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The Manufacture of Zinc and Zinc White.

That beautiful snow white substance, the oxide of zinc, which, during the past fifteen years, has come into extensive use in the arts as a substitute for white lead in paints, is produced in enormous quantities in this country. One of the most extensive manufactories of zinc and zinc white is at Bethlehem, Pa., and is described as follows by an able correspondent of the New York *Times:*

At the works of the Lehigh Zinc Company, two processes are carried on the manufacture of oxide of zinc and the manufacture of metallic zinc for rolling into sheet zinc, etc. Either process is very interesting.

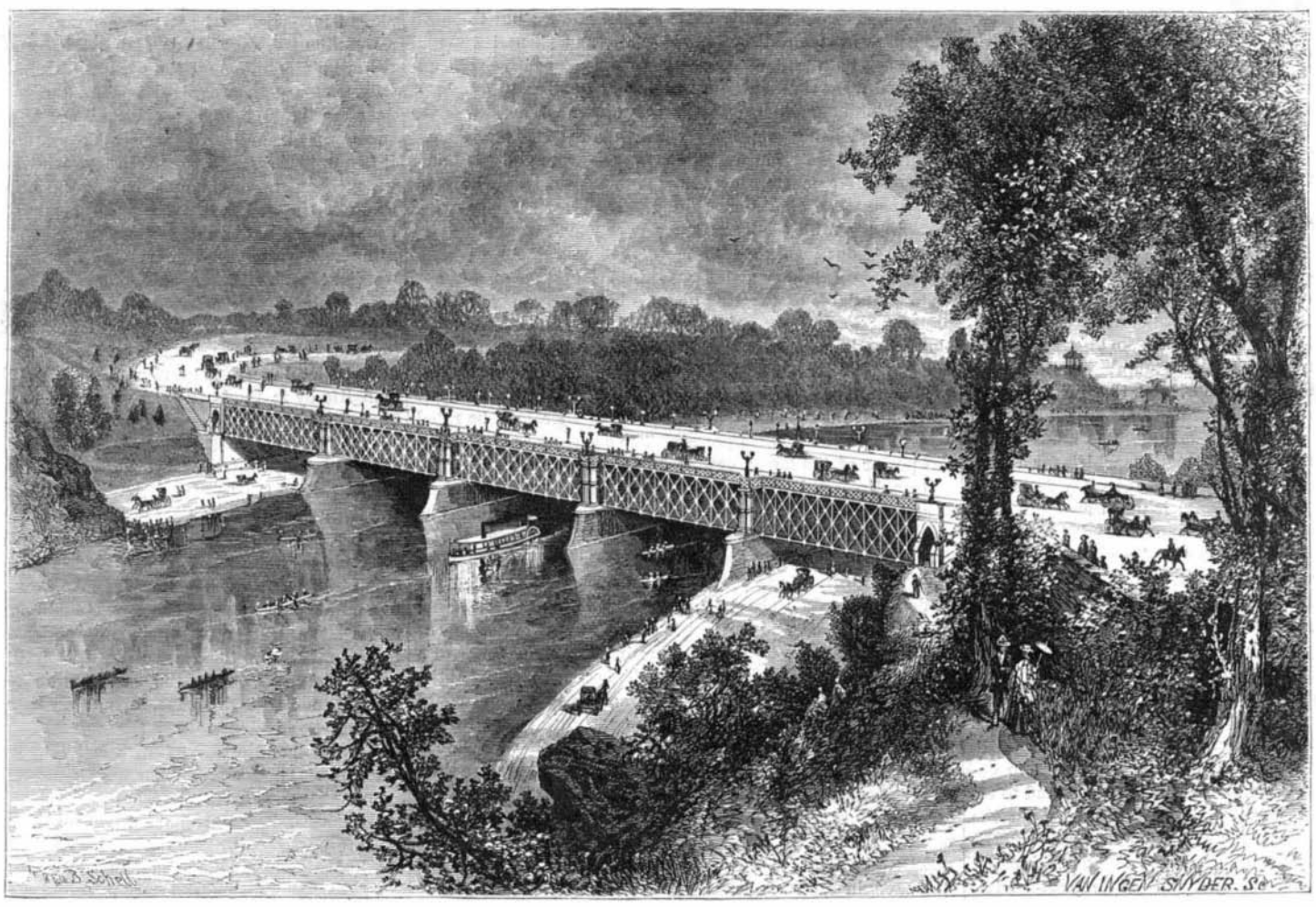
The making of metallic zinc—or spelter, as it is termed in the markets—is one of those wonders of the chemical world which are so astounding and so fascinating to witness. The three kinds of zinc ore—sulphuret, carbonate, and silicate of zinc—are found in the company's mines. From the two first the sulphur and carbonic acid can be expelled by roasting the ore; the silex, however, cannot be got rid of. When the ore is ready for the furnaces, the zinc in it is composed of oxide of zinc and oxide of zinc combined with silex. The ore is then mixed with 33 per cent of crushed coal and placed in dry clay retorts, each holding 27 lbs. of the mixed coal and ore. These retorts are placed in layers, fifty-six in a furnace, the face of which is sealed up with fire clay, the orifices of the retorts being cemented in conical shaped tubes of baked fire clay, which project 18 inches from the furnace, and act as condensers.

The firing up is then carried on till the heat of the furnace is 2,160°, Fah. the vaporizing point of zinc.

The reduction of the zinc in the ore into metallic zinc vapor is done by means of the carbon and carbonic oxide gas depriving the oxide of zinc of its oxygen, and liberating metallic zinc as a vapor. This vapor is carried forward by the gases (which are formed by the reduction of the oxide of zinc) into the conical tube condensers, which project outside the furnace, the temperature of which is far below the vaporizing point of zinc attained in the retorts inside, and sufficiently low to condense the vapor into liquid metal. When this condensing process is going on, men go round the different furnaces and, with iron hooks, draw out the melted zinc into large ladles, from which the zinc is poured into iron molds and cast into slabs of 30 lbs. weight. The gaseous flames which issue in great force from the orifices of the condensers are intensely brilliant and of all the colors of the rainbow—the brightest yellows, reds, violets, and greens. As there are sixteen stacks of furnaces, each having fifty-six retorts, the beauty of the colors at night may be easily imagined. The furnaces are charged twice in the twenty-four hours, each charging taking 1,500 pounds of ore and coal. This process is known as the Belgian process.

While still hot, the slabs of metallic zinc are taken from the molds and rolled into rough thick plates, which are cut into two pieces. From nine to twelve of these pieces are placed in iron boxes in muffle heating furnaces, and are heated up to 300°, hot enough to make water dance upon them in spherical globules before it evaporates. As soon as this heat has been attained, the pack of plates is taken out and they are all rolled out together. In twenty-five minutes the plates, two of which formerly made a slab of 10 by 18 inches, are rolled out into sheets which, when trimmed, are 7 feet by 3 feet. Of the importance of these works it is unnecessary to say more than that their capacity is nearly equal to producing one half the metallic sheet and oxide of zinc consumed in this country. The company makes annually 3,600 tuns of metallic zinc, 3,000 casks of sheet zinc, and 3,000 tuns of oxide of zinc.

To make oxide of zinc, the carbonate and silicate of zinc, beyond being crushed and mixed with thirty-three per cent of coal, is put into large fire brick furnaces just as it comes from the mines. Air is blown into the furnaces, and the oxygen in it oxidizes the metallic zinc vapor, for which it has a great affinity, as soon as it is liberated. The oxide of zinc is thus formed, and is propelled by air forced into the furnaces into a high tower in white flocculent particles, with which are associated coal ashes and particles of other foreign substances. It is driven by powerful blowers through a series of chambers connected by pipes; the majority of the oxide associated with impurities deposits in the tower, and the less impure in the chambers and cooling house, the most flocculent and purest passing through pipes, to which muslin bags are attached and in which it is collected. The best is like white wheat flour, though very much heavier, an almost impalpable powder. There are fifty-two of these brick furnaces in the works. They are charged every four hours, from 750 to 1,000 pounds making a charge. The pressure of air forced in is twenty-four pounds to every square foot of furnace.



GIRARD AVENUE BRIDGE, PHILADELPHIA.

How to Search for Metals.

A correspondent, C. G., Virginia city, Nev., having read an article on this subject on page 133 of our current volume, states that, in his experience, all the gold and silver west of the Mississippi is found on the Sierra Nevada and not on the Rocky mountains. He also states that gold has been found in limestone, some of the richest ore he has ever seen being rock of that description; and that it is often found in the beds of rivers, those of the Yuba and Feather having continued to yield it from the year 1849 to this day. Leads of gold ore do not become poorer as the search is prosecuted to a greater depth, and silver ore becomes more plentiful under similar circumstances. C. G. has seen both gold and silver in limestone, black spar, white spar, granite, slate, porphyry, and conglomerate in which everything seemed o be melted together.

Peat Ashes as a Fertilizer.

M. Lebœuf, a large cultivator of asparagus and strawberries, of Argenteuil, France, has recently obtained some advantageous results from peat ashes used as a fertilizer. He filled three pots with the substance without any other admixture and planted in one oats, in another wheat, and in the third strawberry plants; leaving them through the winter without attention, germination took place, the wheat and oats sprouted and bore large and heavy grains, the stalks attaining for the wheat a hight of 4·5 feet and for the oats 3·6 feet. The strawberries were unusually vigorous. M. Lebœuf has repeated the experiments several times with uniform success.

Railway Management.

The London *Railway News* gives some interesting comparisons between English and American railway returns. In regard to rolling stock and train earnings, it is surprised to find that our roads are more economically run than their own. Taking four roads in each country, aggregating about 4,000 miles, it is found that the American road has only ·33 of a locomotive and 6·72 freight cars per mile, while the English has ·93 of a locomotive and 28·83 cars. The New York Central, with a heavier traffic than the London and Northwestern, has not half the locomotives per mile. The English refuse to believe that the superior size and strength of American locomotives account fully for this difference. The earnings for instance of an American locomotive are 70 per cent more than those of an English, and the entire rolling stock, which, in England, barely pays for itself in a year, in this country pays for itself and 65 per cent more.

The *News* also discovers that, while passenger fares are 30 per cent lower than in England, the earnings per train here are 40 per cent more, and on freight trains 15 per cent more It concludes that it is time for English managers to study our system.—*Railway Review.*

Hints to Inventors.

A correspondent, J. W. K., says: If manufacturers of rubber goods would get up a style of rubber picture frames that would permit the picture to be easily removed, they might sell many of them. The frames should be made so as to exclude dust and rain from the picture, and would then be useful for outdoor advertisements or bulletins.

Cannot some one manufacture an apparatus to obviate the necessity of turning the leaves, in short hand or long hand reporting? A tablet with a roller at the upper and lower ends, the upper rollers to work with a spring so as to move the paper the proper distance each time the spring was touched with one of the fingers of the left hand, and thus present a fresh surface of paper to the writer, would be very useful. It might be arranged so that the reporter could have his eyes at liberty to watch the speaker during most of the time and yet write legibly and in straight lines. Such an apparatus would be convenient for the blind, for persons with weak eyes, and for writing where the light was insufficient. The paper should be made in sheets long enough for one or two hours' writing in phonography.

DURING the visit of the late Mr. Seward to China, while in Pekin, he visited the residence of a wealthy native who was withal a mandarin and an intelligent man, somewhat scientific in his tastes and well acquainted with the modern appliances for household purposes. Among other objects contained in this Chinaman's residence was a Yankee cast iron pump. To Mr. Seward's enquiry as to the use he made of the pump, Yang Fang replied: "It is set up to extinguish accidental fire, and I put the women under it when they quarrel." He had five wives.