

**Hammond A (1890) The Rudiments of Practical Bricklaying (7th Edition).
London. Crosby Lockwood and Son**

This is an excellent text in its explanation of many aspects of bricklaying craft practice. In its discussion of mortars, their preparation and uses, it well-illustrates the state of flux, as well as the uses of traditional and then 'modern' materials, such as Portland cement, without much critical thinking – the typical characteristics of Portland cement are seen as a benefit, not a hazard, for the buildings they are used upon, though the materials it is displacing, both natural cement and feebly hydraulic limes were more benign. There is no consideration of cement-lime mortars here. Concretes and most ordinary mortars are being hot mixed, including pointing and putty mortars for gauged brickwork. The author recommends the use of 'superior' blue lias lime, whilst acknowledging the rarity of its use in London (and perhaps other metropolitan centres) at this time, where feebly hydraulic grey chalk/stone limes remain the norm, even for concrete. As the more hydraulic limes came to be used in keeping with the author's recommendations, sand-slaking and banking, with the lime allowed to cool before mixing with the sand laid around and over it for use became more common (see Frost, The Modern Bricklayer, 1925, as well as the British Standard 1951), to allow for both slow initial slaking and late slaking of the more hydraulic limes. Lime for plaster mortars is being slaked on site with a minimum of water, diluted after slaking to form a thin paste before being sieved and mixed, probably whilst still warm or even hot. Lime for use on its own as a putty or mixed with silver sand is being slaked and diluted after slaking, but then laid down for a period to stiffen before use. The author advocates such laying down for the lime for coarse stuff also, acknowledging that this was not much done at this time. Its detailed description of the process and materials of tuck-pointing is invaluable.

CONCRETE

The 'limes' generally used for concreting in this country are obtained from Dorking in Surrey and Rochester in Kent, besides other places where the grey limestone is to be obtained.

This lime is **ground and mixed with ballast while in a powdered state**; it is then wetted and turned over twice, to mix them well together; this is then wheeled in barrows to an elevated position and thrown into the trenches, and afterwards levelled to receive the brickwork. This kind of concrete is mixed in the proportions of **one part of lime (quicklime) to six or seven parts of gravel**. Although this kind of concrete is very much used in and about London, it is considered a very imperfect method, although economical as regards the labour: it proves most expensive in the material, for if the work was properly executed it would not require nearly so much of the latter (??).

The method of concreting which is thought by most engineers to be the best is to reduce the lime to the state of a thick paste, and then it is made into a soft mortar by mixing about an equal quantity of sand with it before it is mixed with the gravel; and instead of shooting it down from a height and leaving it to settle by itself, it ought to be wheeled in upon a level and beaten with a rammer; for it

is thought by being thrown from a height the materials separate, and by so doing some parts get more lime than they ought to have, while others get but very little.

LIMES, CEMENTS ETC.

Of limes, *blue lias* is reckoned the best in this country, because it is equally adapted for work below water-level or for moist situations as for dry ones. But it is **not generally used for ordinary building purposes**, principally on account of its taking but a very small proportion of sand before its setting properties are weakened; so it is thought best only to use little more sand than lime in the mixing.

This lime must not be made into mortar a long time before it is required as other limes often are, or else it will get so hard that it will be of very little use for the purpose of laying bricks.

This lime will take less water than the other limes usually do; **and it ought to be slacked several hours before it is made into mortar**, as some parts will take much longer than others. The principal supplies of the lias limestone are obtained from Aberthaw, near Cardiff; Barrow, near Mount Sorrel, in Leicestershire; and Watchet.

Dorking and Halling Limes. These may be considered the **principal limes used in and about London for making mortar**, owing to their taking a greater quantity of sand than any other before their setting properties are weakened, the usual proportions being three or four parts of sand to one of lime. But it must be remembered that very often it is not the quantity but the quality of sand that destroys the lime; for the cleaner and sharper the sand, the better the mortar will be.

These limes are obtained from Dorking in Surrey; and between Rochester and Maidstone in Kent.

Chalk Lime is seldom used in London for outside work, because it sets so slowly, and in damp places never sets at all. But it is used to a great extent for plastering the inside of houses, where there is no dampness; and **although it is not used in London for outside work, it is very much used in many parts of the country, where it is very cheap, and better limes are not so easily obtained.**

Cements. The cements used by the builder are of various kinds, such as Portland and Roman for external, and Keen's and Martin's for internal decorations.

Portland Cement is considered **the best for general use**, owing to its fine setting properties and its cheapness; for it takes a greater quantity of sand than any other before it is much weakened....and will take two or three parts of sand to one of cement for ordinary purposes....

Roman cement, although possessing many good qualities, is greatly inferior to Portland, and therefore is **but little used by the builder....**

FROST

If the brickwork is carried on in frosty weather, all walls must be carefully covered up with weatherboards, straw, or something that will protect them; if not, the frost will penetrate into the work, and greatly destroy the strength of all that which is damp....

Gauged brickwork

...Gauged arches, as a rule, are set in grey lime putty, brought to the consistence of cream. This is put into an oblong wooden box, about 2 ft by 1ft 9" deep, for the setter to dip that side of the brick where the bed-joint is required. But in doing this, care must be taken that the bricks are neither too wet nor too dry; also that the putty is of such a thickness that it will give the brick just such a joint as the work requires; of course the brick should be held in the putty until it takes up the joint. If each course is bedded regularly throughout its thickness, the joint will be full and even on the face of the arch; and should it project a little, which is often the case, it ought to be left until the building is cleaned down, then they can be rubbed off level with the bricks, and so leave the face of the arch perfectly regular. This method only applies to gauge-work.

Pointing

(two main kinds:) tuck-pointing and flat-joint pointing....

Stock work with the white joint is most general in London; and the first thing necessary is to mix the pointing stuff. It is often thought best to colour the work, even if it is a new building, **to bring all the bricks to a uniform colour;** because some bricks are much darker than others, and therefore have a bad appearance when finished. This colour as a rule is made with green copperas in the proportion of one pound of copperas to five gallons of water...If the work is wetted before the colour is laid on, one gallon of colour will do 100 feet, more or less, according to the bricks and the season of the year.

Yellow Stopping – this is made with grey lime putty, and fine washed sand, in the proportion of one bushel of the former to three of the latter, and will take about 2 lbs of yellow ochre to each hodful of stopping. But...the workman will regulate it to suit the colour of the brick....in all cases let the stopping be a shade darker than the brick when it is dry.

White Putty. This is generally made with chalk lime (because it dries much whiter than grey lime and gives the work a better appearance), and silver sand, or marble dust; the latter should be used whenever it can be obtained, on

account of its giving a beautiful glaze. **It is usual to heat the pieces of marble until they fall to a powder, then screen it through a very fine screen or sieve before mixing it with the lime.** But silver sand is more generally used. **The lime is slaked and sifted through a fine sieve.** Sometimes oil or size is mixed with it to make it work better; and also to give it greater binding properties; but this **must be done while the lime is hot and dry,** and one pint of either to half a bushel of lime is enough.

If chalk lime is used, one peck of silver sand is sufficient for half a bushel of lime, but if grey lime is used, it will take double that quantity of sand.

If work is to be pointed, it must be well rubbed with pieces of the same brick as the wall is built with; this will give the work a level surface. Brush off all dust, and wet it well, then follow with the colour and give it one coat throughout; if it should require two coats, let one well set before the second is laid on...It is usual to (apply the stopping) in lengths of about 8 feet...and if this is taken for the length and 5 feet for the height, it will be quite enough at one time.

We sometimes see houses stopped in from top to bottom before ever a putty joint is laid on...whenever this is done, the stopping gets so dry and hard that the putty will not combine with it as it ought, and it will fall off in a very short time...When the length as before stated is stopped in, it is usual to rub it well with a piece of dry sacking...to give the stopping and bricks the appearance of being one uniform block. Brush off all dust, and, if necessary, damp it with the stock-brush carefully, so as not to disturb the stopping; then gauge the joints at each end of the rule as a guide for holding it; so that each course is of the same thickness, and each joint perfectly level...this gauging must be applied to all work, whether yellow, white or red...The cross-joints should be perfectly plumb from top to bottom of the building...The fine stuff is spread upon this rule, and afterwards taken off it with the jointer and laid on the work that is stopped in...after this, the rough edges are cut off with a knife, or 'Frenchman'...This is the process for yellow or stock-work pointing.

Red brickwork is treated in many respects quite differently. The colour used for this is composed of 1 lb of Venetian red and 1 lb of Spanish brown to 1 ½ gallons of water...This colour has no setting properties, therefore it is necessary to mix something with it that has...One of the best things to use for this purpose is white copperas. This must be dissolved in warm water, and 1 lb will set about 3 gallons of colour. Alum is also used in the same proportions; and sometimes half a gallon of stale beer to the same quantity of colour for setting.

Red Stopping is composed of 1 part of grey lime to 3 parts of fine washed sand (red sand would be better, as it would take less colouring). This is coloured with Venetian red and a small portion of vegetable black. (Proportions will vary according to the tone of particular bricks)...Red work is coloured throughout first, and then a second coat is laid on *after it has been stopped*; this is done very lightly, so as not to rub up the stopping.

White Brickwork...(only requires) rubbing down before pointing; but should there be any flesh-coloured ones among them, it is best to leave the dust on the face after rubbing it, and give the whole a coat of alum-water; this will set the dust so securely on the face of the bricks, that no quantity of water will wash it off, and will give the whole front a regular appearance. This is made with 1lb of alum dissolved in three gallons of hot water; and if it can be laid upon the work when warm, so much the better....

There are three sorts of putty used for this work, white, black and sometimes red....

Black putty requires ½ bushel of grey lime, slaked and finely sifted: 1 ½ bushels of very fine washed or silver sand and 12 lbs of lamp-black or vegetable black; the last named is much easier to mix with the lime and sand....

Red putty. (as above, but with Spanish brown pigment).

It is not always necessary to colour brickwork; and if the bricks are all of one colour, such as Suffolk whites, best reds, or malms, it is much better not to do so....

The putty joint in all tuck-pointing ought not to exceed a quarter of an inch in thickness.

Old Brickwork

When this is repointed, all the old mortar must be raked out of the joints. The whole front is then well rubbed with pieces of brick to clean off the grease and dirt, and well swept down with a hard broom perfectly clean, so that the colour may enter the face of the brick, and after this, it is given two coats of red colour or green copperas as the case may be...**the stopping in old work is generally smoothed down level with the face of the bricks with the trowel, and not rubbed in the way that new work usually is**, for very often it is stopped with brown or black stopping, if it is stockwork, and, of course, it would never do to rub it.

Flat-joint Pointing. This is of three kinds. The first is laid on with a trowel and cut off at the top only with the Frenchman...the second kind is cut off top and bottom...and the third is simply done by filling up each joint flush with the brick; then rub it over with a stock-brush or a piece of sacking, and next run a line in the centre with a jointer or anything that will mark it. Inside work which is to be whitewashed or coloured is the only work which is done with this kind of pointing. Washed sand and lime made into a stiff mortar is the only pointing material required for flat-joint pointing, but the darker the sand the better...in all kinds of pointing, the work should be kept well damped, for upon this depends the soundness of the pointing....

Plastering

...All internal plastering, as a rule, is done with chalk lime, hair, plaster of Paris, and Keen's and Martin's cements. The following are the different methods of mixing them:

Lime and Hair, or Coarse Stuff. For this purpose the sand should be clean, sharp and screened. Then form a pan to receive the lime. This is slacked in a tub, and sufficient water is **afterwards** added to bring it to the consistence of cream, and is then run through a fine sieve into the pan formed with the sand (*this will still be warm to hot*). After a sufficient quantity is run out to carry the sand, the hair is thrown into the lime and thoroughly raked about with a two-pronged rake, so as to part the hair and mix it well with the mortar; but it would be better to run the lime into putty, **as for fine stuff**, and **when cold**, mix the hair with it; this will not be so apt to rot the hair, and so add to the stability of the work. For this purpose bullocks' hair is generally used, and this should be well beaten with small laths, or else laid in water a day or two before it is mixed with the lime. The whole is then mixed and allowed to stand for a short time.

Fine Stuff or Putty, is made of pure lime, and is **mixed in the same way as lime used for coarse stuff**; but instead of running it into a pan of sand, this is run into a 'putty bin' built with bricks according to the size required, and allowed to remain there until the evaporation of water has brought it to a proper thickness for use; if the water rise to the top, it can be drawn off if required, and the putty will get dry the sooner.

For lime stucco the sand is mixed with the putty according to the quantity required. This stucco, when left for painting, is left smooth from the trowel....

Portland, Roman and lias cements are those generally in use for all external plastering; and as regards quality and cheapness, Portland is decidedly the best.