IMPROVED ELEVATOR FOR GRANULAR MATTERS.

Our illustrations show an ingenious adaptation of the injector principle to the elevation of corn and other granular material, utilizing the power of the steam directly, and saving the expense of the usual rotary mechanism. It is the invention of Messrs. Körting Brothers, of Hanover, Germany, whose improvements on the injector are too well known to need recapitulation here; and the inventors describe it as especially adapted for raising pulverized charcoal in sugar refineries, but the adaptability of the principle to our grain elevators is sufficiently obvious.

An hermetically closed receptacle, D, is supported above the point to which the charcoal is to be raised, and a partial vacuum of greater or less pressure is created therein by a steam exhauster, V. The receptacle, D, is connected by a suction tube, C, with the suction base, A, Fig. 3, which takes up (by a bottom opening, O, and a suction opening, B) the air, and carries it in upward direction with a velocity corresponding to the force of the vacuum created in the receptacle. The current of air acts on the charcoal entering through the funnel-shaped part, A, Fig. 3, of the suction base, and carries the same, through the suction tube, C, upward into receptacle, D, where the charcoal, owing to the reduced velocity of the air in the larger receptacle, falls by gravity, and the air is drawn off through the exhauster. The exit tube, E, extends from the bottom of the receptacle, D, to the point of discharge, and has an automatically working valve, K, which is opened by the weight of the charcoal in the discharge tube. The tube, E, must be of such a length that the body of charcoal in it when the valve, K, is opened will be of sufficient thickness to prevent the air from entering the receptacle, and therefore the exhaust air will be compelled to pass through the suction base, and be available for for raising the material. A funnel below the discharge valve may be connected by a telescope tube with the filters, etc., to convey the charcoal directly to the point where it is required for use. The quantity of charcoal, etc., raised is regulated by the exhauster and the adjustable base. No engine is required; and as a steam pipe is all that is necessary to work the elevator, the apparatus may be erected at any point in a factory. The construction is simple; and the elevator needs hardly any repairs, and is always ready for use. Moreover it does not pulverize the charcoal, a fault common to the various belt and bucket elevators, and one that occasions considerable loss.

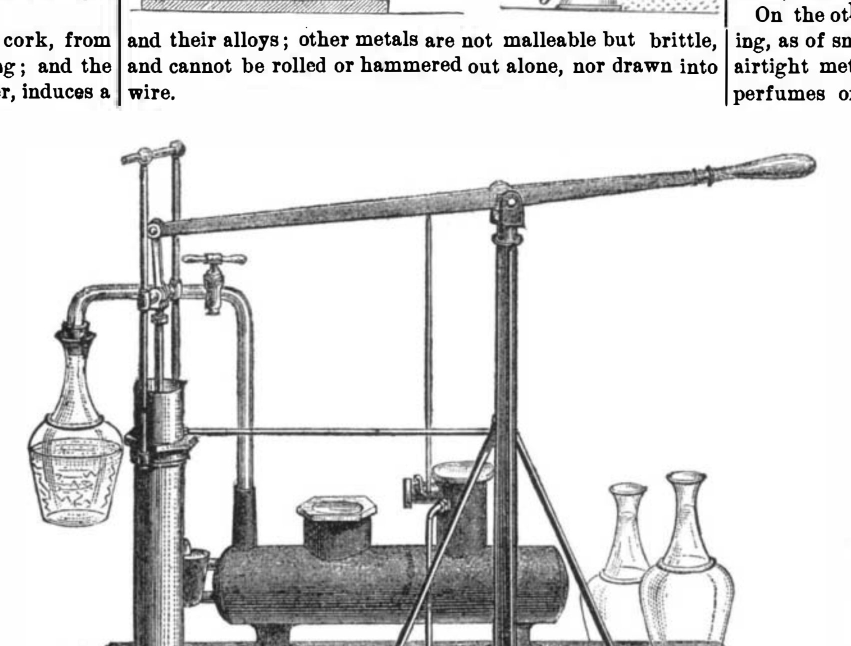
FROZEN WATER IN BOTTLES.

Visitors to Paris are well acquainted with the glass bottles containing water frozen into solid blocks which are delivered every morning by *La Société des Carafons Frappés* to its customers; and the country cousin wonders indefinitely as to how the block of ice is put into the bottle. A new method of congeling such bottles of water has recently been introduced by M. Carré, an inventor whose success in the introduction of freezing machinery is well known.

Freezing water in a vacuum is a common lecture room experiment, and it is readily done by placing water in a saucer under the bell glass of an air pump, and exhausting the air; when the ebullition caused by the withdrawal of the aerostatic pressure ceases, congelation begins. It is not difficult to understand the sequence. In passing from a liquid to a vaporous condition, without the aid of heat from outside, the water must borrow some heat from surrounding objects; and this heat passing off in vapor, the remaining water quickly becomes frozen. M. Carré has utilized this process in a very ingenious manner, and has reduced it to a very simple and economical method, capable of domestic use.

The bottle is suspended, by means of a rubber cork, from the nozzle of a pipe, as shown in our engraving; and the withdrawal of the air, by working the hand lever, induces a speedy commencement of ebullition. The rising vapor is drawn through an intermediate vessel filled with sulphuric acid, which at once absorbs and condenses it, and congelation commences in the middle of the water in the bottle; and from the first formed particles, needles of ice soon radiate in every direction. Their number augments in geometrical progression, and their size increases as you behold them, until, in less than one minute from the commencement of the operation, a bottle of water (a liter, four fifths of a quart) is frozen solid with very little exertion.

This seems to be a handy apparatus for use in places where ice is not readily obtainable; and the only inconvenience in its use is the presence of sulphuric acid, which in this relation soon becomes diluted till it is inefficient for its purpose. But it does not seem to be difficult to render the dilute acid marketable, and the attention of chemists may well be turned in this direction. It seems that the hard treatment which the public in some places has for many years suffered at the hands of ice companies may soon be avenged. Ice is now being made and sold in London for 10s. ($2.50) per tun; and if a more simple method of doing this can be introduced, so that the indispensable commodity may be made in every grocery or household, the storing companies, with their huge monopoly, their cumbrous carts, and their high charges (owing partially to risk of storing too much, to the great waste, and to interest on money sunk in the process), may soon be gone from among us.



CARRE'S FREEZING APPARATUS.

Lead and Tin Foil.

Many metals and alloys can be hammered or rolled into thin sheets, and in this operation the ordinary molecular structure, which they have when cast, is changed, and they become more dense. Among these metals are gold, silver, copper, tin, platinum, lead, zinc, aluminum, iron, nickel, and their alloys; other metals are not malleable but brittle, and cannot be rolled or hammered out alone, nor drawn into wire.

Fig.1.

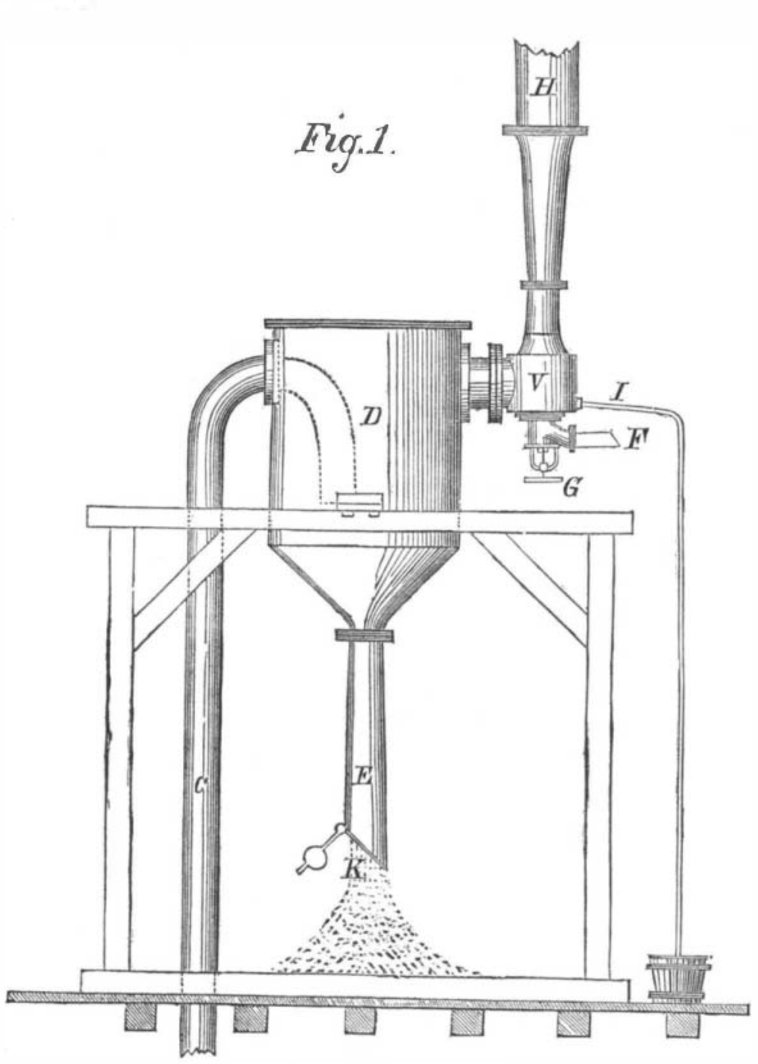


Fig.2.

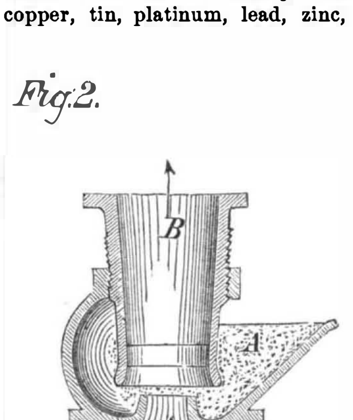
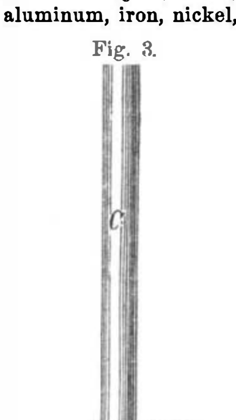


Fig. 3.



KORTING'S ELEVATOR.

Beside the noble metals, which were used by the oldest civilized nations, bronze (an alloy of copper and tin) was also employed by the ancients for useful utensils, for at the present day a glance at Pompeii teaches us how extraordinarily artistic and neat were the water vessels, stands, and holders of all kinds, as well as the water spouts adorned with bronze figures. We know that the Romans, and perhaps the Phœnicians, obtained their tin from England. But the common metals then known, like copper, tin, lead, and iron, were not prepared in such large quantities, and consequently must have then represented a much higher relative value than now.

Lead, which occurs in Nature, for the greater part, in combination with sulphur only, as sulphide of lead (galena), is the easiest of all metals to reduce from its ores, being obtained at a comparatively low point of fusion. For this reason, as well as on account of the frequent deposits of lead are in the old world, especially in Greece, Sardinia, and Spain, civilized nations employed metallic lead extensively for pipes and in sheets. In almost every house newly excavated in Pompeii, there may be seen the thick cast lead pipes, with the names of different firms and the place of manufacture cast upon them. These antiquities are chiefly preserved in the museum at Naples. Not only Rome and Greece made use of this easily fusible metal, but even the still older nations of India and China possessed, and still possess at the present time, great skill in smelting lead and tin. Proofs of this are the well known genuine tea chests which are lined with lead, packed, and soldered up in China for shipment.

The Chinese employ an alloy of lead with some tin and copper to prepare metallic foil as thin as paper, in which large lots of tightly pressed tea are packed and shipped to all parts of the globe. The fusible alloy is melted and poured on a smooth stone; and as the mass solidifies slowly, because the amount of heat for fusing can only be small, the Chinese workman has time enough to throw a second smooth stone upon the still liquid mass, and finally, in primitive style, jump upon it so as to increase the pressure. The Chinese people are so extraordinarily conservative in their customs that we cannot expect that this method of making sheet lead will suffer any advance by the introduction of rolling or hammering. In Europe especially in Germany, it is not so very long since men were obliged to work with very limited aids. Then there sprang up in Venice, and afterwards in Nuremberg, the mirror makers, who employed their tin foil with mercury for covering the glass plates.

A mirror of the size that we are accustomed to have now could not be obtained in the last century, because the sheets of tin foil were not large enough to make them; besides, the wide cylinders for mirror glass could not then be made.

The demand for larger sheets of metal was satisfied gradually by the progress and extension of machine building, although large plates of copper, tin, and iron had already been hammered out with great skill. A few decades ago snuff was packed in rolled lead foil, but this has been prohibited for a long time. In its place has appeared pure tin foil, which is quite cheap on account of its great thinness and small specific gravity. By reason of its manufacture in larger quantities and new discoveries of tin ore in Australia, the price of tin foil has fallen to one half its previous price.

Tin foil is chiefly used for a reliable airtight covering. Like the well known tin boxes used for preserving food on a sea voyage, so wrapping an article in tin foil protects it from the external air so that it does not decay. Extract of meat, sausage, cheese, etc., are protected in this way.

On the other hand, tin foil prevents evaporation and drying, as of snuff, wine, liqueurs, bouquets of flowers, etc. The airtight metallic wrapper preserves the costly odors and perfumes of many fine articles, as chocolate, fine cigars, vanilla, cosmetics; there is in fact no more reliable protection against the volatilization of valuable odorous substances than the nonpoisonous metallic foil referred to. Not only is this object accomplished, but with it are combined neatness and elegance, the useful and the agreeable, since the silver-white, polished, and mirror-like shining metal makes a better impression of neatness than any other envelope for a commercial article. This exterior at once adorns the contents and indicates their high value.—*A. Andersohn.*

PIG IRON IN THE UNITED STATES.—The production of pig iron in the United States last year amounted to 2,689,413 tuns, as compared with 2,868,278 tuns in 1873, and 2,854,558 tuns in 1872. The following States made more iron in 1874 than in 1873: Maine, Vermont, Massachusetts, New York, Virginia, Georgia, Alabama, Texas, West Virginia, Tennessee, Ohio, and Michigan. The following States made less iron in 1874 than in 1873: Connecticut, New Jersey, Pennsylvania, Maryland, North Carolina, Kentucky, Indiana, Illinois, Wisconsin, and Missouri. The greatest increase in 1874 occurred in the miscellaneous bituminous coal and coke district in Ohio; the greatest decrease in 1874 took place in Lehigh, Pa.