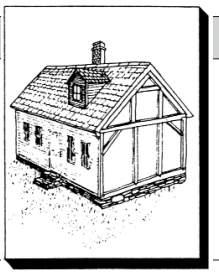
Tips on Plaster Repair



by John Leeke

In my restoration and renovation work on early American homes I'm often faced with repairing old plaster walls. I have found that even severely damaged plaster walls can be reclaimed.

The most common problem is loose or bowed plaster that has lost its key with the lath but is still in place. This plaster can be reattached, making the plaster sound again (see Figure 1).

"Injected adhesive bonding" is one method to re-attach loose plaster. It was developed by Morgan Phillips and Andrew Ladygo for the Society for the Preservation of New England Antiquities (SPNEA). Through this method, they inject specially formulated acrylic adhesives in between lath and plaster through holes drilled in the face of the plaster (or through the lath from behind, if it's accessible). They hold the plaster in place with a sheet of plywood until the adhesive sets. When they remove the plywood, they fill the injection holes and other cracks.

The special adhesives they use solve many problems for this application.

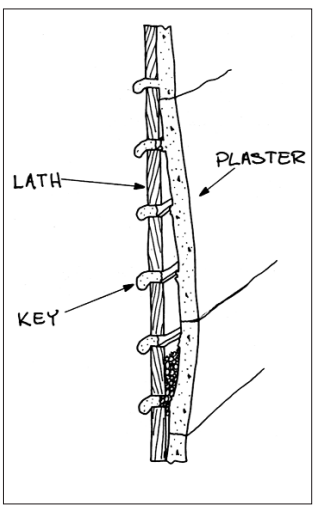


Figure 1. *The plaster has bowed because it has lost its "key" – the part that droops into the wall cavity.*

But, distribution of the adhesive materials is limited by the manufacturer, making it difficult and expensive to get started with this method. I have revised the SPNEA method for more common work by using readily available adhesives.

Repair Methods

To begin, I mark out the loose areas with chalk. I find loose plaster by pressing gently with my flat hand. If the plaster seems to move in relation to the lath and studs beneath, then the key is broken. Be careful not to punch a hole in the loose plaster.

With greater pressure you may find a similar movement if the plaster is well keyed to the lath, but the lath is loose from the studs. (This condition requires further investigation of decay and structural damage.) Thumping with my finger makes a solid snappy sound on good plaster. The sound is hollow and dull on loose plaster. If the back of the plaster is exposed, wiggle the keys to see if they are loose.

Preparation. When you've identified a loose area, treat the whole loose area at one time. This minimizes stress on surrounding plaster when it is pressed back into place. On ceilings with access from above I begin by vacuuming up debris. I try to leave loose and broken keys in place because they will provide a channel for the adhesive I inject later on. Then I drill 1/4-inch injection holes through the lath. I put a stop on my twist bit to keep from drilling into the plaster. When there is no access from the back (as on most walls) I drill through the face of the plaster. I position the holes 3 to 6 inches apart and at the center of a lath strip.

Cleaning the space between lath and plaster is the key to success with this technique. I use a vacuum and a bent wire tool to loosen and suck dust out through the injection holes (see Figure 2). In wall cavities, you may find chunks of broken keys at the bottom of the loose area. They will prevent the plaster from moving back into place. I break open the plaster to clean out the debris.

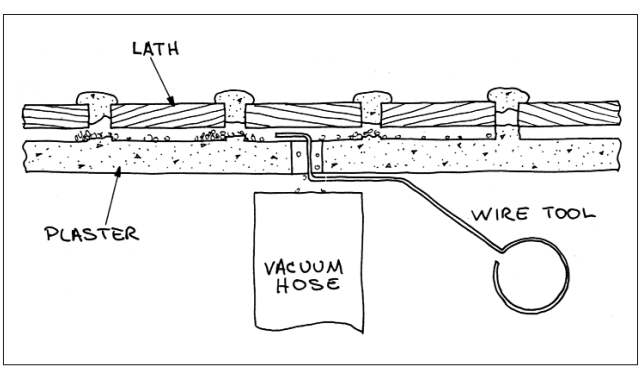


Figure 2. *To make sure you can push the plaster back against the lath, vacuum the injection hole and clean out any debris with a wire tool.*

Figure 3. *To reattach loose plaster to the lath, you can use a caulk gun to push specially formulated adhesives through predrilled holes.*

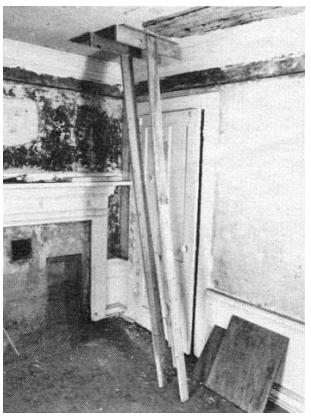


Figure 4. *T-bracing on the ceiling supports plaster that has just been injected with adhesive.*

Application. To get ready for gluing the plaster back into place I make sure I have 1/2-inch plywood as big as the patch area and enough 1x2 wood braces to prop it up.

Then I prepare the adhesive. Special formulations can be packed into a refillable caulking gun. Some adhesives come in standard caulking gun cartridges. I trim the tip so it just fits in the wood lath holes. When injecting through plaster I trim the tip just slightly larger to make a tighter seal with the plaster (see Figure 3).

With some adhesives you have to use a primer, I squirt this into the holes with an oven baster before I put in the adhesive. This pre-wets the dry lath and porous plaster and gives you a better bond (see "Repair Materials").

The adhesive is gunned into each hold "blind." I judge the amount of adhesive that comes out with each squeeze of the handle by testing a full squeeze beforehand on an old board. Each hold might need only a partial squeeze.

As soon as the adhesive is injected place plywood over the repair. Use it to push the plaster back in place. You want to reestablish the bond between the plaster and lath. Thick plaster that will not move back into place completely will need to have the pressure of the plywood evened out with a layer of 1/2-inch foam carpet pad between the plywood and the plaster. Very flat or thin plaster should be pressed into place without a pad. I protect the plywood or pad with wax paper and hold it in place against the patch area initially with a T-brace (see Figure 4). Then I spring additional 1x2 wood braces into place pressing

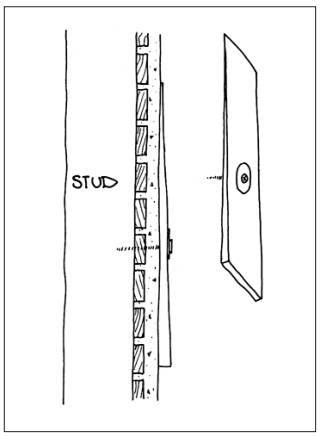


Figure 5. *You can draw wall plaster back to the lath with a long drywall screw and a shingle.*

the plaster back against the lath. Where braces are impractical draw the plaster against the lath with drywall screws driven through plaster or roofing washers, wood shingles, or 1/4-inch plywood. Make sure your screws reach through the plaster into the lath (see Figure 5).

When the adhesive has set, remove the plywood. If it's stuck to the plaster twist it sideways (in the same plane as the plaster surface) to break the bond. If you pull it toward you, some of the plaster may come down, too.

Repair Materials

The big trick in plaster repair is knowing how to adapt the materials to the conditions. Heat, humidity, ventilation, and the weather affect how the materials behave. I can give you some clues, but experience is the best teacher. Start on small, less important jobs until you gain confidence. Always run tests to determine if the materials will perform the way you expect.

Construction adhesives. When I first started using injected adhesive bonding on plaster I used these adhesives because they were easy to get in small quantities. There are two common types of construction adhesives. For plaster repair, water-based adhesives are more adaptable than solvent-based adhesives.

You can tell if you're buying a water-based adhesive because the labels almost always will mention water clean-up. The label will also tell you they are made of "acrylic," "latex", or "polymer emulsion".

I use a water-based adhesive like "DAP Big Stick" construction adhesive because it can be thinned down to make a primer for itself that is sure to be compatible. The primer formula I use is:

- 4 parts (by volume) tap water
- 2 parts denatured ethyl alcohol
- 1 part water-based adhesive

Mix the adhesive with one of the 4 parts of water first then mix in the rest. The alcohol acts as a wetting agent, making the primer spread out and soak into the dry dusty wood lath and plaster surfaces better than water alone.

I squirt primer into the injection holes and let it soak in and begin to set for about an hour, or until it starts to get tacky. This consolidates and seals the dusty dry surfaces, so the adhesive will stick better.

Solvent-based adhesives are more limited in when and how they can be used. They work with clean hard plasters that can be moved back into place against the lath. The best adhesives for this use have a thin consistency and long "skin-over" or "open" time, and they are described as "gap filling". Solvent-based adhesives may not work well with very porous plaster or when the space between lath and plaster is extremely dirty. Experiment to see if they will work in your situation. Pre-wetting the surfaces would help, but unlike water-based adhesives, which can be thinned down to form a compatible primer, a compatible solvent-based primer would be hazardous.

Special formulations. The special acrylic adhesives developed by the SPNEA use materials that must be purchased in bulk through specialty suppliers. I estimate my cost f getting started with them a few years ago was about $1,100, counting materials, setup, and experimenting time.

For a complete description of acrylic adhesives for reattachment of loose plaster refer to The Bulletin of the Association for Preservation Technology, Vol X11, No. 2., Association for Preservation Technology, P.O. Box 8178, Fredericksburg, VA 22404, 703/373-1621.

Rhoplex (made by Rohm & Haas) resins are used as binders in the special APNEA adhesives, and they are available from: Conservation Materials Ltd., Box 2884, 240 Freeport Blvd., Sparks, NV 89431; 702/331-0582. (To order Rohm & Haas products from Conservation Materials you need to be a member of the American Institute of Conservation. For membership information, contact Ann Webster, 3545 Williamsburg La. NW, Washington, DC 20008; 202/364-1036. A $55 membership fee is required.)

Acryl-60 (Thoroseal) is an acceptable substitute binder you can find at most masonry suppliers. Masonry lime, Microballoons (Emerson and Cuming, Canton, Mass.) and Cabosil (made by Cabot Stains, Boston, Mass.) are dry powders used as fillers in the adhesive.

Costs

Often costs of repairs are lower than complete replacement with drywall. I can repair up to one-fourth of the total area at the same cost as covering the entire area with drywall. Repairs on a recent project that also included crack repair and plaster infill took 12 minutes per square foot. Total costs including labor and materials were $4 to $5 for each square foot repaired in this way.

But saving money isn't the only reason I repair plaster. Saving original paintings and textured surfaces that show early craft techniques is an added benefit. Repair instead of replacement is especially worthwhile when the plaster is historically important. It may even be worth extra effort and cost. ■

One of the directions for installing wood columns in September's Restoration Primer column was incorrect. Under the section on "Scribing the Shaft," the second sentence of Step #3 should read: Set the dividers to the thickness of the capital, less [emphasis added] the thickness of the plywood, plus the distance the entablature is above its final position (1 3/8 inches in this example).

John Leeke, of Sanford, Maine, restores and maintains historic buildings. He also consults with contractors, architects, and owners working on older buildings. Portions of this column are adapted from The Old House Journal *and* The Landmarks Observer. *If you have questions on restoration topics, write to John Leeke c/o* The Journal of Light Construction, *RR 2, Box 146, Richmond, VT 05477.*