NEW YORK, APRIL 8, 1848.

Iron.

Iron is the most valuable of all metals : and although it is not estimated to be of equal value with gold, yet our remark will not be invalidated for incorrectness, any more than if we compared coffee or spirits with pure water by a just standard of intrinsic worth. Iron has the remarkable property of being welded, in other words, two separate pieces of iron, like the fabled serpents of mythology, can be united together by heat and the action of the hammer. Platina alone of all other metals, has this same quality. This is one property in iron which makes it so valuable, because it can be forged into so many different shapes. It is therefore used for almost every purpose, such as house building, ship building, machinery of every description, in medicine and for coloring. Within the past ten years iron has been applied to a greater variety of purposes than ever could have been anticipated by the most sanguine philosophers of old. To some of these applications, namely, bridge building and tunneling, we would desire to direct attention for a few moments.

Suspension bridges are no longer problematical, they have been " weighed in the balance and not found wanting." But although success has attended suspension bridges and genius and skill have triumphed over supposed impossibilities, yet no sound practical man can doubt for a moment that there is a limit to the extent of our powers—a line beyond which man cannot extend the sceptre of mechanical dominion—a line beyond which the laws governing practical mechanics, so far as we understand them yet, seem to be suspended. The fall of the Dee Bridge in England aroused attention to the subject on both sides of the Atlantic, and there has been a wise setting down of the Scientific to schemes of perfect practical utility, and not Icarus like, attempting flights to the sun on waxen wings. We would not, however, be supposed to speak a word against experiment, but would only caution against the supposition that experiments successful on a small scale will all be equally so on a large scale. Science and art have now been carried to such a state of perfection that it is almost impossible to define its limits —to point out the line of demarcation which bounds the empire of mechanical genius. Tubular bridges are rising up on the other side of the Atlantic like the mighty works of the fabled Titans. A single iron tube has been thrown over the river Conway in England, which weighed 1300 tons—as heavy as some of our largest packet ships. An iron bridge will soon span the gulf of Niagara, and countries that have been separated for ages by the furious waters of the whirlpool will then be linked together by a metal dug from beneath the dust upon which we tread This is truly the age of iron—iron intellect and iron enterprise.

Method of Silvering Cast Iron.

The combination of iron with carbon, cast iron, from the ease with which it melts, and the consequent possibility of taking the finest impressions of form, has come into very extensive application. The art of founding, converts cast iron into enormous arches, columns, cannons, and also into the most delicate bracelets. ear-rings, &c. Unfortunately the moist atmosphere very soon alters the surface of these objects, and it is found necessary to coat them with paint, which gives the cast iron a color which is of itself not very attractive—the appearance of mourning. In the present state of the art of founding, cast iron might easily be substituted for bronze were it not for its sombre appearance, which entirely excludes it. This disadvantage may however, be entirely overcome, from the possibility of plating it with silver ; in fact cast iron may be readily silvered, and equally as well as copper and bronze. The liquid for silvering is prepared in the following manner, viz. :—Cyanide of potassium is introduced into a stoppered vessel, and freshly prepared pure chloride of silver, still in a moist state, added, the whole being covered with water, and shaken violently for some time at the ordinary temperature. An excess of chloride of silver is taken, and should a small quantity of it remain undissolved, a few more of the cyanide are added after some time, taking care however, to avoid having an excess of the latter salt, but always a small quantity of undissolved chloride at the bottom of the vessel. This last circumstance is important, because when the liquor contains too much free cyanide of potassium it is easily decomposed, and moreover does not silver so well ; before employing it, it is filtered, and is thus rendered perfectly clear, iron and a little chloride of silver remaining on the filter. The plating is effected by means of a galvanic pair of plates, consisting of zinc and a coke cylinder, which are separated from each other by means of an earthen diaphram. The pair are placed in a glass vessel containing dilute sulphuric acid, and dilute nitric acid is conveyed into an earthen diaphram Experience has shown that the best mixture for the coke cylinder should consist of 5 parts by weight of finely pulverized coke, 6 parts pulverized coal, and 2 parts of common rye flour. When the cylinders are dry they are placed in earthen crucibles, in the lids of which there is an aperture for the escape of the gasses, and are then heated to redness. Those cast iron objects may be most easily silvered which have not been painted, as the removal of the paint from the surface is somewhat difficult. The cleansed object is immersed in the silver solution, and connected with the zinc pole by means of a conducting wire, and a platinum plate immersed in the liquid at some distance from the object to be silvered, and connected with the coke cylinder. A plate of cast iron, of 5 square inches surface is generally completely plated in 30 minutes.

The Russ Pavement.

Roman roads, Macadamised roads, Railroads and Plank roads have become " famous in story," but there is another kind of road destined to be as famous as any of them, namely, the Russ Pavement, the invention of Horace P. Russ, of this city. Cobble stone pavements, block pavements and rosin pavements, have been weighed in the balance and found wanting, but the Russ pavement is just beginning to shine, and shine it must as there is " scarce any wear o't." This kind of pavement is now being laid down in front of our office, and we have a good opportunity to judge of its merits. We have no hesitation in saying that if all the streets in New York were paved with it, our city would possess more splendid paved streets than any city ever possessed, either ancient or modern.

The Russ pavement is made by first laying a foundation of dry concrete well beetled down, then a second substrata of wet concrete made with small split stones and plaster.— This substrata is laid down in pannels to give access to pipes and conduits below. The frames of these pannels have an edge thinned upwards to allow the concrete to be lifted out if required to get at water pipes and gas pipes below for repairing. Upon the top of this concrete is laid a strata of heavy granite blocks nearly square. These blocks are laid down across the causeway at right angles with the sidewalks and are beetled down solidly upon the concrete strata, a little sand being used for levelling. These blocks are about 15 inches long, 9 inches in breadth and 12 to 15 inches in depth, so that of themselves they would make a good pavement just embedded in sand, but being laid down upon the concrete strata and the pavement rounded but very slightly for draining off water, it makes a most substantial and perfect causeway. The blocks being laid down so that the abraiding action of carriage wheels will traverse the blocks in curves differing from the planes of clevage, is a good and scientific plan to make more permanent the most durable system of street paving ever introduced into our city. Mr. Russ secured a patent for his substrata on the 14th of last month.

For the Scientific American.

Economy of Power in Cotton Factories.

The rapid increase of manufacturing establishments in our country during the last ten years, has so enhanced the value of water privileges, that a good mill site cannot be purchased so as to make *water* much cheaper as a motive power than *steam*.

This circumstance has led scientific men to investigate the best mode of applying water to wheels to obtain from a given quantity its maximum effect. And no doubt many curious facts, and much useful information has been brought to light upon the subject, yet after all that has been said and done, we are of opinion that, in the proper manner of communicating power from the first mover to the several machines, the manufacturer has a study more worthy his attention in point of economy than is presented in determining what kind of water wheel shall be adopted. No practical man can visit our older manufacturing establishments without noticing the clumsy arrangement of their main shafting, the ponderous apparatus by which it is set in motion and the exceedingly small number of spindles and looms they can operate, compared with the capacity of their water wheel.

There are several particulars, which if duly considered by the manufacturer before erecting his mill, would not only give it a much neater and more compact appearance, at a less expense, but also an advantage in the saving of power, of more than twenty per cent over one where they have been neglected. A few of these we shall briefly notice, hoping some of your correspondents, whose age and experience enable them to do so, will take up the subject and treat it with greater ability.

The walls of a cotton mill ought to be constructed of brick or stone, and in no case of wood. The latter will always shrink and swell with changes of the weather, thereby throwing the main shafting " out of line," and causing an almost incalculable amount of friction in the bearings. This by the way is the occasion of so many wooden mills taking fire, and not, as some may suppose, the combustible nature of the materials.

A warm sun after a rain storm striking one part of the building while the other is shaded, the former will shrink first, and the shafting running the whole length must " bind" somewhere ; if in a place not exposed to view the lubricating substance is dried up, and heat enough may be generated before it is discovered to set the mill in a blaze.

Whether built of brick or stone, a solid foundation is the first requisite, and should never be compromised. If the site does not naturally furnish this, no expense ought to be spared in creating an artificial one. Having finished the building, the heating apparatus should be completed, so as to keep the several apartments at the highest temperature during, at *least*, six weeks before the shafting is fitted up. The machinery should also be placed on the floors in the mean time. This will give opportunity for the timbers to shrink and the floors and walls to settle, (a circumstance which always takes place to a greater or less extent, according to the nature and quality of the materials used,) without interfering with the machinery and shafting, as these are to be levelled in their places afterwards.

The *means* used for conveying power from the first mover to the line of shafting, if not in accordance with correct principles will very materially diminish its effective power.— The superiority of belting over shafts and gears for this purpose is now generally conceded. Indeed while nearly all the recently erected mills have adopted the former method, many of the older ones have substituted it for the latter.

The principal advantage of belting, results from the greater *speed* at which the line shafting can be driven with much less weight on the bearings than when shafts are used— for example, if 60 horse power is to be conveyed from the first mover to the third story of a building, say 36 feet, by cast iron shafting performing 100 revolutions per minute, something over four tons of metal would have to be employed, while six hundred pounds of belting would answer the same purpose.— This of course saves extra weight on the first mover equal to the friction caused by $3\frac{1}{2}$ tons. It is ascertained by experience that a belt 15 inches wide, moving at the rate of 3000 feet per minute, will convey 50 horse power. If however the belt should be 17 inches wide, it could be run much slacker, and make no more friction on the bearings than if 15 inches.— The error of making the belts too narrow has been made in every mill with which I am acquainted. As a general remark, machine makers should make all pullies for belts about one third wider than has been done hitherto. This would not only economise leather, but friction to an amount which would not be credited without actual demonstration. The smooth side of leather should be turned towards the pullies or drums, which should also be covered with leather.

W. MONTGOMERY.

(*To be continued.*)

Model of the Steamship United States.

This steamship built for Mr. Marshall of this city, and intended to ply between this port and Liverpool, has some peculiarity in her model which from her successful trial trip has led many to believe that she will beat any thing afloat. She certainly gives fair promise but " let not him that putteth on his armor boast," is an old and a very prudent rule of guidance. We will content ourselves to abide the results of a fair voyage. New York beats the world for ships and for marine steamers she will not be behind.

Another of Hoe's Presses.

The Boston Times has been compelled by its large circulation to procure " Hoe's fast press." There are only five of these presses yet in use, but they will soon engross all others. The first and second of them were used to print the Philadelphia Ledger, the third and fourth were made for the New York Sun. The fifth is that now in possession of the Boston Times. The sixth and seventh are being made and nearly completed, to be put up in the office of the New York Herald, and the eighth and ninth are ordered for Paris.

A Rich Man Gone.

John Jacob Astor, but a few days since the richest man in America is now rich no more in this world's goods. He is laid with the clods of the valley. He died on Wednesday, of last week. Concentrated wealth is dangerous in a Republic, but by our *no-law* of primogeniture inheritance, Mr. Astor's great wealth will soon spread in a thousand channels. Standing beside the grave of the rich, how forcibly cometh to our hearts, the thrilling warning, " lay not up for yourself treasures upon earth, but treasures in heaven."

Mission of Education.

The British Government have resolved upon sending out properly qualified schoolmasters and schoolmistresses to the colonies in different parts of the world, to conduct the public schools established there for the instruction of the natives.

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