Scientific American.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS.

One copy, one year, postage included..............................$3 20

One copy, six months, postage included..............................1 60

Club Rates.

Ten copies, one year, each $2 70, postage included..............................$27 00

Over ten copies, same rate each, postage included..............................2 70

☞ By the new law, postage is payable in advance by the publishers, and the subscriber then receives the paper free of charge.

NOTE.—Persons subscribing will please to give their full names, and Post Office and State address, plainly written, and also state at which time they wish their subscriptions to commence, otherwise the paper will be sent from the receipt of the order. In case of changing residence, state former address, as well as give the new one. No changes can be made unless the former address is given.

If any of our readers fail to receive their numbers regularly; if the direction is not plainly written; if premiums are not received; or if there is fault of any sort at this office, we will thank our friends to send us postal card complaints, and repeat the same, if need be, until the remedy is effected. *Do not hesitate to complain.* We desire to keep all matters between ourselves and patrons right and satisfactory.

VOLUME XXXIV., No. 16. [NEW SERIES.] *Thirty-first Year.*

NEW YORK, SATURDAY, APRII 15, 1876.

Contents.

(Illustrated articles are marked with an asterisk.)

THE SCIENTIFIC AMERICAN SUPPLEMENT.

No. 16.

With 51 Figures and 60 Articles.

For the Week ending April 15, 1876.

TABLE OF CONTENTS.

A GOLD lacquer closely resembling the real Chinese article is made by first melting to a perfectly fluid mixture 2 parts copal and 1 part shellac. To this add 2 parts good boiled oil. Remove the vessel from the fire, and gradually mix in 10 parts oil of turpentine. To give color, add a solution of gum guttæ in turpentine for yellow, or of dragon's blood for red, a sufficient quantity of coloring material being used to give the desired shade.

FLUOSILICIC ACID IN THE ARTS.

One of the compounds of silicon with hydrogen and fluorine, known as hydrofluosilicic acid, $H_2 Si F_6$, seems likely to become at some future time as useful and well known as it is now rare and untalked-of. It is not a new substance, but has long been used in analytical laboratories for precipitating potassium, one of the most difficult salts to precipitate; and also it is used for separating barium from calcium and strontium. About eight years ago, Tessié du Motay and E. Karcher attempted its manufacture on a commercial scale at Grossblittersdorf; but the Franco-Prussian war interrupted the business, which has never been revived. Their process consisted in smelting together in a shaft furnace, by means of a cold blast, a dry mixture of sand, clay, fluorspar, and fine coke. The gases evolved, consisting chiefly of nitrogen, carbonic oxide, carbonic acid, and fluoride of silicon, were passed through water in a condensing apparatus, when the fluoride of silicon was decomposed into silicic acid and hydrofluosilicic acid. The acid solution was either introduced into commerce in that form, or employed in preparing silico-fluoride of potassium and sodium. This process was quite imperfect, and, until a better one is devised, the manufacture of fluosilicic acid on a large scale is not likely to be revived. In the first place, not all the fluoride of silicon is decomposed by the water, and this involves a waste; secondly, some hydrofluoric acid is formed, which cannot be expelled, and this interferes with its usefulness in decomposing the chlorides of potassium and sodium. Finally, the silico-fluorides of potassium and sodium, when formed, are not completely decomposed by heat into fluoride of silicon and alkaline fluorides.

That it is highly desirable to devise a cheap and perfect method of manufacturing fluosilicic acid will be seen when we mention some of the uses to which it is applicable, although some of these are of less value to us than to our German neighbors. This is especially true in regard to the manufacture of fluoride of potassium from the Stassfurt brines, rendering its separation from the troublesome magnesium very easy. It can also be employed to separate sodium from sea water. The alkaline silico-fluorides are decomposed by heat into fluoride of silicon gas, which is utilized, and alkaline fluorides, which are easily converted into caustic alkalies by means of quicklime. Kessler has also patented a process for making soda from table salt, in which carbonate of lime is used. The fluoride of calcium produced may be used over again in making the fluosilicic acid, in place of fluorspar.

But there are many other uses to which fluosilicic acid may be put beside the preparation of caustic alkalies. It has been proposed to use it for decomposing bones, phosphorites, and sombrerites, in the manufacture of artificial fertilizers; while fluosilicate of potassium is itself a very suitable form in which to introduce this alkali into the soil.

Fluosilicic acid has been used in the manufacture of beet sugar, as it is able to precipitate the alkaline salts contained in the molasses, which hinder the separation of the crystallizable sugar. Their precipitation by this acid was first proposed by Von Kletzinsky and afterwards by Marix.

Combe and Wright recommend its use in the manufacture of glass and porcelain. They propose to replace the lime by silicofluoride of calcium, either alone or with the barium salt, in the manufacture of glass; and instead of carbonate of potash they would take the silicofluoride of potassium. Still more important is the substitution of fluosilicic acid for boracic acid in the lime, alumina, and other compounds used in English stoneware. Silico fluorides could scarcely be used for glass on account of the evolution of fluoride of silicon vapor when fused.

It may also be mentioned that it has been proposed and used in making artificial stone, for fixing stereochromatic colors, in making tartaric acid, as a substitute for this acid, as a mordant in dyeing and calico printing (in place of the drug bath), for whitening pins, for removing the lime from beet juice in making sugar, and many other uses. It produces an incomparably beautiful patina on brass, bronze, zinc, and German silver. A French manufacturer uses its sodium salt to make hard alloys rich in silicon. T. Christy has taken a patent in England for its use in the manufacture of ammonia from gas liquor.

It seems as if fluosilicic acid, notwithstanding the service it has already rendered, is not attracting the attention it deserves either from chemists or manufacturers. Let America take hold of the problem and show the old world what she can do with this curious and useful acid. On a small scale in the laboratory, it is made by mixing together pulverized fluorspar and fine sand, adding oil of vitriol, and heating. The gaseous fluoride of silicon thus formed is passed into water, precautions being taken to prevent the tube from choking up with precipitated silica. The products are pure gelatinous silica and a solution of hydrofluosilicic acid.

THE BAOBAB AS A FIBER PLANT.

The baobab (*Adansonia digitata*) has long been known as one of the giants of the vegetable kingdom. It has lately become an important source of fiber for papermaking. The fitness of its inner bark for this purpose was demonstrated some years ago, but it is only within the past decade that it has begun to rank as an important article of commerce. By the natives of Africa the bark is put to various uses: Twisted into string and rope, it is used for all sorts of purposes, and in untwisted strips it serves to secure loads and to bind together the poles employed in making their huts. Finer pieces are pulled out so as to resemble coarse netting; and the edges being sewn together, they make handy bags for cotton, gum, grain, and the like. Coffee and ground nuts are brought down from the interior to the coast in very strong bags woven from thin strips of the bark.

The bark is obtained by first chopping off the softer outer bark of the tree with a hatchet, after which the inner bark is stripped off in large sheets. The pieces are beaten with a stick to soften them, and shaken to get rid of some of the pithy matter which they carry. The sap is then dried out in the sun, and then the fiber is pressed into bales for shipping. The smaller trees produce the finest and softest fibers. The bark is taken off all round the tree, which does not appear to suffer much injury. A fresh layer of bark grows and is thick enough to be taken off in six or eight years. Mr. J. J. Monteiro, who has the credit of adding this valuable fiber to the resources of the paper trade, tells some amusing stories of the difficulty he experienced in developing the business of collecting the fiber. By paying liberally, he induced some of the natives to take hold of the new work at last, and matters went on tolerably smoothly until a season of drouth came on. The fetich men declared that the "big iron"—his hydraulic press—had fetiched the rain and prevented its appearance. The matter was discussed throughout the country; and at a general meeting of the people of the neighboring towns, it was decided to apply the usual tests to the big iron, and, if it proved to be a sorcerer, to destroy the press and throw it into the sea. It is the custom in those parts to try all cases of supposed witchcraft by subjecting the suspected to the ordeal of poison. For this purpose they use *casca*, the bark of a large tree, the *erythrophlæum Guineensis*, which acts either as a violent emetic or as a purgative, innocence or guilt being determined by the manner of its action.

In the case of the press, the application of this simple and, to them, perfectly satisfactory test was seriously interfered with by the absence of any stomach or insides to the big iron, for the poison to take effect on. After much deliberation it was resolved to employ a substitute in the person of a slave to the king. To this unwilling representative of the big iron the *casca* was duly administered, and luckily acted as an emetic; so the press was declared innocent of bewitching the rain. Still the rain held off, and grave suspicions arose as to the sufficiency of the trial. To resolve all doubts, the poor slave had to undergo the ordeal a second time, fortunately with the same result, and the press was never more suspected of complicity with evil spirits.

THE SECRETS OF MAKING VIENNA BREAD.

One of the most practical and useful works which has recently emanated from the government printing office, at Washington, is Professor E. N. Horsford's report on the subject of Vienna bread. Professor Horsford was a member of the United States Scientific Commission to the Vienna Fair of 1873; and the present book is the result of careful and exhaustive research, the aim and object of which was to unearth the secret of the world-famed bread peculiar to the Austrian capital. There is something very appetizing in his description of the *Kaiser Semmel*, as the bread is there termed. It is "a smooth, irregularly rounded small wheaten flour loaf, of uniform weight. It presents a rich reddish brown crust and a delicately shaded yellowish, almost white, interior. It is always light, evenly porous, free from acidity in taste or aroma, faintly sweet without the addition of saccharine matter to the flour or dough, slightly and pleasantly fragrant, palatable without butter or any form of condiment, and never cloying upon the appetite."

The reverse, the Professor might have added, on one hand, of the dyspepsia-breeding, doughy compound which passes for bread in many a country home, and of the attenuated, alum-treated, tasteless loaf which is produced in many a city bakery. It seems, however, that these gastronomic abominations are not necessary evils, and that, despite the repeated efforts which have been made to imitate Vienna bread out of Vienna, which have uniformly failed, a way does exist of producing it in all its delicacy. And that way is very simple, as the reader will see by the following:

The first requisite is to procure as good flour as the Vienna bakers have. Good flour can only be made from pure sound wheat, and by good milling. This means in general flinty wheat reduced by the process of high or half high milling, and a selection of the products of the milling, not to exceed one half the total weight of the wheat ground. Good fresh middlings flour, Professor Horsford says, would compare favorably with the average Hungarian flour used in Vienna.

The next requirement is fresh pressed yeast. This is already made in the United States. It is not difficult to manufacture, since it is made by skimming the froth from beer mash in active fermentation. This contains the upper yeast, which must be repeatedly washed with cold water until only the pure white yeast settles clear from the water. This soft tenacious mass, after the water has been drawn off, is gathered into bags, and subjected to hydraulic pressure until there remains a semi-solid, somewhat brittle, dough-like substance, still containing considerable water. This is the pressed yeast, which will keep for eighty days in summer and for an indefinite time on ice. For use it should be of recent preparation and sweet, so that it will yield only alcohol and carbonic acid as products of fermentation.

Next follows the very important operation of mixing. Into the middle of a zinc-lined trough, about 2½ feet wide and 8 feet long, semicylindrical in form, the Vienna baker empties his flour sacks. Then, into a pail holding about five gallons, equal parts of milk and water are poured, and left to stand until the mixture attains the temperature of the room, between 70° to 80° Fah. It is then poured into one end of the trough and mixed with the bare hand with a small portion of the flour to form a thin emulsion. The press yeast is