

The Basics of PLASTER REPAIR

by Patricia Poore

Water damage from plumbing leak

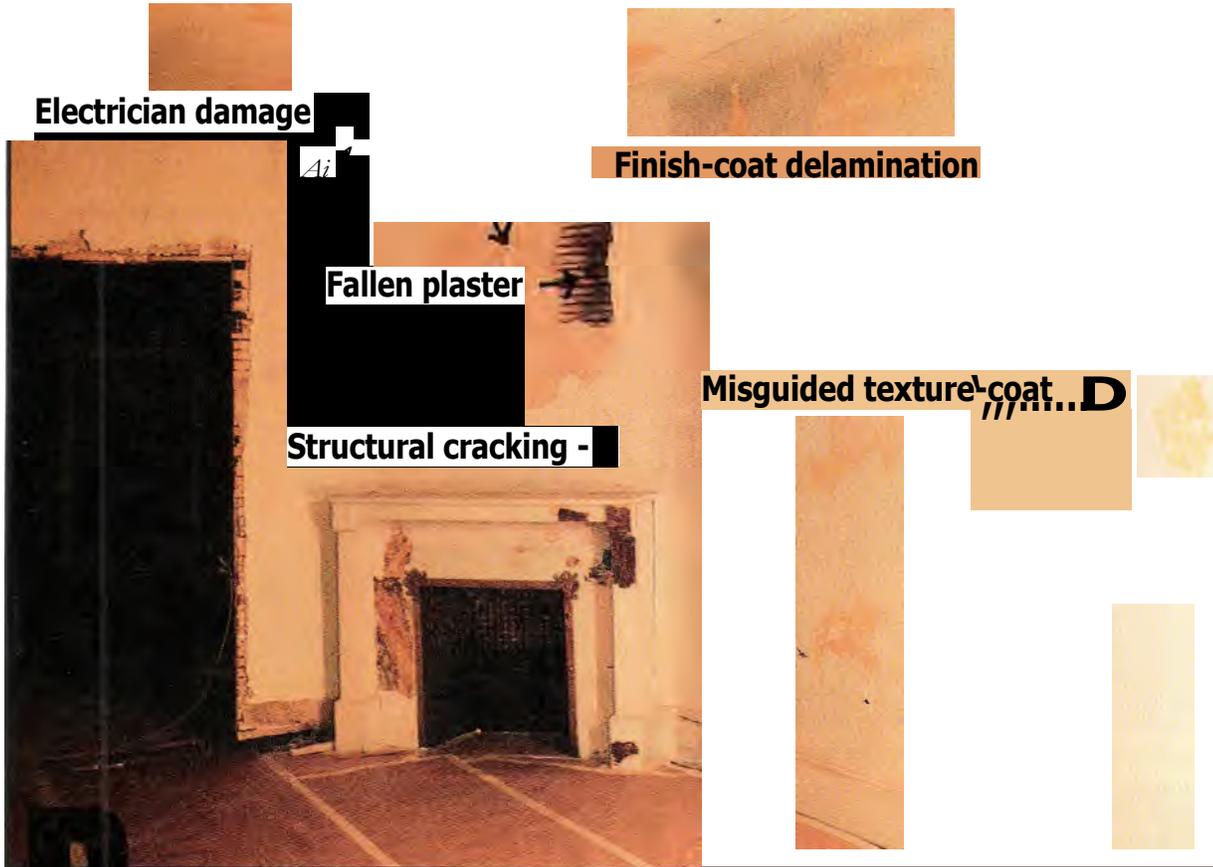
Electrician damage

Finish-coat delamination

Fallen plaster

Structural cracking -

Misguided texture-coat



Plaster technology and techniques would fill a big textbook. My purpose here is to explain what plaster is and why it fails, and to outline your options in dealing with problems. Throughout, I'll assume that 50% of your plaster is salvageable; in other words, we're talking about patching and repair, not demolition and replacement.

Reading this article won't make you a plasterer. Big jobs, especially, require a lot of practice working with the materials. But I think you'll be convinced that plaster is usually salvageable using simple, inexpensive techniques. Even if you're already an experienced taper or patch-plasterer, a few of the tricks or products described in this article may be news to you. And the Plastering Glossary that appears on page 34 clears up confused vocabulary for all of us.

WHAT IS PLASTER?

In old houses, plaster is most often a three-coat system of lime- or gypsum-based, trowellable mortar that was applied wet over wood lath strips. The first two coats contain sand (and perhaps animal hair); the finish coat is thinner and contains no aggregate or binder. The base coat of plaster has a mechanical and adhesive bond to the lath: *mechanical* through keys, or hardened slumps of plaster that went through the spaces between lathing strips; *adhesive* by virtue of suction created between the wood lath and wet plaster.

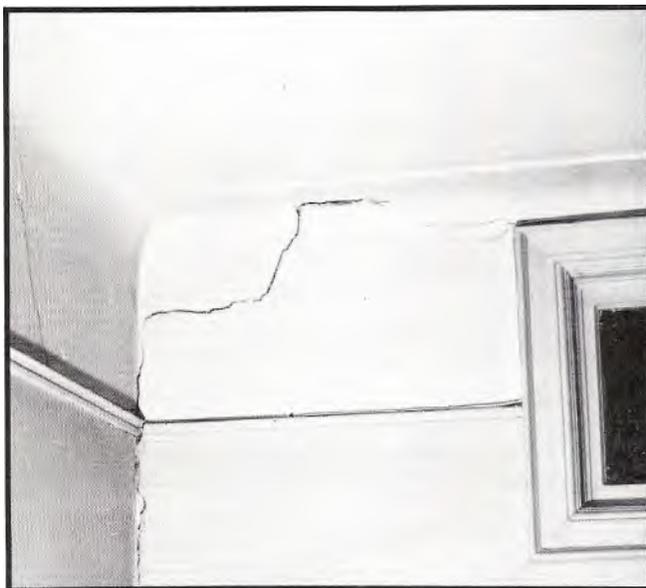
Obviously, plaster can fail because of imperfections in the material itself, or because of stresses in or failure of the structural system that supports it (house framing, studs, lath).



Patching cracks is time-consuming



but if you tape them, they won't come back.



Settlement cracks to be patch plastered and taped.

CRACKS

Hairline cracks are no threat to the integrity of the wall or ceiling, but you'll want to patch them before painting. Open the crack with the point of a can opener or a putty knife, and fill it with spackling compound. Cracks may be cyclical — opening and closing with seasonal variation in humidity which causes the lath to swell and shrink. In that case, it's best to not "spackle" them with rigid plaster. Instead, bed fiberglass tape in joint compound and feather over with more compound.

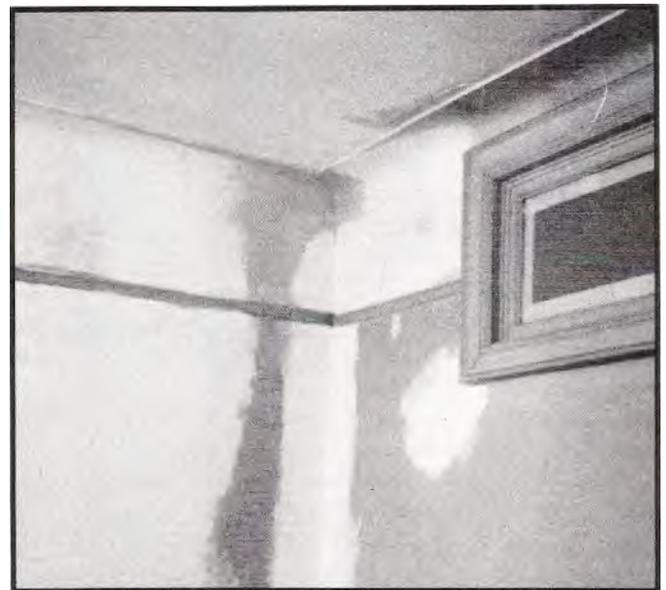
Structural cracks or large cracks usually happen early in the building's life. Dig them out, undercutting slightly to provide a key for the patch plaster. Vacuum out all debris. Patch with the appropriate patching plaster, finish with a layer of compound, sand or sponge, and prime.

canvassing

Wall canvas or modern substitutes are used to line plaster walls before they are painted or papered. (Order it through wallpaper stores.) Decorative painters in the past used to canvas walls before stencilling to protect the fancy painting from hairline cracks. You can use it over patched walls or ceilings, as long as the plaster is basically sound. It's a good way to resurface if you've got less-than-perfect patches, lots of hairline cracks, uneven paint layers, or other minor imperfections. Canvas can't bridge holes or disguise badly uneven patches, however, so do your stabilizing, taping, and patching first.

plaster washers

Plaster washers, also called repair discs or ceiling buttons, are an old-fashioned fix for pulling sound plaster back up to lath (when the keys have broken), or for pulling plaster and lath back to the studs or joists. They are used in conjunction with flat-head wood screws or drywall screws, and are subsequently covered with joint compound. They're



The same corner after patching.

useful for securing areas of sound plaster before you remove damaged plaster nearby.

Even bowed plaster can be saved by anchoring it with plaster washers. The plaster itself must have integrity — it can't be crumbly or soft due to water damage. If the plaster-and-lath assembly together has separated from the structure, long wood screws can be used to go through the lath and into studs or joists.

Plaster washers may be hard to find. We know of two companies that will ship them to you via mail-order: Charles St. Supply Co., 54 Charles St., Dept. OHJ, Boston, MA 02114; Fastenation, PO Box 1364, Dept. OHJ, Marblehead, MA 01945.

PATCHING HOLES

In the middle photo at right, an area of missing plaster was patched with traditional three-coat plaster (more on this later). Another method for patching holes larger than four inches square is to use drywall as a base material, as in the bottom photo. This method is usually easier for non-plasterers — you don't have to buy and mix and trowel traditional plastering materials. Areas of bad plaster are removed. Then the hole is squared up so that a neat patch can be cut from drywall to fit the hole. Cut the plaster back to studs or joists so you have something to screw the drywall to.

The drywall might have to be shimmed to bring it up to the surface of the surrounding plaster. The gap between patch and plaster is treated just like a Sheetrock seam: taped and finished with joint compound. You can skim the entire patch with compound, too, if necessary to level it or impart a trowelled finish texture. All patches, taped cracks, and skimmed areas *must* be primed before painting.

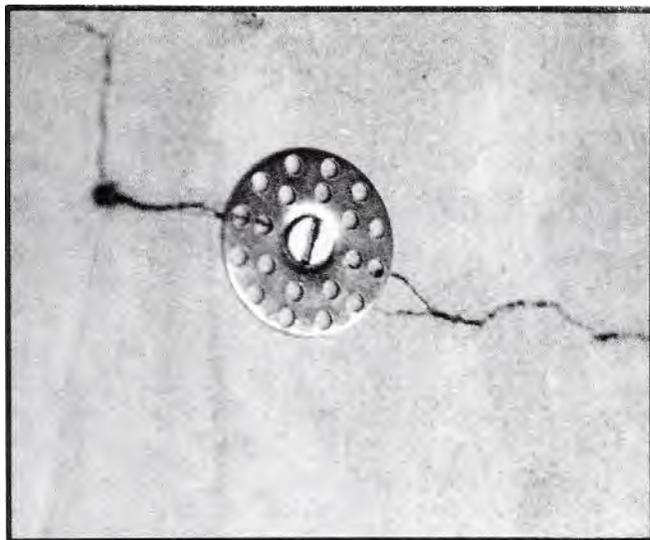
secret of the screw gun

A screw gun comes in handy for installing both plaster washers and drywall patches. By the time you bang nails into the drywall, the surrounding plaster will have cracked and crumbled further. And debris caught behind the patch will keep it from laying flat. A screw gun is an electric screwdriver with a retractable sleeve that controls the screw depth. It's fast, and the depth adjustment allows every screw to be countersunk just below the surface of the drywall without breaking the paper face. But its greatest advantage in patch plastering is that it avoids the hammer impact that would damage fragile plaster.

patch plastering

The alternative to the drywall patch is patch plastering. For holes less than four inches in diameter, fill to not-quite-level with Structo-lite or patching plaster, and finish (skim) with joint compound.

Larger holes down to the lath will probably require three coats. For the scratch and brown coats, use Structo-lite Regular (USG's perlited gypsum plaster) or the equivalent. The top or finish coat is finish lime mixed with gauging plaster. (Refer to a very detailed article on how to patch



John O. Curtis

A plaster washer draws cracked plaster to the lath.



John O. Curtis

Washers secure the remaining old plaster around a hole that has been patched.



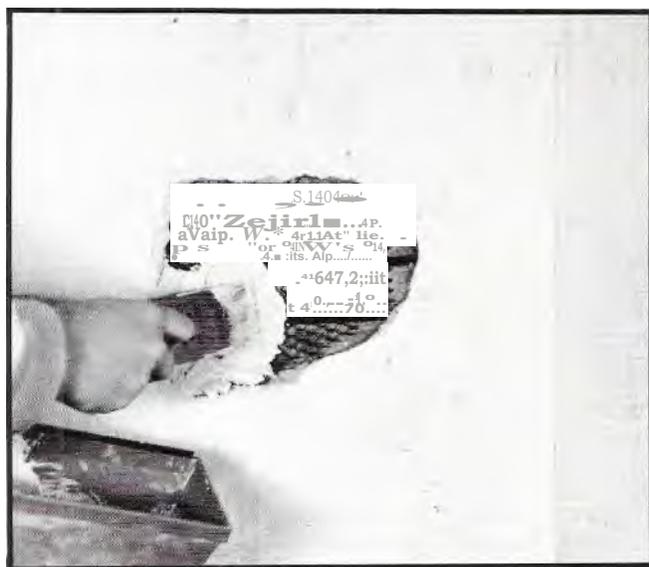
When large chunks of plaster are missing, drywall patches can be used as a base.



Paint and plaster failure from water penetration.



Raw materials and tools of the trade.



Metal lath has been tied over wood lath to provide reliable keying of the patch plaster.

plaster in the July-August 1986 issue of OHJ)

Remove damaged plaster very carefully. You can't just bang it out unless you were intending to remove the whole wall and whatever is on the other side of it. Cut it with a chisel and pull it away with your hands, using a prybar gently. Anchor salvageable surrounding plaster with washers as described previously. Resecure loose lath to the studs or joists, predrilling to avoid splitting lath. Vacuum out all debris. We suggest installing metal lath over the wood lath before patching with plaster: this makes the patch less likely to fail.

FINISH-COAT FAILURE

Buckling or delamination of the finish coat of plaster is a common problem in old houses. It can occur because of a bad original bond between the brown coat and the finish coat. Problems in the manufacture of the raw materials, or with the on-site mixing, application, or humidity, may have interfered with the chemical reaction that causes the plaster to cure.

If failure is limited to small areas, joint compound (the restorer's best friend) can be used. Just be sure to remove all areas of loose finish coat, because it *will* fail. If delamination is extensive, it makes more sense to replaster the finish coat; call in a plasterer unless you're willing to invest some time in learning the skill yourself.

DAMP WALLS, WATER DAMAGE

Plaster that was merely stained by a short-term water leak in the past can be sealed with shellac or a shellac-based primer. But if the plaster lost its integrity (becoming bowed and crumbly), it probably is unsalvageable. Remove only the damaged section, of course. Anchor edges of remaining sound plaster, and patch.

Plaster badly damaged by water effloresces. The dry powdery bubbles are salts in the plaster brought to the surface by the water. If it's minor, the efflorescence can be brushed away and the plaster sealed with shellac before painting. More often, efflorescence is not a good sign. Water-damaged plaster will not hold paint and, worse, it will eventually fall.

TEXTURE-FINISH REMOVAL

Textured wall finishes were popular from about 1920 to the late '30s. They're often attractive, in good shape, and part of the character of the house. Then there's the overdone texture finish, sloppily applied and now failing in areas, which was part of a "modernization" of an older house. If you want to remove this stuff, you're in for a lot of work.

Simple scraping with a putty knife or old chisel may remove much of the finish. A rented wallpaper steamer further breaks the bond of texture to original plaster, making it easier to scrape. If you get most but not quite all of it off, skim the wall with joint compound. Two thin coats, applied at right angles, is best. Warning: A later texture

finish may have been a last-ditch attempt to "rescue" failing plaster, and when you scrape it off, the underlying plaster (finish coat or more) may come with it. Oh well ... better you know now.

STARTING OVER

What if you find your plaster ceiling or walls are unsalvageable? You have three basic options for replacement: real three-coat plaster, drywall, or veneer plaster.

The advantages of real plaster are both aesthetic and practical. Nothing else looks like plaster; the older the building, the more important that look is. Drywall in an eighteenth-century house looks anachronistic. Real plaster has the best insulating and sound-deadening characteristics, too. Don't dismiss the concept of replacing plaster with plaster until you get prices. If you live in a place (usually urban) where you can find a plasterer, plaster may be quite competitive with drywall.

Drywall (Sheetrock) is the usual choice of both do-it-yourselfer and general contractor. The materials are modular; the sheets go up quickly with less mess and disruption than plastering. (Taping takes awhile, however.) Less skill is needed to do an adequate drywall job than plaster, job. On the other hand, only really good tapers can make truly invisible seams. Drywall is perfectly flat and regular (characterless). What makes an old house old is a subtle thing. Let's put it this way: A Sheetrock ceiling in the kitchen or moisture-proof Sheetrock on bathroom walls isn't too much of a compromise. But a whole house with walls of new drywall is a very different animal from the same house with plaster walls. Craftsmanship exists only in the latter.

Veneer plaster is in-between. Here, a real trowelled finish coat of plaster is applied to a prefabricated gypsum-board base. (Sometimes a base coat and finish coat are applied over the gypsum base.) Get prices locally before you decide which way to go.



Bathroom walls and exterior walls are two common sites for plaster failure due to water.



Failing texture finish that will have to be scraped and perhaps steamed.



If the underlying plaster is sound, a chisel can be used to scrape off unwanted texture finish.

Note: The terms used in this craft vat: regionally across the country, and have also been altered by changes in technology and the passage of time. The result is that some definitions have become as plastic as the materials themselves!

■ **Aggregate** — A mass of granulated particles, such as sand and crushed rock. In plastering, aggregates are important 1) to ensure that the applied plaster shrinks uniformly as it hardens, and without excesses that would cause cracking; 2) to form channels for the crystallization of calcium, 3) as fillers for economical purposes. Lightweight aggregates, such as **Vermiculite** and **Perlite**, are increasingly popular because of the improved resiliency, fire resistance, sound deadening, and weight reduction they offer over traditional materials such as sand.

■ **Autoclave Finish Lime** — Double-hydrated lime requiring NO soaking before use: it can be mixed on site and used immediately. Some plasterers feel that Type S (single-hydrated) lime has better workability. Plaster prepared with autoclave lime may be less resistant to environmental moisture (i.e., water leaks).

■ **Base** — Any continuous surface to which plaster can be applied and to which it will cling. A base might be a continuous masonry wall, or **Lath** over structural framing.

■ **Base Beads** (base screeds) — Metal strips, attached to the lath before plastering, that provide a division to work against when troweling plaster that will end at the top edges of base-boards.

■ **Brown Coat** — The rough base coat of plaster used with rock-lath systems. With metal- or wood-lath systems, it is the second application of wet, base-coat plaster.

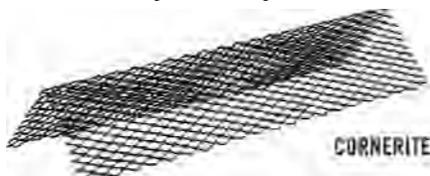
■ **Browning Brush** — Fine-bristled, water-carrying brush used to moisten base coat while working.

■ **Casing Bead** — Metal casing heads are sometimes used around door and window openings. Like a wood **Ground**, they indicate the proper thickness for the plaster.

■ **Cat Faces** — Finish-coat surface imperfections that show up as hollows after **Floating**.

■ **Ceiling Buttons** — See **Plaster Washers**.

■ **Corner Beads** — Wire mesh with a rigid metal spine used on outside corners. Installing the corner bead plumb is important.



■ **Cornerite** — Wire mesh used on inside corners of adjoining walls and ceilings. It keeps corners from cracking.

■ **Darby** — A **Float** with two handles and an extra-long blade, used for further leveling and straightening any of the plaster coats.

■ **Devil's Float** — A wood **Float** with one or two nails protruding in from the sole, used for surfacing the **Brown Coat** after it has dried 24 hours. Scratches left by the nails provide tooth for adhesion of the **Finish Coat**.

■ **Dots** — Small plaster spots placed as depth guides during work on walls and ceilings. They

are plumbed and leveled like **Screeds** to aid in **Rodding** the surface.

■ **Drywall** (wallboard, plasterboard, Sheetrock, gypboard, gyp-rock) — Rigid, insulating hoard of plasterlike material (usually gypsum), covered on both sides with heavy paper. Also, the system of wall surfacing using this material.

■ **Drywall Nail** — Short, heavy nail with large head designed for installing **Drywall**, often ribbed and/or coated for maximum grip into framing.

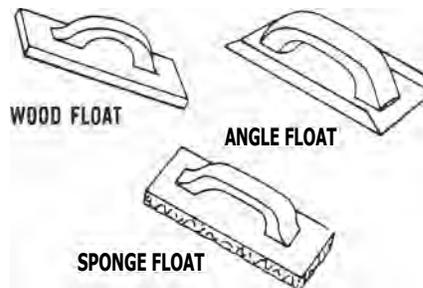
■ **Drywall Screw** — Phillips-type screw fastener designed for power-tool installation of **Drywall**.

■ **Featheredge** — Leveling tool similar to **Rod** except that blade tapers to a sharp edge for cutting in corners and sharp, straight lines.

■ **Finish Coat** — Pure lime, mixed with a little **Gauging Material** (in ratios ranging from 5:1 to 2:1), used for the very thin finish surface of a plaster wall. Fine sand can be added for a sanded finish coat.

■ **Finish Plaster** — Fine, white plaster made from lime putty and gauging plaster.

■ **Finishing Board** — A 5-by-5-ft. **Mortarboard** on which finish-coat lime plaster is hand-mixed.



■ **Float** — Surfacing tool consisting of a flat, short board with a large handle, that is glided over the surface of plaster to fill voids and hollows or impart texture. Also, the plastering operation involving this tool.

■ **Gauging Material** (gauging) — A plaster additive intended to produce early strength and to counteract shrinkage tendencies. For interior work, common gauging materials are **Gypsum Gauging Plaster** and **Keene's Cement**; for outdoor work, **Portland Cement**.

■ **Ground** — Metal or wood strips around the edges of doors and windows and at the bottom of walls. These grounds help keep the plaster the same thickness and provide an edge for it to stop against.

■ **Gypsum** — A naturally occurring sedimentary rock, originally mined from large quarries near Paris. Gypsum, in its natural form, is calcium sulphate. When heated in the calcining process, water molecules are driven off, leaving a hemihydrate of calcium sulphate — the material commonly known as plaster of paris. When mixed with water again for use as plaster, the process reverses and the gypsum recrystallizes, "sets" into rocklike calcium sulphate. What this means is that plaster cures by a chemical process, not by drying, giving it strength and integrity. Until 1910, not enough was understood about the set of gypsum plaster. At around that time, plasterers found that a lime/gypsum combination gave them the best of both worlds: the workability of lime with the quicker cure of gypsum.

■ **Gypsum Bond Plaster** — Calcined gypsum mixed with 2 to 5 percent lime by weight, designed to bond to properly prepared concrete bases.

■ **Gypsum Gauging Plaster** — A special material made from gypsum carefully processed so that it sets in a definite time interval. On the job, it is added to slaked lime to provide initial surface hardness in mortars like finishing plaster.

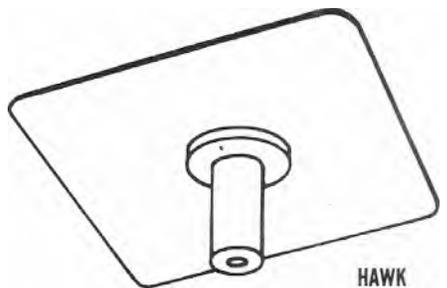
• **Gypsum Neat Plaster** — Gypsum plaster without **Aggregate**, intended for mixing with **Aggregate** and water on the job.

■ **Gypsum Ready-Mixed Plaster** — Gypsum plaster and ordinary mineral **Aggregate**, requiring only the addition of water for use.

■ **Gypsum Wood-Fibered Plaster** — Plaster composed of calcined gypsum and finely shredded wood fibers, used to produce base coats of superior strength and hardness. Wood-fibered plaster has great fire resistance, insulating, and sound-deadening qualities. It is also able to withstand vibration due to its flexibility, and weighs about two-thirds as much as sanded cement plaster. Wood-fibered plaster is slightly more expensive than a sand mixture, but its other advantages make it the recommended **Scratch Coat** for all kinds of lath.

■ **Hair** — Animal hair (usually from cattle) once included in scratch-coat mixtures as a mechanical binder.

■ **Hardwall Plaster** — Gauging plaster mixed with **Perlite Aggregate** to form a lightweight base-coat plaster. Sold under trade names such as "Structolite."



■ **Hawk** — A square, lightweight, sheet-metal platform with a vertical central handle, from which plaster or mortar is applied to the wall with a **Trowel**.

■ **Hydrated Lime** — Lime prepared at the factory by adding controlled amounts of water to **Quicklime**. Two basic grades are available: mason's hydrated (for construction) and finishing lime (for plastering). Finishing limes are used in the final plaster coats, and are the modern, quick-to-prepare versions of **Quicklime**. They can be categorized into three general types by the amount of **Slaking** they require:

■ **Autoclave** — Can be used immediately after mixing with water.

■ **Type S** — Requires less than sixteen hours **Slaking**.

■ **Type N** — Requires 16 to 24 hours **Slaking**.

• **Joint Compound** (wallboard compound, drywall compound, "mud") — A ready-mixed preparation used for finishing joints and seams in **Drywall** construction. Because it is ready-mixed and easy to apply, trowel, and sand, it is widely used for patching and resurfacing plaster.

■ Keene's Cement — A fine, high-density plaster that produces a very hard, fine-textured finish coat. It is produced by heating crushed gypsum rock until nearly all the water of crystallization is driven off, and then adding alum as an accelerator. In decades past, Keene's Cement had many uses, especially in moulded and cast work. Today it is a specialty product (and somewhat altered in composition) that seldom plays a role in house plastering and patching.

■ Key — Plaster that has penetrated through the narrow openings in Lath hardens to form keys which create a mechanical bond.

EXPANDED

■ Lath Any of perforated years, secured to structural were thin wooden strips called gypsum and metal products. Gypsum Lath and Rock Lath are boards with gypsum cores sandwiched between two sheets absorbent paper, and used mostly in new construction. Metal laths are popular for both new and repair work, and have been manufactured in (generally interchangeable) forms, such as: (expanded metal screen with ribbing), sheet-metal lath (sheet metal with perforations), wire lath.

Found in limestone shell mounds, naturally cium carbonate, heated, it cium oxide (and after water added it becomes hydroxide. This cium hydroxide reacts carbon dioxide the air to re-create calcium

Mixed transferred from the box or mixing to the Mortarboard, a large version of a usually a large, flat piece of smooth, Volcanic which, when roasted, expands to of irregular shape. a often used is roughly three an insulator as is

Any pasty construction material of mortarlike consistency, which is applied in a plastic condition, and hardens in place after being applied. As surfacing for the walls and ceilings of buildings, plaster denotes an interior covering, while denotes an exterior one.

See (ceiling buttons) Discs of stamped sheet metal perforated with a central screw hole, designed for repair work on plaster walls and ceilings. In use, plaster washers help stabilize areas where broken have caused the surface to come away from the

See

—An extremely strong hy-cement, produced by burning silica, lime, and alumina (an aluminum oxide) in a kiln proper proportions. Portland Cement plaster is used where an extra hard or highly water-resistant surface is required, such as in walk-in refrigerators and cold storage spaces, toilets, showers, and basement spaces. It should, however be applied over gypsum products, such as gypsum lath. Portland Cement plaster is used in exterior applications.

A naturally formed volcanic glass similar to but heavier than Pumice can double for in most applications, but is less popular because of its greater cost (which is the result of its greater weight).

Product resulting from mixing lime and water together. Technology has greatly reduced the time this operation takes. Traditional, "old-time" putty is soaked in water for an extended period, often as much as 21 days. Modern hydrated limes have reduced this figure to hours and less. See

Limestone that is processed, not hydrated. Chemically, it is calcium and magnesium oxides formed by limestone 1700° F. To make plaster, must slaked with water in an sets a violent, boiling reaction. This hazard was avoidable by the principal

today masonry



4

Wood or handle, often 6 in. first tool used be-

the strength be of high harmful chemicals or to a uniform organic sharp, can A tool for adding fur-improve and the first base coat put on or wood The wet plaster is -scratched" with a broom or the point of a to provide a rough surface so the next layer of base coat will stick to it.

Plaster screeds are ribbons of mortar, plumbed, or otherwise trued on walls or ceilings, which as guidelines for a straightedge to run on when the surface. They are usually the depth of two coats of plaster, and ensure that the new work is spread a uniform thickness. Metal screeds, like provide guide for plasterwork.

U.S. Gypsum's trade name for a product, now used generically like "Kleenex" and "Band-Aids."

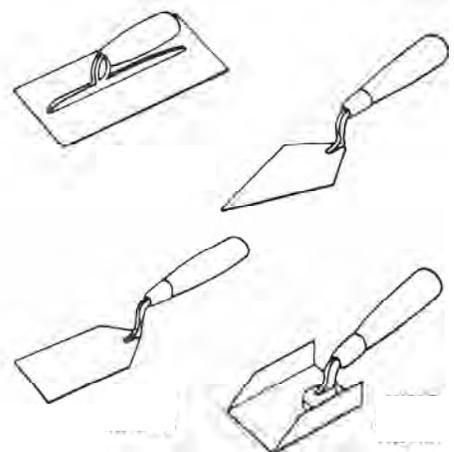
The process of adding water to lime to hydrate it in preparation for mixing it to form a

A flexible straightedge used for leveling wet plaster.

The richness, plasticity, and workability of mixed plaster. "Slip" is a hard-to-define characteristic, but is determined in large part by the quality of the plaster used. Plasters with "slip" mix easily, go on quickly, and spread far, resulting in maximum coverage with minimum effort. Slip is also the thinned plaster used as an adhesive between, say, a cast-plaster ornament and the ceiling.

Muralo Co.'s trade name, often used generically, for a plasterlike used in cosmetic repair work, or as in new drywall work. Spackle as a dry powder or ready-mixed, pound.

plaster a repairs. The used as an covering on buildings. Stucco masonry (particularly water. Once cured, is hard, strong. fire resist-weather resistant. See In drywall construction, paper or fi-strips applied, in conjunction with to reinforce joints and seams. is usually in. wide, and can be purchased per-forated or nonperforated.



hand-held, apply, spread, and smooth and shapes the soft, layered gypsum plaster as a substitute miculite has gained popularity merit of its reduced parts that allow to be fireproofing in construction.