only dainty fare, a craftsmanlike table and beautiful linen, but dishes which would add the completing touch to the sought-for harmony. Pieces made with such an end in view cannot be hurried; but that is no drawback, for possession which is too easy leads to a certain carelessness of attitude toward the article so obtained and thence to the curse of wastefulness because it is “so easy to get another.”

We started our little industry in the cellar of a private dwelling, and today our plant occupies the first floor and basement of a house under the shadow of the old North Church where Paul Revere’s signal lanterns were hung, and opposite the green turf and ancient elms which shade the resting places of some of Boston’s first citizens in Copps Hill Burying Ground.

Our pottery includes the usual necessities—clay bins, sifting, grinding and clay-pressing machinery, wheels, drying closets, racks innumerable, a whirler for mold work, tables for painters, a color mill for grinding glazes, benches for dipping ware and—most important of all—a good kiln. The utensils include vessels for glazes, modeling tools and painting materials, while the items which appear oftentimes on the expense account are packing materials, clay, cones, fire brick, fuel, chemicals, “repairs on kiln and machinery,” plaster for molds, and stilts. But equally important though less tangible factors in the work are the personal interest and craftsmanship that go into the making of Paul Revere pottery.

IMPORTANT FACTS ABOUT STUCCO: RALPH L. SHAINWALD, JR., A.M.

THE ease with which stucco lends itself to artistic treatment, has tended toward a precocious development that has been harmful. The trouble is that a stucco job which at first appears to be an artistic gem, gradually develops flaws which may finally overshadow the original beauty.

What is the cause of the “checking” and “hair-cracking”? Is it superficial, or is it hidden in the physiochemical composition of cement? Much valuable study has been devoted to the external treatment of stucco, but few have stopped to question its internal composition. Let us therefore study some inside facts of stucco mortar.

The subject is an interesting one and the conclusions startling. Who would have thought, for instance, that cement acts like wood: swelling up on wetting and contracting on drying? But this is proven by careful measurements.

A. T. Goldbeck, of the U. S. Department of Agriculture, showed this in experiments described in the Engineering Record of July 8, 1911 (page 45). His researches were confirmed by Prof. A. H. White, working independently in the University of Michigan and published in the Engineering Record for July 15, 1911 (page 73). Both of these gentlemen proved scientifically and conclusively that mortar and concrete expand on wetting and contract on drying, the action keeping up for years.

In some cases the amount of expansion (due to wetting) was as great as that due to 100 degrees increase of temperature. This is a startling fact, when it is remembered that concrete expands with heat just as much as iron does. The strains due to wetting and drying are therefore very severe and come quickly and repeatedly. It is not difficult to see why this should be a serious source of cracking.

It is fortunate that only the cement is affected, the sand remaining practically uninfluenced by moisture. Therefore lean mortars are much less affected than rich ones: a 1:3 stucco when moistened expands much less than a 1:2. But as Professor White says, “If a stucco is lean enough to avoid cracks water will go through it freely, and if it is rich enough to keep out water it will crack.”

In Italy, where stuccos have been used for centuries, masonry walls were thick and waterproof in themselves. Cement was made from pulverized natural rock, and lean stucco mixtures were a matter of economy. The passage of ages has developed comparatively little checking in the Italian stuccos. But today, in America, Portland cement is cheap, walls are thin and climate severe, so that rich mixtures have been used in the attempt to get cheap waterproofing. The result is excessive hair-cracking.

It is, of course, true that a 1:2 stucco is more waterproof than a 1:3, but it is very much more liable to crack. On the other hand, a 1:3 stucco properly applied is safe from cracking, though very porous. This, then, is the dilemma which confronts the constructor: how to make stucco lean enough to avoid cracks, yet non-porous
enough to keep out water. The problem has been solved by the use of a 1:3 mortar in conjunction with an effective waterproofing compound.

The leanness of the mortar prevents cracks, and the compound makes the mortar waterproof. This gives absolutely reliable results both as to permanency of surface and permanency of waterproofing, and is in every way more satisfactory than asbestos or patented stuccos which do not positively prevent checking and are never entirely waterproof.

Practical experience has corroborated the laboratory in showing the need for lean mixtures, but as is frequently the case, we did not see the everyday facts in clear light until science opened our eyes. For instance, it has long been known that excessive trowelling of a floor, etc., should be avoided. Now we understand that the trowelling worked the particles of cement to the surface, making a rich mixture which cracked for the reasons above mentioned.

Some years ago an architect was building a stucco home for himself. The contractor ran short of cement and asked permission to use a leaner mixture. This was permitted for the back of the house where it wouldn’t be noticed, but the richer mortar was insisted on for the rest. To the surprise of every one, the back wall is still flawless, while the front of the house is full of hair-cracks.

It must be emphasized that with a lean mortar, the permanency of the waterproofing compound is a very important point, as the stucco is exposed to beating storms. That class of compound using stearates, oleates, resinates or other soapy material as a base, gradually washes out under prolonged action of water which slowly but surely dissolves even stearate of lime. A permanently waterproof stucco is dependent on using a compound that is absolutely insoluble and unaffected by the elements. Bituminous waterproofing products belong to this class and compounds have been developed which are miscible with water yet become absolutely insoluble after the mortar has set. This result is obtained by emulsifying the bitumen, which then mixes with water as easily as milk does (milk is an emulsion). But when the mortar sets, it de-emulsifies the bitumen, which then becomes as insoluble as a milk spot. (Butter is de-emulsified milk and is not miscible with water.)

Bituminous materials so prepared give a very high degree of permanent waterproofing. They are absolutely unaffected by salt air, brine, running water, boiling water and ordinary chemicals. Weight for weight they give four times the efficiency of soap compounds, yet they actually strengthen the mortar instead of weakening it and because of the lack of all harmful action the amount of compound is not limited to 2 per cent. If desired 10 per cent, or more may be incorporated in the mixture and the waterproofing effect correspondingly increased. In this way a factor of safety may be secured which is as important in waterproofing as in other branches of engineering. It then becomes possible to waterproof under guarantee a cellar 50 feet below tide level, by means of a three-quarter-inch interior mortar facing.

Bituminous materials also lubricate the mortar, enabling a very lean mixture to be trowelled easily and compactly. They also retard the too rapid drying out of the stucco.—(Courtesy of Architecture.)


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