

Martin M E (1829) The Art of the Mason L'encyclopédie populaire ou les sciences, les arts et les métiers, Paris, Audot éditeur.

(Martin was professor of science and physics)

From the chapter, Study of Materials

p38 Quality and of use of plaster (plâtre)

We mentioned the plaster stone (*alabaster*) used sometimes as rubble, or ashlar in constructions but this habit is not widespread and is always in poor taste. The main characteristic of this stone is to acquire, from a slight slaking, the property of becoming a paste with water and to quickly solidify a large volume of liquid.

They are several grades of *plâtre*: The finer one, remarkable for its finesse, its gloss and its creamy texture, is reserved for sculptural ornament. The one less soft and less white is used for inside plaster, and the rougher one is used for partitions and walls. [...]. In the same kiln, we can obtain, if desired, different qualities of plaster. In all cases, we reduce it to powder before using it and the more delicate the work, the finer the powder should be.

[...] Plaster should be stored away from moisture and from contact with the air when stored. Otherwise, it will become air slaked, meaning it will absorb slowly the biggest quantity of water it can absorb and then will be useless, lest we burn it once more. This material offers great disadvantages when used for wall constructions. It falls apart rather quickly with the humidity it absorbs – indeed, we should never use it in humid areas. Moreover, the property the plaster has to expand and bulge when it is still fresh, requires caution in the working method.

The best plaster for construction is that which contains some lime.

Quality and Use of Lime

Nothing is more important than builders being able to recognize the qualities of the lime and to know what they have to do to it on different occasions. [...]

(Fat) limes mixed with common sand make mortars that dissolve underwater and are unsuitable for works in humid places. If we want to make mortars capable of hardening underwater, the sand would need to be replaced by clay, sandstones, pulverised and burnt slates or by fragments of tiles and pottery and ashes of earth coal. These substances, associated with a certain quantity of common sand, form with fat lime, cements of good quality, perfectly resistant to humid and underwater locations.

Qualities and use of sand

...We choose sand with rough and angular grains, as it binds better with the lime and we sieve it when it contains larger gravel. Sand of this type is excellent for most constructions. **However, when the limes are very fat, we prefer a sand containing clay.**

Ordinary mortars

We make this mortar by mixing 3, 4 or 5 parts of sand to 1 part of quicklime. The lime has to be of good quality and not be air slaked. After being slaked in water and turned to a buttery paste, we mix it with the sand.

The sand can be more or less big but it should be cleaned of loamy/silty parts. We have to incorporate it into the lime by long and continuous work and, as the ancients would say, 'in order to have a good mortar, it needs to be watered by the sweat of the brow'.

When we mix powdered quicklime and sand in the proportions of one part of lime to 2 of sand and we moderately wet the mix while kneading it, we obtain a mortar which sets quicker than the first one and hardens better. But we should avoid letting it dry too quickly.

Equal parts of fine sand and sharp sand, a sixth part of quicklime and 1/12th of burnt bones, make a good quality mortar, which hardens quickly when mixed right before using it, another quantity of powdered quicklime. The use of quicklime, advised for the first time by M. Lorient, gives to the mortar the property of setting up immediately, like (gypsum) plaster...

Mortars, cements, concrete of different composition

Ordinary mortar is of better quality when we replace one part of the sand with fragments of tile or powdered pottery. This is only if it is a fat lime; if it was hydraulic lime, any such addition would seem pointless.

In Africa, we sometimes use a cement made of one part of sand, 2 parts of ashes and 3 parts of quicklime, sieved together, mixed and kneaded with water 3 consecutive times and wetted alternatively with linseed oil and water. This cement acquires a particular hardness.

...We prepare a cheap cement mortar by kneading 2 parts of lime, 1 part of coal (*houille*), well sieved and half a part of clay. This mortar is damped slowly and well stirred. Then it is left in a heap for several days after which it is beaten and stretched; it is then left to rest once more until it is flexible and pliable. This mortar can be used to create floors in attics. We apply it layer by layer, and when it is almost dry, we cover it in a light coat of good quicklime mixed in butter milk.

In Italy, we make surfaces in the ancient way which is worth knowing.

We lay a first coat of cement made of 3 parts of tiles and 1 of lime. We spread the cement well, we let it rest for a day or two depending on the season. After that, we beat it with force with an angled-iron-bar and we repeat this operation each day until the bar does not produce any impression on the layer. On this layer, we then spread another thinner one in which the lime is in equal proportion to the tiles and we sprinkle on this, still fresh coat, small pieces of marble by pressing them with a cylinder. When done, we beat the layer again and when it is perfectly resistant and dried, we polish the surface with sandstones and water. We work it after that with pumice. The last task is to give two layers of hot linseed oil and rub it to a polish.

p100 **Enduits (coatings)**

Coatings/plasters are an essential part of the art of the mason; we will give details as to its importance.

P 101 Coatings/plasters of common mortar or crépis

Mortar coatings are usually called *crépi* (plaster, render) when it is made of only one coat and the method is slightly rough. **In all cases, the first coat should contain more lime than the ordinary mortar and should be made preferably from old slaked lime.** It needs to be well beaten and softened. And if it is made from recently slaked lime, it should be left in a heap for a long time and then moistened and beaten once more. To the first coat, once well dried, we add a thinner coat made with finer sand and in more quantity, applied with not only a trowel, but also a small wooden ruler with a handle that we run along the wall by damping it. Once this work done, we limewash the wall with a lime milk. If we would have wanted a better looking plaster, the lime would have been very fine, slaked for a long time and conserved in sand - grind it with chalk and then apply a layer upon the second coat with the trowel and the ruler as we just mentioned. This third coat would be capable of taking a polish. When the 'crépi' has to be applied on a smooth surface such as wood, it is good to nail laths and hatch the timbers.

In regions where we lack (gypsum) plaster (*I assume it's gypsum plaster*) and where lime is abundant, we can compose a mortar to replace the gypsum plaster in the construction of cornices and other ornaments, by adding **3 parts of quicklime in powder to a liquid mortar made of 2 parts of fine sand and one part of pulverised tiles** slurried into clear gruel with a sufficient quantity of old slaked lime to bind everything together. The addition of the powdered quicklime is done in the trough where the mortar has been previously poured and we briskly mix the ingredients together to use it right away.

P 103 (Gypsum) Plaster

(Gypsum) plasters are almost always used in the regions where the substance is not too expensive. We start by wetting the wall well, then we throw with a broom, some very clear plaster and then we cover this layer which is full of asperities with another coat applied with the trowel which we do not try to smooth over. We then add a third coat of fine plaster with the trowel and we smooth it as much as possible. When it is done, we scratch the protruding bits with a sort of toothed copper drag on one side and smooth on the other

Batifodage

We often substitute for the plaster, for economy, or for obtaining a lighter and warmer plaster (*enduit*), **heavy soil, kneaded with care, mixed with a certain quantity of hair (*bourre*) and if we want, a fifth of old slaked lime.**

P 104 This mix we call batifodage can be used as a plaster for walls and ceilings, we give a white colour with white of Spain (fine crushed chalk) wetted with strong size. (eau de colle forte).

Stuccoes

We give the name of stuccoes to the plasters capable of being polished. The best ones are made from well selected lime, slaked with care, well beaten and then conserved for several months in the sand. To make the stucco, we mix with this lime, an equal quantity of white marble or any types of heavy stone or even chalk. We crush it in

such way to form a pliable paste. We apply it on a moist, slightly rough surface in layer of about two lines (millimetres?). When it is dry, we polish it with a moist cloth and with pumice.

P105 We continue to rub it with the palm of a hand and we finish by polishing it with a very small quantity of linseed oil but not so much as to form stains. The polishing is very precise, requiring great experience to be done well and for which time and patience should not be spared.

When the stucco has to be applied to interior surfaces, protected from the weather, we can apply a (common) mortar plaster (un enduit de mortier) made of lime and sand with gypsum. But when it is meant for exterior surfaces, we should give it a better resistance and thus put it only on a good cement, made from lime, pulverised tiles or pozzolan, and scoria [...].