

almost impermeable, it will suffer little, if any, injury from moisture or frost. We may, then, as the lawyers say, "admit" the durability—and if we insist upon further evidence, only posterity, say in the twentieth and twenty-first centuries—can have the benefit of it, and no doubt Mr. Ransome will bequeath plenty of test blocks for their satisfaction—and the stone is everything else that can be desired of a building stone, or of a stone for external ornament, excepting, of course, that it does not polish.

And how marvellous, for its simplicity and beauty, is the process by which this stone is made! Some toiling mason or other hewing in the quarry or in the builder's yard, must have wished, before now, that stone, like iron, might be melted, and run in molds, even though his own occupation were thus at an end. Did he ever, when by the sea shore, or by a sand pit, think of cementing indissolubly together the countless millions of grains into solid rock? Mr. Ransome, no mason, however, unless he be, as he may be for anything we know, a member of the mystic brotherhood, did think of this. And he tried every cement he could lay his hands to, and did not succeed. The sand became little else than mortar by such sticking as he could effect. But he found out, at last—and we are speaking of a time more than twenty years ago—that the best sandstones were held together by silicate of lime. And so he set himself to work to produce this substance, indirectly from flints, of which plenty could be found for the purpose. But the flints had to be liquefied first, and how could this be done? Not by heat, nor would caustic soda touch them, so the chemists said. Flints might be boiled in a caustic solution for a week together, so long as the boiler was an open one, and lose very little by the operation. But by-and-by, Frederick Ransome made one of the most unexpected discoveries in chemistry, viz., that when boiled in a caustic solution, under pressure, flints would melt almost like tallow before the fire. But we are not about to give the long history of the invention. With flint soup, or silicate of soda as a liquid, the question was what other liquid would, in mixing with it, turn both into an enduring solid? What other liquid would turn both into silicate of lime—the substance he was seeking? When he found that chloride of calcium (in solution) would, when mixed with silicate of soda, turn both into flint, or something very much like it, the road was clear, and the manufacture of stone from sand was as simple and beautiful a process as the making of Bessemer steel from pig iron by blowing air through it when in a melted state. Chloride of calcium had been chemically considered a very respectable married couple, known as Ca and Cl. There was a little bigamy attaching to silicate of soda, but the principal parties to the marriage were silicon and natrium, or Si and Na. But, as has happened before now with organic bodies, those inorganic couples, on their introduction to each other, at once ran away with each other's husbands and wives. Si, although still keeping his wife O, took Ca and became silicate of lime, while Cl and Na were, like Lot's wife, turned into salt, or chloride of sodium, for their wickedness.

The sand, a clean-grained, slightly brownish sort, just such as a dishonest grocer might select

for increasing the gravity specific or otherwise, of his sugar, comes from near Maidstone. There is no end to the quantity of it, and we believe it costs less than 3s. a ton in the Thames. There are flints, enough for a hundred years to come, brought up from the chalk pits at Charlton; and the caustic soda and the chloride of calcium, the latter a waste product of the soda manufacture, are bought of the wholesale chemists. The silicate of soda is made from the flints and caustic soda as follows:—The flints are heaped upon iron gratings within a series of cylindrical digesters, of the material, size, and form, of small steam boilers. A solution of caustic soda is then added; the digester is then closed steam tight, and the contents are boiled by steam of 70 lb., taken from a neighbouring boiler, and led through the solution in a coil of iron pipes. The solution of caustic soda is prepared of a specific gravity of about 1,200°. The flints are dissolved into "soluble glass," and are drawn off in that state, as a clear though imperfectly liquid substance, which is afterward evaporated to a treacly consistency and colour, and of a specific gravity of 1,700°.

The sand is completely dried at the rate of two tons an hour, within a revolving cylinder, through which hot air is forced by a centrifugal fan. A small portion of finely ground carbonate of lime, say Kentish rag, or even chalk, is mixed with the sand, the more closely to fill the interstices; and each bushel of the mixture is then worked up in a loam mill, along with a gallon of the silicate of soda. Thoroughly mixed with this substance, the sand has a sticky coherence, sufficient to enable it to be molded to any form, and, when well rammed, to retain its shape, if very carefully handled. In this condition—molded, of course, and any thing that can be done in founder's loam may be done in this sand, sticky with silicate of soda—in this condition it is ready for the solution of chloride of calcium. The instant this is poured upon the molded sand, induration commences. In a minute or so, we hardened little lumps of sand, so slightly stuck together by the silicate of soda that we could hardly keep them from falling to pieces within the fingers, into pebbles so hard that they might be thrown against a wall without breaking, and only a short further saturation was necessary to indurate them throughout. In other words, on the instant of contact, the silicate of soda and the chloride of calcium mutually decompose each other, and reunite as silicate of lime and chloride of sodium, the former practically indestructible in air, the latter, common salt, perfectly deliquescent and removable by washing, although the stone, after the washing, is impermeable to water. Plaster of Paris does not set quicker than silicate of soda and chloride of calcium.

The chloric solution is first ladled upon the molded sand, and the hardening going on, the objects are afterwards immersed in the solution itself, wherein large pieces are left for several hours, the solution being boiled in the open tanks by steam led through it in pipes. This expels any air which may have lodged in the stone, and possibly heightens the energy of union with the silicate.

After this the stone is placed, for a longer or shorter time, according to the size of the object, under a shower bath of cold water. This is not,