

INTRODUCTION OF THE PORCELAIN MANUFACTURE.

Messrs. Thomas C. Smith & Co., have at Green Point, Long Island, a manufactory of fine porcelain ware in successful operation, and by the courteous invitation of Mr. Smith we have had an opportunity of going over the works in his company, and listening to his explanations of the several processes in the manufacture.

THE MATERIALS.

Clay is the silicate of alumina, alumina being the oxide of the light metal, aluminum. The fine kind of clay used in the manufacture of porcelain is supposed to be derived from decomposition of granite rock. Granite is composed of mica, quartz and feldspar, and each of these minerals is a compound substance. Feldspar is composed of potash, alumina and silica, and under certain conditions it is decomposed, the potash being removed, and the silica and alumina remaining in combination as the silicate of alumina, or clay. This fine clay is found in beds in the earth in numerous places. It is called by the Chinese, *kaolin*, and the name has been introduced into Europe along with the manufacture of China ware. Porcelain is made of kaolin, feldspar and quartz. Clay shrinks very much in baking, and this shrinking causes numerous cracks in the ware, it is therefore necessary to add some substance which will not shrink, and silica is found to be the most suitable. The English find pure silica in the form of flint, and the Americans in that of quartz. Besides the kaolin and the quartz a proportion of feldspar is also employed.

THE SORTING.

Feldspar nearly always contains a black mineral called schorl, and if a particle of this gets ground in with the material it is sure to show as a speck in the ware. The stone, therefore, after being broken, is carefully handled over, and every piece containing any schorl or other foreign substance is rejected.

THE GRINDING AND MIXING.

After the feldspar and quartz are broken and examined they are ground to a fine powder in mills of burr stone, precisely similar to those used in grinding wheat. This powder is then mixed with water and the kaolin, forming a fluid porridge, which is subjected to repeated sittings to remove any coarse pieces that may have escaped being crushed in the mills. It is then poured into broad vats, where it is dried to a paste of the proper consistence for the hands of the molders.

THE THROWING.

Of all implements now used in the arts probably one of the very oldest is the potter's wheel. It is a wooden disk revolving in a horizontal plane upon the upper end of a vertical shaft. For common pottery the wheel is usually turned by an assistant by means of a crank and belt, but in porcelain manufactures the molder turns his wheel by pushing with his foot against the upper side of a parallel wheel fastened below to the same shaft. The workman gathers up with his hand a sufficient quantity of dough to form the vessel which he intends to make, and dashes it down upon the wheel. He then with his foot sets the wheel in motion, and works the dough for a while to get out all the air bubbles. To this end he wets his hands in a pail of water, and draws the pile of dough up into an irregular pyramid, and then flattens it down into the form of an inverted saucer. When sufficiently kneaded he cuts off a piece of the proper size for his purpose with a small wire which is fastened at each end to a short stick for a handle. The piece is placed upon the center of the wheel, and, a rotary motion being continued, is quickly fashioned into the desired form, by pressing the clay with a moist sponge, or simply with the fingers. In some cases a narrow board, the edge of which has been cut into the proper curves and notches, is brought against the revolving clay to impart the proper form to the outside of the vessel.

MOLDING.

Pitchers and many other articles are formed in molds made of plaster of Paris. The workmen first throws a lump of dough upon his wheel and fashions it into an irregular hollow cylinder, somewhat like a hat crown, which he sets down into the mold. The mold is then set upon the center of the wheel and rotated, while the workman, partly with his wet fingers

and partly with a moistened sponge upon the end of a stick, presses the clay outward, close against the walls of the mold, and forms the inside of the vessel. The mold is made in two halves, so that it can be readily taken apart and the vessel removed.

Mr. Smith finds it very important to change his hands as little as possible from one kind of work to another. One of his men has been constantly employed for two years and seven months in making one kind of small cream pitcher for restaurants.

BAKING.

After the clay is fashioned into ware, it is set aside to dry for two or three weeks, when it is ready for baking. It is baked twice, the glazing being applied between the first and second baking. After the first baking the ware is called biscuit, a manifest misapplication of the word, which is from the French *bis*, twice, and *cuit*, baked, meaning twice baked instead of once. One of Mr. Smith's kilns is 60 feet high, and 14 feet internal diameter, with walls 3 feet 4 inches in thickness. It is divided by two arched diaphragms or floors into three compartments, the lower one for the second baking, the next for the first baking, with an extension above contracted as a chimney to increase the draft. The heat is supplied by eight anthracite furnaces disposed radially around the base of the kiln.

When the ware is ready to be baked it is placed in pots or boxes of coarse earthen ware, called sagers, to protect it from the smoke, and to enable the pieces to be piled one upon another without being bent out of shape. The bottom of one sagger forms the cover to the one beneath, and the joint is luted with a cord of soft clay to make the joint air-tight. These sagers somewhat resemble in form small shallow cheese boxes. The workmen set each sagger full of pieces of ware, the spaces between the larger pieces being occupied by smaller ones so as to economise the space. When the kiln is filled, the entrance is closed and luted, and fires are started in the furnaces. The interior is brought to an intense white heat which is continued from 40 to 45 hours. The fires are then extinguished, and the kiln is allowed to cool slowly for two or three days, when it is opened and the ware is removed.

GLAZING.

The glazing on porcelain is lime glass. Glass is silica combined with potash, soda, lime, or other metallic oxide, and the kind of glass which has the right degree of fusibility to serve as a glazing for porcelain is lime glass. Quartz, feldspar, and lime are mixed together in the proper proportions with water, and the biscuit—the ware after it has been once baked—is dipped into the mixture. The biscuit comes from the kiln so perfectly dry, and the clay in this state is so greedy of moisture, that the articles as they are raised from the bath have the glazing upon them dried instantly by the absorption of the water into the body of the ware. When the articles are placed in the lower apartment of the kiln, and are again subjected to a high temperature, the lime and silice of the glazing are melted and enter into combination, forming a silicate of lime, which is lime glass.

ASSORTING.

The baking of the porcelain is a very delicate operation, and a variable proportion of the articles is sure to be injured in the process. In some, the clay settles down so as to change the form, in others, the glazing is cracked, or some other damage occurs. Consequently the ware must be assorted carefully after coming from the kiln. The second quality is sold at half price. Mr. Smith says that he has discovered that some of the dealers have been selling his second quality ware for American, and his first quality for imported.

THE WORKMEN.

The workmen are mostly French and German. They are very skillful, but it is amusing to see how fond they are of carrying the material long distances on their heads or shoulders. Mr. Smith is remodeling his works, and arranging them in such manner as to save all unnecessary handling and carrying of material. He is also introducing power for turning the wheels, and for doing everything that can be done by machinery.

THE PRODUCT.

Some very handsome porcelain is now being turned out from the works at College Point. The first attention has been given to make the manufacture pay,

and ware for hotels and restaurants mostly has been made up to the present time. Door and drawer knobs are made in large quantity, but the process for those is so peculiar that we purpose to describe it at another time.

Chinese Adulterations of Tea.

The following article on the above subject, from the pen of one of the most experienced tea buyers in this city, will be read with interest. The two general classes of tea known as "green" and "black," are both subjects for chicanery. The Chinese to meet the demands for tea, are often "obliged" to "make up" the styles to "suit the eye," of the "foreign barbarian;" and if at the same time they can deceive the palate, this is lucre gained. To accomplish this, they use leaves, flowers, roots, barks, buds, seeds and stems of shrubs, plants, and trees, foreign to the real tea. The class "green" is more generally known to be colored. To meet this predilection among the Americans for the "verdant," the Celestials use Prussian blue—ferrocyanide of iron—a deadly poison; gypsum—sulphate of lime—or plaster of Paris, such as our farmers use as a manure, turmeric—the root of the *Curcumatonga*, used as a medicine and a dye, to make this beautiful "green." Sometimes the drug indigo is used in the place of the Prussian blue.

To color the "blacks," a preparation of iron—a most deadly poison—is often used, as well as the juice of certain barks. The leaves of the *Epylobium angustiflorum* (excuse the length of this name, as it is botanical), the *Gardenia florida*, as well as its flowers, are used to mix with teas. The leaves of the *Camelia susanqua* and other varieties of the *Camelia*; also those of the *Rose*, their buds and stems, and the leaves of the *Olea fragrans* as well as their flowers, with a host of others, are mixed in with true tea, for the purpose of adulteration. Indeed, there are so many leaves growing in China that resemble the tea leaf in shape and color, that they avail themselves of this species of fraud for the purpose of increasing their wealth. The writer has often taken these foreign leaves from packages of tea; some of which possess no more the flavor of qualities of tea, than the autumn leaves of our own forests. Lie tea is the dregs of all that pertains to real tea. It is made from the sweepings of the China tea packing houses, consisting of the broken leaves of all the various teas, both "green" and "black," damaged and spurious, dust and dirt, cemented together with rice water, or the "serum of the blood of animals," and rolled into grains. If for "black" tea, it is colored with a preparation of iron; if for "green," it is colored with turmeric, Prussian blue, and plaster of Paris, and in appearance is a good imitation of delicious gunpowder tea. The proportion of mineral matter in the genuine tea leaf, is from 5 to 6 per cent; in the lie tea, from 37 to 45 per cent; chiefly sand and vile impurities.

This lie tea is imported to this country—particularly the lying gunpowder. The writer has a sample out of two thousand boxes which were sold in a New York tea sale, at four cents per pound; and a tea judge would, from appearance, decide it to be worth fifty cents or more per pound. This stuff, put with true "green" tea, will make a mixture deleterious in its effects upon the constitution of the drinker, and makes up a real lying compound. Another variety from the same source, called "little tea," "tea endings," "tea bones,"—anomalistic in name, as well as quality—is imported to this country for the purpose of adulterating wholesome and good teas. This is the sweepings of the "Hong," consisting of the dust of "green" and "black" teas, passed through sieves to make it uniform in size. There are millions of pounds of damaged teas, musty, decayed, and those that were once infused, brought to America, and find their way into the stomachs of even the fastidious. The wild tea plant affords vast quantities of leaves, which are made into a kind of miserable tea, used for adulteration. It is sold for from five to fifteen cents per pound, and even more.

An oil well has been sunk to the depth of 2,000 feet at Jackson, Mich., and it is proposed to continue to the depth of 3,000 feet if necessary to strike oil—a depth of 400 feet greater than any well yet sunk on this continent.