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BUILDING STONES AND THEIR PRESERVATION.

It is always a subject of general regret when some well-known structure, distinguished for its beauty and the architectural purity of its style is seen going prematurely to decay. In most cities there may be seen costly buildings—such as some of the churches in New York—the most ornamental parts of which have assumed a faded and worn appearance, in a very few years after their erection. No building of the present day, however, has excited so much wide-spread attention respecting its early dilapidation as the new Houses of the British Parliament, in London. They were erected only a few years since on classic ground, and are distinguished for their imposing dimensions and ornate architecture. It was supposed that the elaborate and delicate tracery on their walls would have remained for ages, "untouched by the hand of time," as monuments of the architect's taste and the sculptor's skill; but the stones are already crumbling, and the structure "hastens to decay." To arrest, if possible, the future disintegration of this splendid pile the British government appointed a commission of scientific and experienced men to investigate the cause of decay, and ascertain, if possible, the remedies that may be applied, and report the result of their labors. The report has lately oppeared, and as some of the information which it contains is of general importance we give its substance.

Building stones are divided into two classes: first, those consisting of substances not easily acted upon by acids; second, those composed of materials which are partially or entirely acted upon by acids. To the first class belong granite, porpheries and serpentine; to the second, limestones, dolomites, and certain sandstones containing carbonate of lime as a cementing agent. The stones of which the new Houses of Parliament are built belong to the second class, and are composed almost entirely of the carbonates of lime and magnesia. Regarded from a purely chemical point of view, the resisting power of stones to the corroding action of the weather would appear to depend entirely upon their chemical composition; but there are other conditions equally important in determining the durability of building stones. Chemical substances under different conditions possess very different properties. Thus, marble and chalk are chemically identical, but one is crystalline, the other amorphous, and the former is much less readily acted upon by acids than the latter.

Stones in buildings are subject to both mechanical and chemical action. Those which are very porous and absorb moisture are liable to disintegration, when the moisture freezes in their pores, and splits their cells. There is always some carbonic acid in the atmosphere, and when rain water contains a portion of it, a powerful solvent action is exerted upon exposed magnesian limestone. In cities, where bituminous coal is used for fuel, a small quantity of sulphuric acid is found in the atmosphere, and when this is combined with rain it acts as a powerful solvent upon magnesian limestone. Two kinds of stone come under the ban of science for expensive buildings in cities, namely, very porous sandstone and magnesian limestone.

No stone should be chosen for a costly structure unless it is known to be proof against atmospheric disintegration. But this advice affords little consolation to those who have erected expensive buildings under the impression that the materials were perfectly durable, but which are now rapidly undergoing premature decay. What is the remedy to check the decay, is the all-important question. We have very little, if anything, by way of answer. The inquiry has been made of us frequently respecting the preservative character of silicate of soda (soluble glass) for such purposes. Soluble glass has been applied to stone in the form of a concentrated wash, and afterward washed with chloride of calcium, to effect double decomposition and precipitate an insoluble substance in the pores of the stone. Thus far permanent results have not been achieved with this substance. Parraffine, beeswax and resin dissolved in volatile oils have been recommended for experiment as preservative agents by distinguished professors of chemistry in London; but while these will undoubtedly close the pores of decaying stone, they are certainly not superior to prepared linseed oil and paint for this purpose. What is wanted is some chemical agent which, when applied, will render decaying building materials as durable as those of the most permanent structures. There is still an extensive field for experiment and investigation in this department of the arts.

SAND, SOAP AND GLASS.

The difference between chemistry and mechanics can be very clearly explained by the changes produced on sand. Thus, if we take a piece of quartz and reduce it to powder it becomes sand. This is simply a mechanical change, the sand remaining of the same nature as it was prior to its being reduced to dust. Silica is the chemical name for quartz, and it is one of the most refractory substances known. It is perfectly insoluble in water, and neither sulphuric, hydrochloric nor nitric acid will dissolve it. It is also so infusible that it cannot be melted by any heat obtained by the blow-pipe; and yet this substance, so hard, so infusible and insoluble, can readily be converted into soap and made to melt like wax through the subtle agencies of chemistry. By taking some sand and mixing with it a portion of caustic soda—carbonate of soda and lime—and submitting these substances to a very high heat in melting pots placed in a furnace, it fuses and becomes glass. In its molten state it is blown into bottles and vessels of every variety of form, and is also converted into sheets for window panes, and molded like clay for many other purposes.

Glass contains just a sufficient quantity of alkali to render it fusible, but not soluble, as neither water nor the three acids named dissolve it; indeed, glass is the substance commonly used for containing those very corrosive acids and for this purpose it is of inestimable value to the arts. The change produced by the soda on silica is a chemical one. The molding of glass, when fused so as to change its form, is a mechanical principle; the action of the soda upon the silica in conjunction with the high heat in the furnace, whereby the silica is made fusible, is a chemical one, and the compound thus formed, which we call glass, is a silicate of soda. A still more wonderful change than this is effected if an excess of caustic alkali is combined with the silica, as it then forms what is called "soluble glass," a substance which will dissolve by being boiled in water. Soluble glass (silicate of soda) is best formed by boiling finely subdivided sand in a very caustic lye under steam pressure, so as to subject the silica to the highest possible temperature, as this tends to form more concentrated solutions of the silica. This is also a chemical change. The hard silica, formerly so insoluble, unites with the excess of alkali and really becomes a soap which is now used in Prussia and some other places for washing purposes. The silica takes the place of tallow, oil and grease, which are used for making common soap, and uniting with the alkali it becomes soluble in water, and may be used for washing as an inferior saponaceous compound. Such are some of the mysteries of chemistry.

Silica is one of the most common and useful substances in nature. It is the constituent of many rocks and composes most of the pebbles in gravel beds. Rock crystal is pure transparent quartz, and its name is derived from *krustallos*, a Greek word signifying ice. Silica is the base of a great number of precious stones, such as the carnelian and sardonyx, which are bright red; also the opal, &c. We are entirely dependent upon silica for our present advanced position in some of the arts. It forms the lenses of the telescopes by which such advances have been made in astronomy, and from it the lenses are made for our most improved system of lighthouse illumination.

Spectacles, those aids to the aged, are also formed of it, also our windows and looking-glasses; in short, silica is applied to numberless purposes in all the philosophical, useful and elegant arts. The "little grains of sand" have become mighty agents in the hands of cultivated man. It is said, however, that the ancients were acquainted with the art of making malleable glass—an art which, if it ever existed, can be re-discovered.

M'CORMICK'S EXTENSION AGAIN—PERSONAL.

Commissioner Holloway, in his decision of the McCormick extension case, published on page 295, took occasion to criticise the conduct of the attorneys, Messrs. Lee & Fisher, who conducted the opposition. Our readers will remember that in our review of the case we defended these gentlemen from the charges alleged against them, basing our remarks wholly on the premises laid down by the Commissioner. In a letter addressed to us on the 16th inst., Messrs. Lee & Fisher express their thanks that we should have defended them, especially inasmuch as they were strangers to us, and that we acted without solicitation. We are happy to find, also, that Commissioner Holloway, upon further investigation of the facts, has made the following correction, which now appears of record in the office, following his opinion, and made part thereof:—

PATENT OFFICE, Nov. 7, 1861.

Since the publication of the foregoing opinion I have received a communication from Lee & Fisher, per S. S. Fisher, in which it is declared that the letter above referred to "was the only letter of the kind written, and the expression, 'defeated in the Patent Office,' referred only to the legitimate use of the funds, under our agreement (with our clients, herewith inclosed), for the purposes therein specified." It is due to the parties named that I should give them the benefit of this their disclaimer, and, regarding it as satisfactory, I do so by making it a part of my recorded opinion.

D. P. HOLLOWAY, Commissioner.

It affords us pleasure to publish the Commissioner's correction. It is certainly creditable to his candor.

OUR NAVY AND ITS GALLANT COMMODORE DUPONT.

The name of Commodore Dupont will hereafter stand side by side with those gallant worthies who have made our navy glorious in former times. He has long been regarded as a master spirit in the navy, wanting only an opportunity to show his skill, which he has done in a signal manner in his successful bombardment of Forts Walker and Beauregard at the entrance to Port Royal harbor. It is accounted a dangerous experiment for wooden-walled ships to attack forts or earthworks, as it is generally conceded that one gun on land is equal to five on shipboard. The Confederate General Ripley in his orders summed up his instructions with this declaration:—"To give up a position on shore while the enemy is afloat, is totally and absolutely inexcusable."

In spite of all the disadvantages attending such attacks the brave Dupont went resolutely to work to bombard the enemy's works, and in his letter to Capt. Fox, Assistant Secretary of the Navy, modestly declares that he "*thought his plan a clever one.*" We