left rough but true so as to form a good key for the finish; or the back ground may be done with the same cement as you are going to finish with, only with sand added. When this is the case, ordinary lath nails should not be used, unless they are galvanized or the heads given a coat of shellac. When the lathing is done, zinc or copper nails are still better. If this precaution is not taken the heads of the nails will rust through to the surface no matter what you may do. The finish known by the name of "stucco finish" left from the float may be done with any lime, or cement with sand.

In selecting sand to use with Portland cement you cannot very well get it too coarse, as neat cement is far stronger than when mixed with sand, it being exactly the reverse of lime; but even with this it is well to use, comparatively speaking, some fine sand to make the body compact, without what might very well be called a waste of cement.

In England, for building sea walls, harbors, breakwaters, etc., the material generally used is very coarse gravel, to six parts of which is added one of washed sand and one of Portland cement. The whole of this is thoroughly mixed with water and cast into blocks of various sizes about 18 inches square by 3 ft. long. They are allowed to get quite hard and are then built into position.

When water tanks or swimming baths are built of concrete or brick and are then lined with Portland cement, it is well to use a small quantity of washing soda with it which causes the cement to set more quickly and also helps to increase the hardness; but for outside work, such as moulding or ornament, soda has an objectionable feature—an efflorescence on the surface which makes it unsightly for a time.

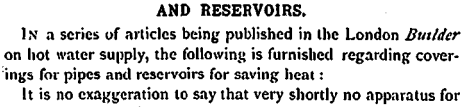
Brick work should always be well wetted before plastering is done, as it gives a better bond to the work, and in the case of cement, if the wall absorbs the moisture too quickly, it will never get thoroughly hard, or, in plasterers' language, "the nature has all died out" before it has had a chance to set.

During the months of July and August you can never make so satisfactory a job of plastering as you can in the spring or fall of the year when the drying is less rapid. Portland cement should never be painted for at least one year. Lime mortar should never be mixed with Portland cement when the work is described as being done in Portland, but Portland cement may be added to lime mortar with great advantage.

Roman cement is not as much used now as formerly, Portland having almost superseded all other cements of that kind. It was used in England some years ago very extensively and was most useful for casting sections of large brick sewers—the brick, generally about 12 to 16 in number, being put into a trough that was shaped to the right curve of sewers, and spaces about ½ inch being left between them; they were then well grouted in with the cement, and in about half an hour they could be turned out of the mould and were ready for use.

Mastic is a cement of a different nature to any used for plastering, being composed of sand and litharge, and when about to be used mix with oil instead of water. There is a very good sample of this work done at the corner of Carlton and Church streets in this city.

When repairing is done old laths should never be allowed to remain on, particularly in the case of ceilings, as in a new lath there is quite a lot of ragged fibre; caused by the saw in cutting, which helps to bond the plastering; in an old lath that is all filled up.



NON-CONDUCTING COVERINGS FOR HOT WATER PIPES AND RESERVOIRS.

IN a series of articles being published in the London *Builder* on hot water supply, the following is furnished regarding coverings for pipes and reservoirs for saving heat:

It is no exaggeration to say that very shortly no apparatus for hot water supply will be considered complete or finished if the whole system is not insulated, so to speak, so that almost every particle of heat absorbed by the water in the boiler will be obtainable from the taps, instead of nearly fifty per cent of it being radiated from exposed surfaces, and worse than wasted.

There are at this moment hundreds, if not thousands, of hot water systems that, by being carefully covered, would be converted from miserably inefficient to highly satisfactory appliances—this in particular with the tank system, when the tank is so commonly fixed in a cold, draughty roof.

An interesting instance of the success attending the covering of pipes occurred quite recently, in which a residence was fitted with a complete system of hot water supply pipes on a scale sufficiently large for a good boiler in a five-foot kitchen range, but owing to a delay experienced in obtaining the range in question, another of a smaller kind, three feet, was fitted up and connected to the chimney and circulating pipes for temporary cooking and hot water supply. It was not supposed that this little range, with its boiler, would do much in the way of water heating, but to the astonishment of everyone it gave a really abundant supply of very hot water in every part of the house as quickly in the morning and altogether as satisfactorily as a larger range would be expected to do.

This desirable result was wholly brought about by the pipes and cylinder being everywhere carefully covered with a sufficient thickness of felt. It really does seem opposed to all reasonable and workmanlike principles to allow such abundant opportunity for heat to be thrown away, while labor and fuel is being expended in the kitchen apparently for this object. The waste of heat is not always the only ill result experienced, as in many instances the warmed air is very objectionable, and if a hot water pipe is carried alongside a soil pipe it is possible for a very unpleasant feature to introduce itself. It is a very customary practice for a hot water fitter to carry his pipes up in the casing that is nearly always to be found passing from the bottom to the top of the house, this casing containing all the different pipes of the house, such as the cold service from the main, the cold service down from cistern, the water closet cold water services, and, very commonly, the soil pipe. There is no objection to his making use of the casing if it is large enough to hold a few more pipes, and it is often used of necessity, as to carry pipes openly through well decorated rooms is out of the question; but to carry hot water pipes up this case without felting them is an exceedingly bad practice, as they are not only brought into contact with very cold surfaces (they have frequently been found wired on to cold pipes, four or five pipes in a bundle), but the heat radiated causes a draught or current of air to set in, as we find in a chimney.

When a casing contains pipes that radiate heat, that casing, within a few moments after heat is felt within it, is converted into a flue, as by applying heat to air it can be made to circulate to all intents and purposes like water. Air that is brought in contact with heated surfaces becomes heated and rarefied, and, thus being made lighter than the surrounding air, rises, and cold particles immediately flow in to take its place, they becoming heated and following the first particles, and so on, so that it resolves itself into a stream of warm air flowing out of the upper part of the casing, and cold air flowing in in corresponding volume below. This may be excellent in practice when hot water pipes are used for effecting ventilation; but it is fatal to hot water services, which are particularly required to keep the heat within them; in many instances they are cooled at about the same speed as they would be if placed outdoors when a strong wind was blowing.

It may be argued that if the casing is stopped off at its two extremities the trouble will be obviated; and so it would be if the casing was perfectly air-tight everywhere, and had no cold pipes within it. But this is never the case; there are always numbers of crevices and apertures which permit of a tolerably free ingress and egress of air.

The best material for covering these pipes, and also the reservoirs, is hair felt; hair is a natural poor conductor of heat, and nothing surpasses it for this purpose, especially as it is so easy of application. This felt, which is readily obtainable in sheets, is usually cut up in strips for pipe work; the strips are wound upon the pipe spirally, being secured here and there with cord or wire, but where spiral winding is impossible it can be tied on in lengths, which answers equally as well, but has not such a good appearance.

The best and most complete arrangement for pipe work, but which entails a little greater expense, is to have the felt wound on spirally in one direction, say from left to right, and well secured with cord; then cover this with good canvass, also wound on, but in the opposite direction, and this secured with wire.

It is most necessary, to secure the best results, to have the felt thick enough; hair-felt is sold in great quantities about 3-16-inch thick, but this is not thick enough for good work. If possible, have it ½-inch thick, and a marked benefit will be had by using even thicker than this, or, say, two thicknesses of ⅜-inch.

In felting cylinders, it is the best plan to take sufficient sheets of felt, and then sew the edges together to form one sheet large enough to go all round the reservoir. This sheet can then best be secured by bands of hoop iron or brass passed round the top and bottom, and around the middle; these bands being tightened up by having a bolt to draw the two ends together. After