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PORCELAIN MANUFACTURE IN NEW YORK.

Resuming our description where we quitted it last week, we have to direct the reader's attention to the next process, which is

CONVERTING THE WARE INTO BISCUIT,

as it is termed after the first baking. The kilns in which this operation is performed are huge cylindrical structures (see Fig. 7), fifteen and a half feet in diameter, and having two stories, the lower one eleven and a half, and the upper one nine, feet in hight. The walls, which are of brick, faced inside with fire brick, are nearly four feet in thickness. Directly beneath the lower story is a grate, covering the entire area and accessible by several doors. When fired, a kiln uses about ten tuns of coal to a baking, and combustion is continued for twenty-eight hours. It takes three days for the interior to cool. The raw ware for the first baking is placed in the upper story, which is subjected to a less degree of temperature than the compartment below, the exhaust heat being used. The seggars now come into use, each one being filled with as many articles as can be placed in it without touching each other, small pieces of fire clay serving as supports. The filled seggars are then ranged in piles from floor to ceiling of the kiln, the bottom of one seggar serving as the cover to the other, and the surfaces being separated by rings of soft clay, which form a tight joint. As many as 30,000 pieces of ware may be included in one baking. The fires are now urged for the proper time; and after the kiln has cooled, the ware is removed, a hard, brittle, porous body. This is the biscuit, so called from its resemblance to ship bread.

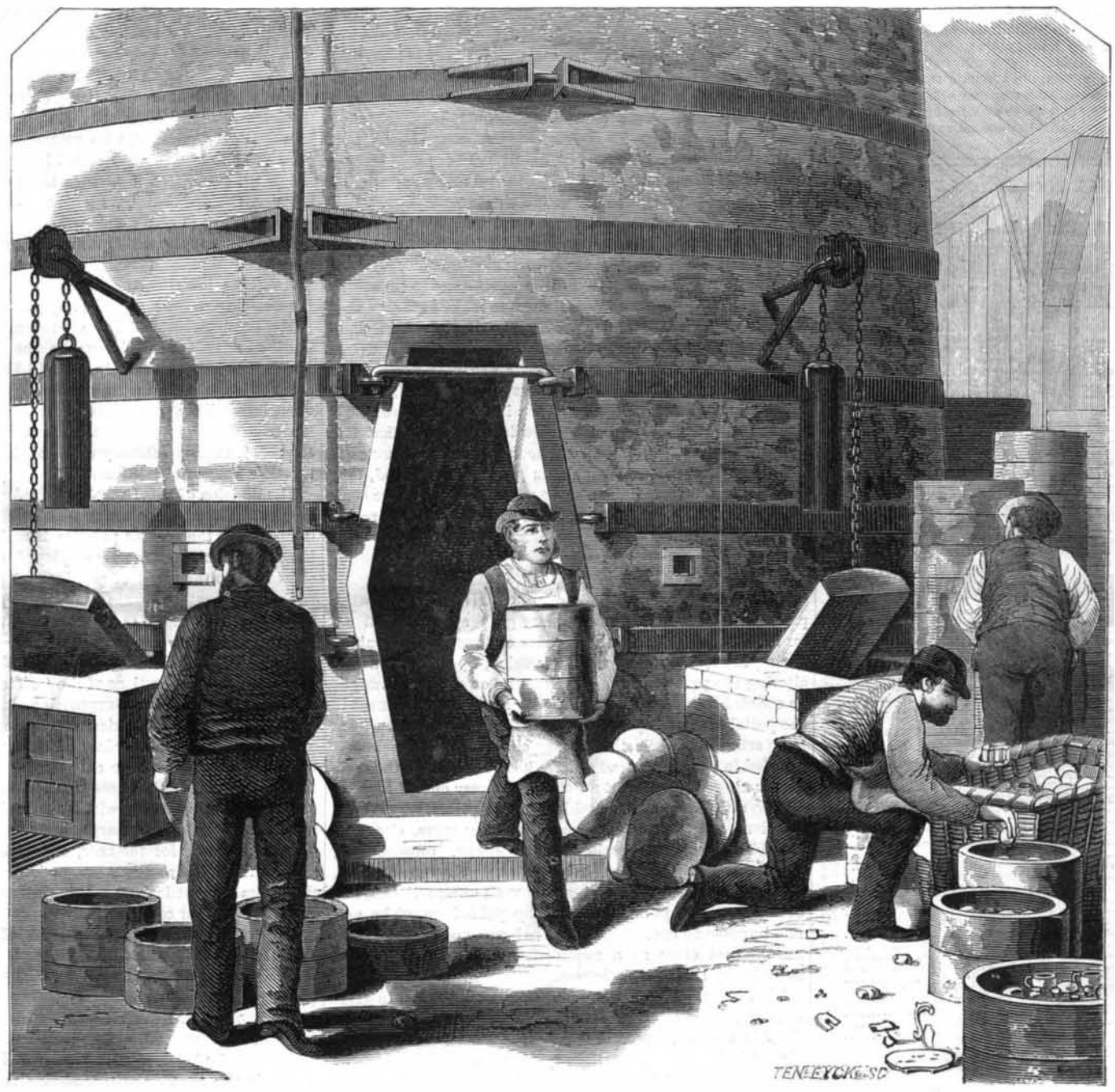

Fig 1.—THE EARTHENWARE KILNS.

The next operation is

GLAZING.

The glazing compound is made of precisely the same ingredients as the ware, only they are differently combined. There is more felspar added, so that the result is a complete

Fig. 8.—DIPPING IN GLAZING LIQUID

vitrification. To witness the process we were conducted into another great room; in which were a number of tubs, the contents of which a girl continually stirred, as shown in Fig. 8. The liquid was the glazing powder mixed into a thin cream with water. Into this the article to be prepared is quickly dipped. Being dry and porous, it speedily absorbs the moisture in the material deposited upon it, leaving the powder in an almost dry state, adhering to the surface. Thick pieces, such as knobs, have to be dipped in water first,

Fig. 9.—INTERIOR OF THE KILN.

so as to prevent their absorbing too much of the moisture, while smaller articles, on the other hand, are sometimes heated in order to force them to take up moisture enough.

We next found the articles being packed in seggars a second time, in order to undergo the intense heat of the gloss oven or

SECOND BAKING.

For this purpose the lower story of the kiln is employed, and the heat generated is far more than sufficient to melt iron. The seggars and their contents glow with an intense white radiance, and this continues until vitrification ensues. It is at this point that great skill is required in managing the fires, for, as our guide explained, "the art is to get up vitrification and yet have the ware stand up in the kiln." In other words, the fires must be checked at a point a little beyond that at which the glaze vitrifies, and just before the articles themselves run and melt.

Our artist has chosen the operation of removing the finished ware from the gloss oven as the subject of the large illustration, and in a smaller engraving (Fig. 9) he shows the interior of the kiln, with the seggars arranged in piles. The open shoots (on each side of the kiln in the large engraving), with the heavy covers, are furnace doors; and just beside the entrance to the kiln will be seen the glass-stoppered holes through which the process of baking is watched.

The porcelain is now finished, and nothing remains but to sort it over for imperfect pieces, which are consigned to the grinding mill to be pulverized and made over. In case the ware is to be ornamented with colors and gilding, still another manipulation is necessary. The

DECORATION

is done by hand. The colors used are formed by the combination of certain metallic oxides and salts, with certain fluxes, which enables them to fuse into colored glasses. The oxides are usually those of chromium, iron, uranium, manganese, zinc, cobalt, antimony, etc. The salts and other bodies are ground up with fatty turpentine, and painted on in the ordinary manner. It is not until the heat of the furnace has driven off the oil and chemically combined the ingredients of the colors that the effect can be judged of, for the hues at first are dingy and unpleasant, and

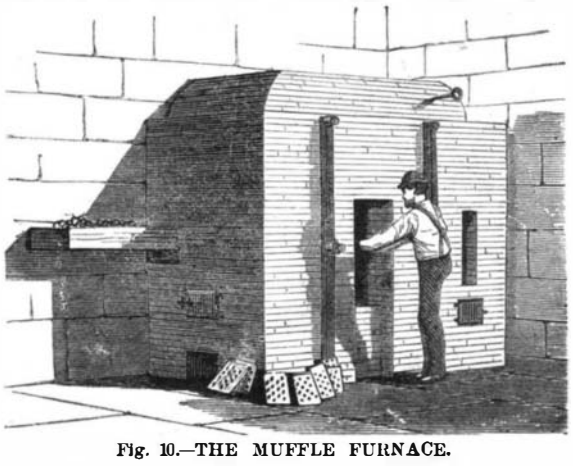

Fig. 10.—THE MUFFLE FURNACE.

give no idea, to the inexperienced eye, of the intended effect. Gold is applied by dissolving the metal in aqua regia; the acid is driven off by heat, when the gold remains in a state

of minute division. After the ware is ornamented, it is inclosed in a muffle furnace, shown in Fig. 10. This consists of an inner box of fire brick, which is so arranged as to be completely surrounded by the products of combustion. After the colors are developed the articles are removed, and hand-burnishing of the metallic portions completes the manufacture.

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VOLUME XXXII., No 13. [NEW SERIES.] *Thirtieth Year.*

NEW YORK, SATURDAY, MARCH 27, 1875.

Contents.

(Illustrated articles are marked with an asterisk.)

FROZEN PIPES AND HYDRANTS.

This year the winter has been really one of the kind that are only equaled in the memory of the oldest inhabitants. In some places not far from New York, we hear of the water in mains being frozen, where it was supposed that the pipes were deeper in the ground than the frost ever penetrates. As for house connections and hydrants, they gave out soon after the commencement of the cold snap. As we explained recently, the house connections were in many cases unduly exposed by the carelessness of the plumbers who did the work. But there were numerous instances in which the water froze in connections that were laid on the level of the main. It did not need an occurrence of this kind to prove that there are a great many plumbers who have no consciences, for we see in the daily papers numerous remarks in regard to their outrageous charges, at all seasons of the year. But the manner in which they ordinarily proceeded to thaw out a frozen pipe seems to cap the climax, in regard to making repairs in the most expensive manner possible. As a general rule, when the water in a house connection was frozen, the plumber would lay a portion of the pipe bare, and light a fire around it, consuming from one to three cords of wood, and keeping several men employed for from twelve to thirty-six hours, or even longer. In this manner he would manage to run up nice little bills of thirty, fifty, one hundred dollars, and more, if we can credit the statement of victims, published in the daily papers. In some extended tours of observation throughout the city, we have seen but two or three boilers in use, furnishing steam to thaw out the pipes. It is such a simple means of clearing a pipe, and the boiler required can be constructed so cheaply, that we were surprised not to find them generally employed. As a result of a good deal of inquiry, however, we infer that the plumber reasons somewhat in this manner: "It will cost me thirty or forty dollars, or perhaps a little more, to make a steamer; and if I use it, I can clear a pipe in two or three hours. But if I keep on in the good old way, and build a wood fire around the pipe, I will incur no expense at starting, and will be a day or two about the job." We shall be greatly mistaken if some enterprising individuals do not draw a useful moral from these facts, or if, by another winter, the charges for this class of plumber's work at least will be properly regulated. While the house connections were becoming frozen, the street hydrants were following suit; and we see by the papers that in some cases they were frozen so hard that fires made great headway before they could be brought into service. We have been edified, in New York, by disputes between two departments, as to whose duty it was to thaw out the hydrants; but we have not seen much stress laid upon the fact that it is somebody's duty to prevent the hydrants from freezing up. In fact, we find a good many people who seem to think it is the correct thing for ice to form in a hydrant in cold weather, so that it cannot be used until the ice is melted. On the contrary, however, if a hydrant is properly constructed and cared for, no ice will ever form in it until the main with which it is connected becomes frozen. We could give a number of reasons in support of this assertion, but a practical proof will no doubt be more satisfactory to our readers. On the occasion of a recent visit to Poughkeepsie, in this State, we were very courteously shown around the water works by Mr. Davis, the superintendent. This gentleman informed us that, though it had been cold enough to form ice in one or two instances in the mains, all the hydrants had been serviceable, with a single exception. This single hydrant, which was frozen up, well illustrates the value of system. The hydrants are all inspected every day to see whether or not they are frozen; and immediately after a fire, the hydrants that have been opened are examined by an employee of the water department, to make sure that they are properly drained and closed. After one fire, the chief engineer of the fire department reported that three hydrants had been opened, while, in fact, four had been used. As a consequence, the fourth hydrant was not examined, and ice formed in it during the night; but it was discovered early the next day and thawed out. Now it seems to us that this demonstrates that hydrants can be kept ready for use even in very cold weather, although, as generally managed, they are very apt to freeze. It may be added that there are some forms of hydrants that should never be employed in a region where pipes are liable to become frozen up.

INCREASE OF POSTAL CHARGES.

The same Congress which rendered itself infamous by the passage of the well known salary grab again looked after its own interests, at the expense of those of the public, during the last hours of the late session, by enacting a law altering the postal rates in order that its own speeches might be enabled to cumber the mails. By a recent amendment to the postal law, the speeches of members and other stuff are to be sent free, while the postage charged to the public is doubled in price. Instead of half a cent an ounce, the scale is now altered to one cent an ounce on every one of the following articles: Books, pamphlets, maps, prints, engravings, transient magazines, periodicals and newspapers, circulars, handbills, posters, occasional publications, prospectuses, book manuscripts, proof sheets, blanks, patterns, samples, and, in fact, all articles sent by mail except letters, and newspapers and periodicals sent by publishers. The new rate imposes an enormous additional expense on those who use the post office as a means of transmission for articles more bulky than simple letters.

That this additional tax upon the people is due, in large measure, to the lobbying influence of the express companies there is very little room for doubt. Cheap postal rates are obviously in opposition to their interests, and it is well known that a strong and constant pressure has been brought to bear on Congress in their behalf during the past session. The express charge for the smallest package sent from New York to San Francisco is 75 cents; the post office carries one weighing a pound for sixteen cents, and before the recent amendment did the same service for eight cents. In some cases, for packages of certain weight forwarded short distances, under the old law the mail rates were much below the express charges; under the new, the former are considerably higher

There is a large number of persons whom the measure will directly affect in a business point of view. Publishers of books, of pamphlets, in fact of all works other than periodicals, many of which are of great value to the community as disseminators of useful information, will find it necessary to reduce the weight of their packages one half, in order to mail them at the same price as formerly. From this follows a diminution of labor and a decreased consumption of paper and material, and thus other classes of the public are in turn affected. Mercantile houses selling by samples sent by mail, shippers of seeds and of manufactured productions readily inclosed in small packages, and like forwarders will, in many instances, find the doubled postal charge by no means an inconsiderable inroad into their profits, and it will necessitate on their part a reduction in the weight of the articles sent. The consequence of the above, so far as the postal revenue is concerned, is that it will remain stationary, and will not experience that gradual increase which has always been attendant upon the cheapest tariffs.

The measure generally affects the reading public. Three cents postage must now be paid on the SCIENTIFIC AMERICAN and other large papers, and eight cents on each magazine that formerly went for four, and so on. Besides, a rather anomalous state of affairs is caused when a person is charged three cents to send this paper across the river from New York to Brooklyn, and but two cents to forward it over the ocean to London.

The country has very little cause for gratitude to Senator Hamlin, of Maine, for pushing through this ill-advised law. Its prompt and early repeal is a measure which the next Congress will doubtless find is demanded by the people.

MODELS BY MAIL.

We recently advised our readers that, by the provisions of the new postal law, they were at liberty to send models and other matters through the mail, in packets weighing not more than four pounds, at the rate of eight cents a pound; and we dilated a little upon the excellence and great public convenience of this arrangement. But scarcely were our types printed before the salary-grabbing Congress made a change in the law, doubling the above rates for the public, while ordering their own speeches to be sent *free*. Looked at in one aspect, this is an outrage on the public; but it cannot be helped until the meeting of the new Congress in December. Meantime the public must endure the payment of the doubled rates, and all who propose to send models should bear it in mind. Sixteen cents a pound must now be paid.

A TRADE MARK REJECTION.

The Commissioner of Patents, on an appeal taken to him in person, has had occasion to set aside a decision of the Trade Mark Examiner, who refused registration to the applicant, because the latter stated in his papers that he had not used, *but intended to use*, the mark. The Examiner rejected the application, requiring that, before he would grant it, the applicant must strike out the word "intended" and insert "commenced," thus making the applicant say in his papers that he *had already commenced to use the mark*. As this was not true, the applicant declined so to state, so the case was rejected and the appeal taken.

The Commissioner of Patents reversed this decision, and at the same time administered to the Examiner a rebuke which, if has any sensibility, he will be likely to remember.

"The language of the statute is made so plain that it would seem impossible for any one to err therein. Yet this plain language the Examiner assumes to criticise as loose, and interprets it exactly contrary to the obvious meaning by an altogether unnecessary inference."

The decision of this Examiner is only one of the many examples of Patent Office errors which are not likely to be eliminated while the present practice is maintained. About one hundred examiners are now employed, chiefly in hunting up objections to the grant of petitions for patents. If they did not make large numbers of incorrect rejections, their occupation would, to a great extent, be gone.

PARTNERSHIPS OF ANTS AND PLANTS.

The curious observations of the "Naturalist in Nicaragua," in connection with the ant-supporting plants and plant-protecting ants of tropical America, have been described in these columns. In certain *acacias* and *cecropias*, it will be remembered, Mr. Belt found the ants serving as volunteer armies for the defence of the trees against invasion by insect or other enemies, resenting with bites and stings the slightest interference with their charge, while the plant in return provided habitations for the ants, and either special secretions and fruits for their sustenance, or juices for the support of their domestic cattle: the relation between the two being so close that neither could thrive without the other.

It appears from the investigations of Mr. Britten, of the Botanical Department of the British Museum, that this remarkable sort of partnership is not so rare as has been supposed. His attention being called to the matter by Mr. Belt's observations, Mr. Britten has gone over the books and material at his command, and collected the scattered notices of ant-tenanted plants, a *resumé* of which he gives in a long article in the *Popular Science Review*, mentioning the following orders and genera as affording known examples, and specifying the parts of the plants which the ants inhabit

Leguminosæ: Acacia, various species: thorns.

Melastomaceæ: Tococa, calophysa, mycrophysa, myrmidone, and *maieta*, various species: petioles and leaf bases.

Rubiaceæ: *Myrmecodia* and *hydrophytum:* tubers. *Remijia*, petioles.

Gentianaceæ: *Tachia Guianensis:* stems.

Boraginaceæ: Cordia nodosa: base of petioles.

Verbenaceæ: Clerodendron: internodes.

Polygonaceæ: Triplaris, various species: trunks and branches

Artocarpaceæ: Cecropia peltata: trunks and branches.

Orchidaceæ: Schomburgkia tibicinis: pseudo bulbs.

One of the most striking instances of this sort is afforded by *myrmecodia tuberosa*, to the very existence of which it is essential that the tuber should be tenanted by ants. It was discovered by Rumpf, in Amboy, something over a hundred years ago; but he was uncertain whether the whole was a vegetable or whether the tuber was an ant's nest from which the plant sprung. It presents the form of a large, irregular tuber, from which spring a few thick, fleshy leaves crowded together at the summit. Dr. Beccari, who has lately collected the plant in Borneo, has watched the development of the tube throughout all its stages. The seed is surrounded by a viscid pulp, resembling that of the mistletoe, and readily attaches itself to the branches of trees on which it falls. It is probable that birds aid also in its distribution. The seed soon germinates under favorable conditions and unfolds its cotyledons; the stem develops slightly, then stops until a particular species of ant burrows a small lateral cavity at its base. The wound determines a great development of cellular tissue, as the sting of the cynips causes galls on the