *Northwestern University Press, 625 Colfax St., Evanston, IL 60208; 800-621-2736 (orders).*

Our thanks to: Lloyd Hornbostel, Jr., *South Beloit Historical Society, South Beloit, IL 61080.* Brian Pionke, planning assistant, *city of Beloit, Beloit, WI 53511.*

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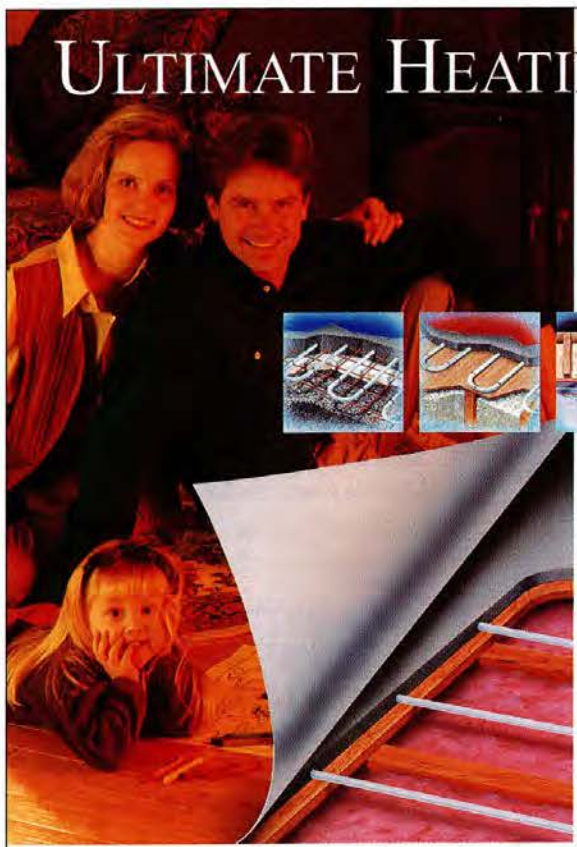

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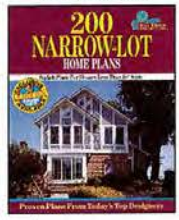

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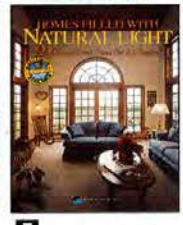

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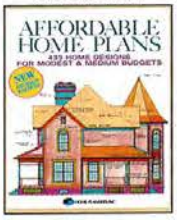

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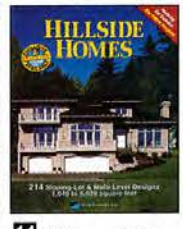

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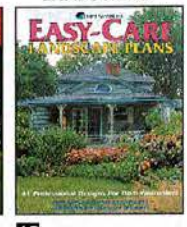

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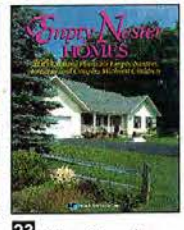

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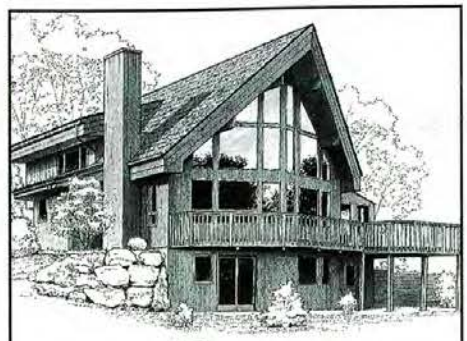

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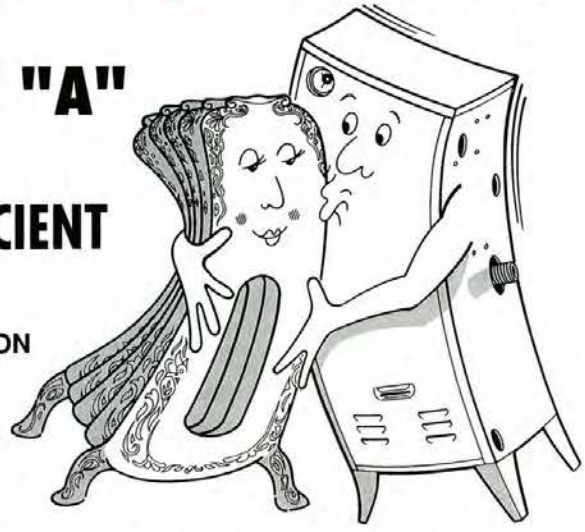

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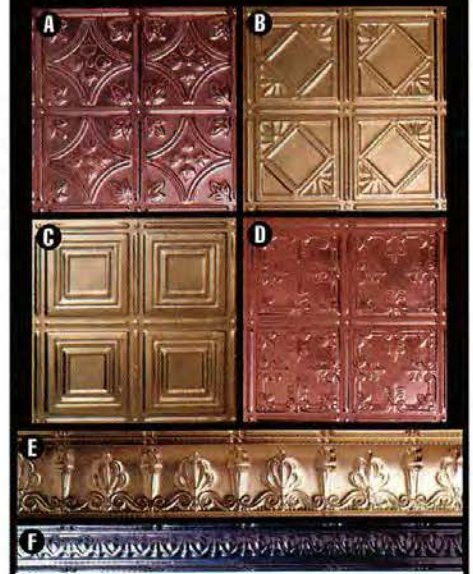

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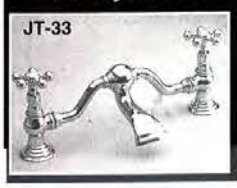

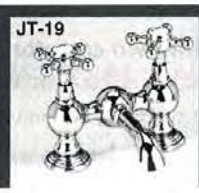

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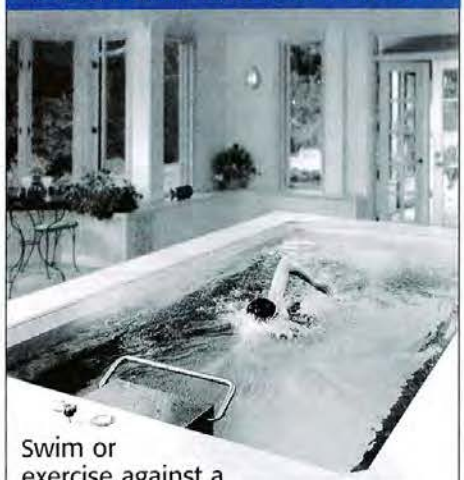

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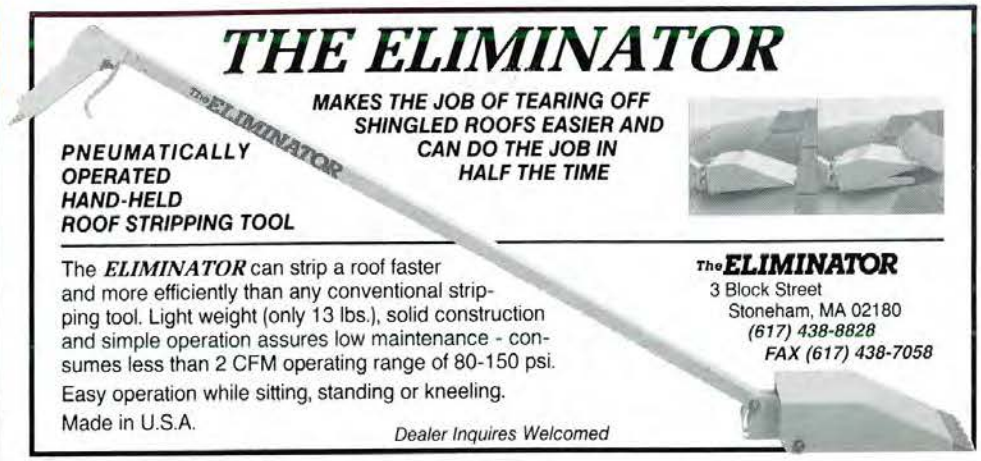

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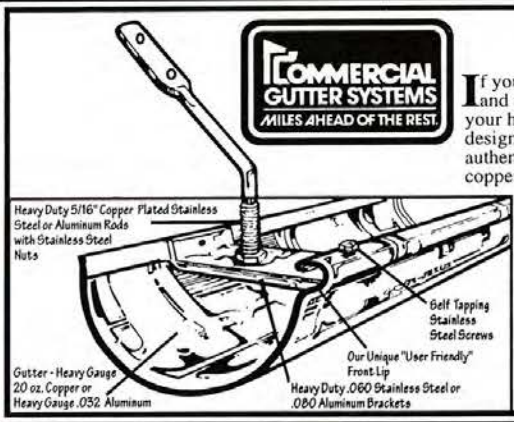

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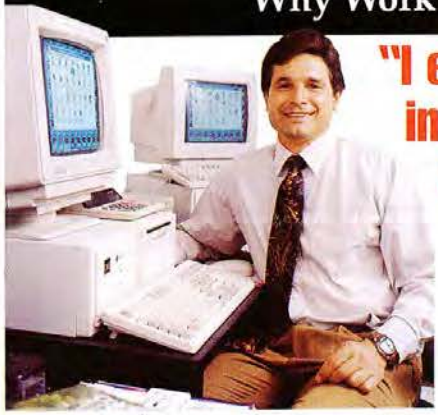

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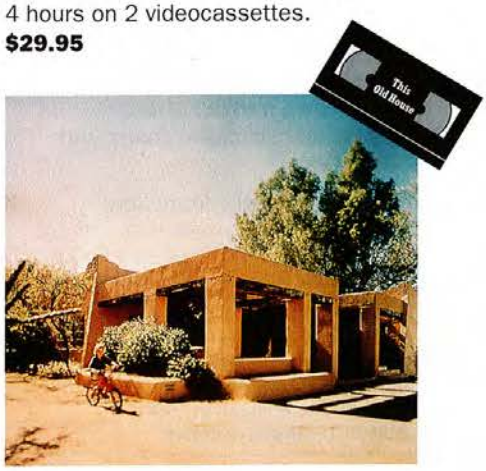

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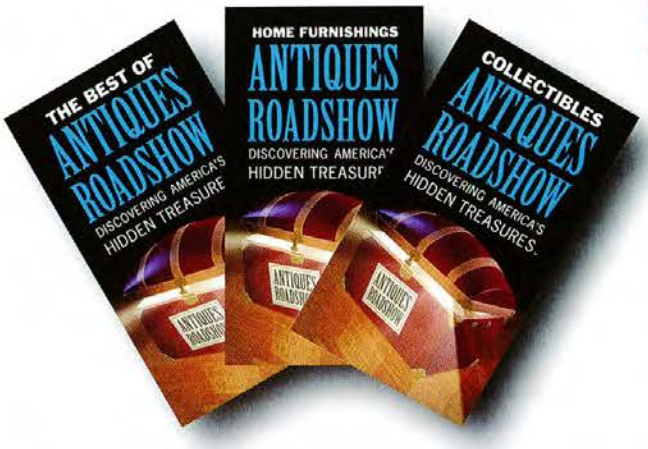

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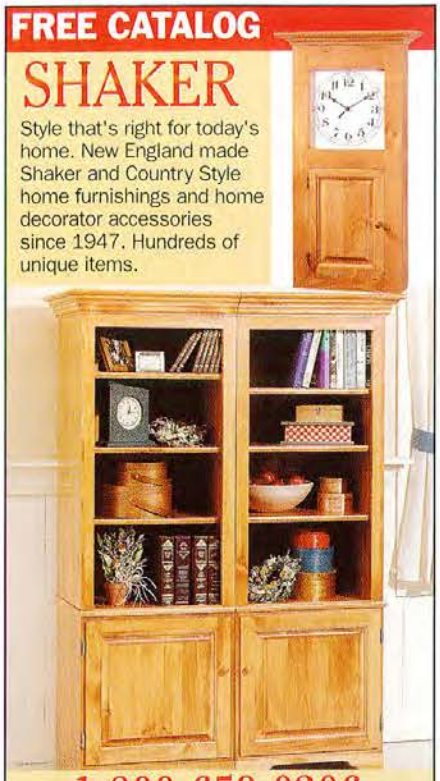

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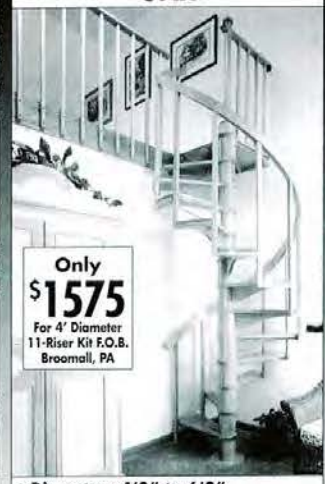

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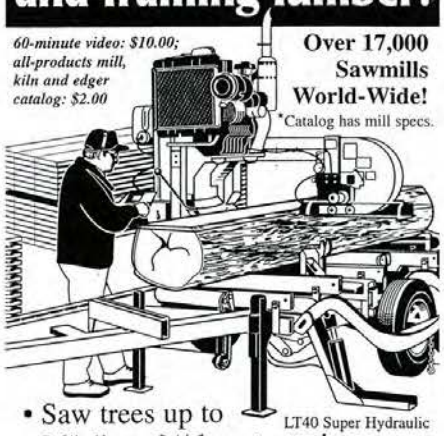

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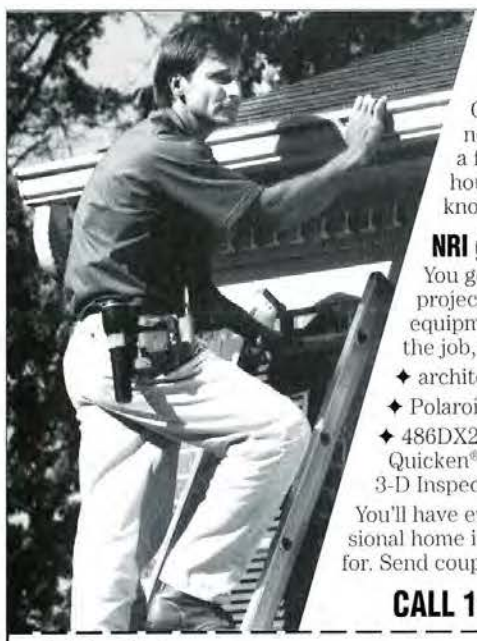

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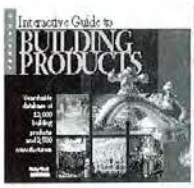

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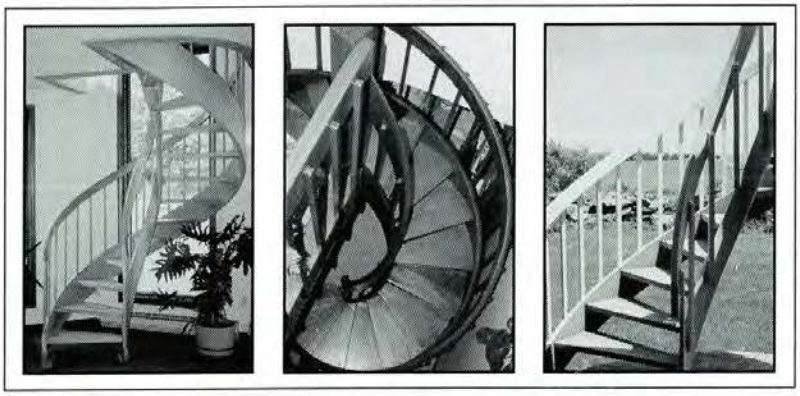

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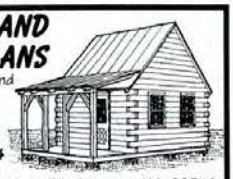

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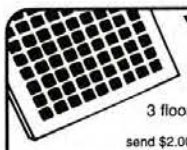

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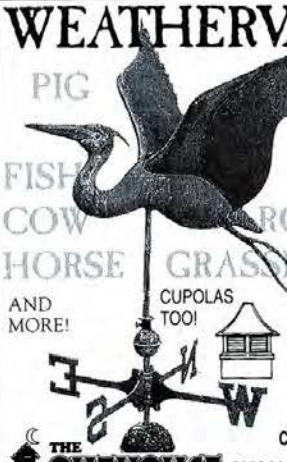

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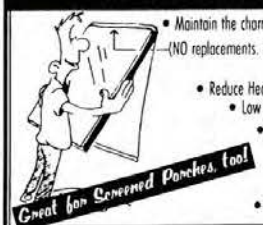

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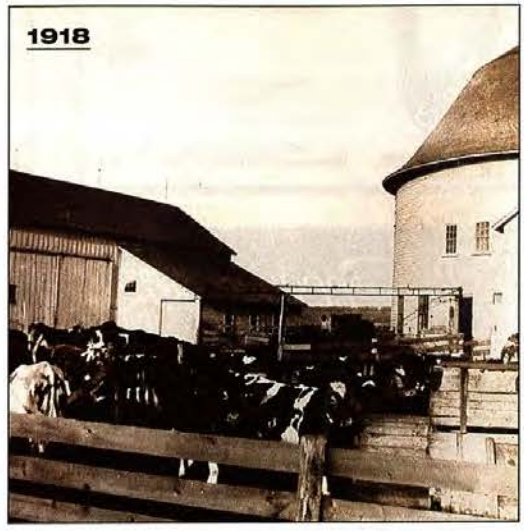

The Dougan barn, anchored by a 14-foot-diameter concrete silo, center, was framed entirely with 2x6s. When it was a working dairy, right, feed drained from the silo to the 42 milking stalls. To move the building, the silo will have to be cut into sections.

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LOCATION

Colley Road, Beloit, Wisconsin

The Dougan Round Barn is an object lesson in the plight of the Midwestern farm. When it was built in 1911, it was an innovative design: Compared with traditional barns, the circular floor plan could hold more milking cows and was easier to clean. It was here, in 1931, that an enterprising farmhand invented the Korn Kurl, the first of many corn edibles that established Beloit as the snack-food capital of the United States. But the completion of nearby Interstate 90 increased land values enough to make development more attractive than dairy farming and in 1971 the farm was closed and sold. Now an industrial park is scheduled to be built on its 110 acres, and the 60-foot-diameter, 60-foot-high barn, which is on the National Register of Historic Places, must be relocated. Last November, after years of neglect, it was condemned and slated for demolition, but the city has held off in hopes of finding someone to give it a new home and a new purpose. Moving and re-erecting the barn in the same area would cost about $50,000. The owner has offered to contribute to moving costs, and purchasers can also get help from the Wisconsin Barn Preservation Initiative, which offers information on barn conversions. A less desirable outcome—dismantling the structure—would still be better than demolition and disposal: The old barn would yield as much as 3,000 board feet of lumber and siding.

CONTACT

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Beloit, WI 53511
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