For the Scientific American.

The Voltaic Battery.---Precipitation of Metals.

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In the article on gilding we endeavored to describe the process in such a manner that the watchmaker might conduct it with an apparatus placed under his counter. But electro-plating will be considered as a trade by itself, for the arrangements for this process are too extensive to be put in order and again abandoned on every occasion.

In commencing the business of electro-plating we must first provide an abundant supply of rain or other soft water.

The battery to be used may be the same as that described for gilding, except that it should be larger: each glass should hold half a gallon.

The vat to hold the solution of cyanide is of great importance; there is no vat yet contrived which answers well; the kind most generally used is constructed by making a double box, the inner one to be every way one half inch from the outer: into the space between the boxes melted pitch is poured, the boxes being previously secured in their relative positions by bars screwed to their upper edges.

To make the cyanide of silver, the metal must first be dissolved with nitric acid; this is very frequently a vexatious operation; commercial nitric acid is very generally contaminated with muriatic acid, this envelopes the silver with an insoluble crust of chloride, and so effectually defends the metal from the nitric acid. When a lot of nitric acid has been bought, it should be purified from muriatic acid by adding nitrate of silver to it till it ceases to precipitate the white chloride, the acid must then be violently agitated for a minute, when the chloride will settle and leave the acid clear, it is then to be poured off, and the chloride placed in a bowl, and some fragments of zinc put into it; the chlorine will leave the silver to unite with the zinc, and the silver will be precipitated pure in small brilliant grains, or as a gray sediment. The chloride of zinc may be washed off, and the silver re-dissolved in nitric acid.

The acid, when purified, will readily dissolve the silver; the metal should be put in an evaporating dish, and a portion of the acid diluted with half its weight of water poured on it; heat must now be applied. After the acid has ceased to act, it should be poured off, and a fresh portion of the dilute acid applied; this is to be repeated till all the silver is dissolved. By this method of adding the acid in successive portions, we avoid having an excess of acid with the nitrate of silver, and economise time, fuel and acid. The whole solution is to be returned to the dish, and while yet hot a slender stream of strong sulphuric acid is poured into the nitrate until it ceases to precipitate the white sulphate of silver. After the precipitate has settled, the blue solution of copper and free acid may be poured off and saved for the next time we want to dissolve silver, but as it contains some silver, this may be precipitated by adding common salt; after collecting the chloride it may be decomposed as before shown, and the acid and copper thrown away. The white sulphate may be washed to free it from the remaining copper and acid; this wash water must also be treated with common salt to save what silver it may contain.

The pure sulphate of silver may now have some water poured on it to dissolve a portion; not much will be dissolved, for it is very insoluble, yet ever so little will be sufficient. We must now gradually add a solution of cyanide of potassium till the white curdy cyanide of silver ceases to form; care must be taken not to add the cyanide of potassium in excess, as that would dissolve some of the cyanide of silver. After well agitating the cyanide it will settle down; the sulphate of potash should be poured off and the cyanide washed and dissolved in an excess of cyanide of potassium. The solution of silver made by this method will work smoother and keep longer than any other, and has the great advantage of being clear of acid salts and free potash.

The apparatus will now be ready for work, and, for distinction, we may divide the operations into two classes: the first will embrace the silvering of curtain furniture, trinkets, and everything not requiring a thick coating of silver. The second class will embrace table cutlery, door furniture, and the re-plating of old plated ware, and every thing requiring a durable coating of metal—this branch is properly electro-plating.

It is of the very first importance that the articles to be silvered should be perfectly clean at the moment they receive the first film of silver; or, in other words, that there should be no impurity between the silver and base: simple as this may seem, nothing can be more difficult to attain. Every metal will require a different process for cleaning, and where two metals form different parts of an article, the cleaning process is very difficult. Some things are cleansed by the wet method, and others by the dry—some by both.

The dirt or impurities may be divided into three orders—first, insoluble matters, as dust, earths, and the like—these are removed by sandpaper or brushing; second, grease—this is removed by soft soap, ley or turpentine; third, oxides—to be removed by acids.

To give the procedure for every metal or article, would be too tedious. We will give a few as samples:—Copper, after being freed from earth and grease, should be dipped into nitric acid, this will give it a brilliant appearance, when it must be well rinsed in pure water. Brass should go through the operation called dipping, which is extensively applied to curtain brasses and gas fixtures, to give them a golden hue: pulverised saltpetre is mixed to a paste with sulphuric acid, and the mixture set aside until done fuming; a little dilute sulphuric acid is then put to it, and the brass immersed, when a brisk action takes place, and the brass, if free from lead, acquires the golden hue; it should be immediately rinsed in hot water and put in the vat to silver. Old plated ware is to be immersed for half a day in a dilution of soft soap with turpentine and rosin, taken out, well brushed, and placed in strong ley for an hour, then well polished with dry whiting.

The articles to be silvered must be connected with the zinc end of the battery and immersed in the vat; and every article should be opposed by a silver plate of the same size and attached to the silver end of the battery. The dipping into the vat should always be the last thing to complete the voltaic circuit.

After the articles are silvered they should be immersed in water containing a little sulpuric acid, then rinsed in hot water, dried in saw-dust and gently heated for one hour; they may then be burnished.

The operation of silvering, continued till the film is of some thickness, constitutes electro-plating; let the beginner thus plate some spoons or a door plate; he will find it no easy matter to get a smooth coating, and uniformly as thick as required for a door plate, and if he should here be successful, most probably he will find that when the articles are burnished the metal will peel off and rise in blisters by a gentle heat, and the silver will become dingy in a few hours after cleaning.

When the electro arts first appeared, many persons in the large cities began electro silvering, but when they came to try electro-plating they quickly abandoned their new trade.

We will consider these defects and their prevention in the next paper.

The Linen Trade of Ireland.

"In 1830 the protective duty on Irish linen was removed in Ireland, and at that time there were about 1,000 dozen French cambric handkerchiefs imported into England for every 100 dozen made in Ireland. In the next four years, from 1830 to 1834, the Irish manufacture was in the proportion of 300 to 1,000, from 1834 to 1838 as 900 to 1,000, from 1838 to 1842 as 4,000 to 1,000, and from 1842 to 1846 as 16,000 to 1,000 dozen. Since the withdrawal of the duty, great manufactures have arisen in the North of Ireland, and what was the result? Why, the great dealers in London waited on me the other day, and stated that whereas, ten years ago, three-fourths of the cambric and cambric handkerchiefs came from France, and one-fourth only from Ireland, in the last year the proportion was just reversed, one-fourth coming from France and three-fourths from Ireland."

The above is an extract from Sir Robert Peel's speech in 1846, and the inquiry naturally suggests itself, "what has been the cause of this remarkable increase in the Irish linen manufacture?" Well, this great increase of Irish manufacture is the result of an invention in the finishing of the articles. The inventor is a Mr. Adam Howie, of Woodburn, Carrickfergus, in the North of Ireland. He is a practical bleacher and finisher, and introduced the improvements at the Lambeg Bleach-works, near Lisburne; they have since been introduced into all the bleach-works in the province of Ulster, and they enable the manufacturers to compete successfully now with the French. The finishing of goods has as much to do with the sale of them as the quality of the material and the weaving. Goods made out of the same quality of linen, cotton, or wool, may be submitted to exactly the same operations, excepting the finishing, and the one class may sell for 25 per cent. more than the other, owing to their superior finish. Here we have a striking example of the superior finish of a certain class of Irish goods affecting the whole industrial prosperity of a large province (the most enlightened portion, to-be-sure) of Ireland. This should teach our manufacturers a useful lesson.

For the Scientific American.

Vacuum for the Transmission of Power.

There have been several instances of vacuum successfully employed for the transmission of power, and I am inclined to believe that there are many more in which the same might be applied to advantage, but the almost universal adoption of steam induces us to overlook the application of any other power. Air, the food of life, so many cubic feet of which we imbibe each minute, has its absolute requirement more generally acknowledged than its nature and properties are known. In reference to pneumatics, the ancients have been the legislative discoverers—consecutively came Aristotle, who shrewdly suspected the air to have weight; Hero, that suction would rarefy it; Galileo and Torricelli proved more correct and useful in their studies; and Papin, both in England, Auvergne and Westphalia, first applied, in a practical form, its transmission through pipes, for the obtainment of motive power; afterwards Pinkus, of Pennsylvania, who first and so eminently succeeded in establishing in England the propulsion of carriages on railways, on the principle of air acting in opposition to a vacuum, a principle which overcame the difficulties encountered by Medhurst in 1799, Bombas in 1828, Mann and Samuel Wright in the same year, who, employing compressed air, were ignorant of the chemical loss sustained by the escape of caloric evolved by compression, and necessary to the development of the power generated; and many attempts there have been to revive this exploded theory, by which the laws relating to pneumatics are directly impugned; for, independent of the chemical loss adverted to, the great friction of the air, increasing as the cube of its density and velocity, is of itself an insuperable obstacle to the use of long columns of compressed air, an example of which is recorded in the Franklin Journal, viz., of a three inch diameter pipe, one mile long, which, to drive a column of air through with a velocity of 128 feet per second, 1½ miles per minute, or say 80 miles per hour, required a pressure of nearly 5½ atmospheres, giving a delivery of 2,304 gallons per minute; and that a nine feet head of air, or 1-800th of a 9 feet head of water, through the same pipe, would generate a velocity of only 1 foot per second, or three-quarters of a mile per hour, whereas the initial velocity of ordinary atmosphere entering a vacuum, is 400 metres per second, or say 840 miles per hour,—thus showing the superiority of a vacuum over a compressed air force, and supposing a pure vacuum to be obtained, a propelling power of nearly 15 lbs. on each square inch would be given, which might, through the means of underground pipes, be conveyed any distance, and the first or prime mover, exhausting the air, be made to develope its power in a thousand different places, miles away from itself. I shall not intrude upon your space here to show the exact machinery by which such results could be accomplished, but certain it is that America, possessing the finest water power in the world, could, by a proper application of the theory treated on, secure for all her mills, factories and agricultural purposes, a power, safe and entailing no working cost or expenditure of fuel. Leaving the suggestion for more able hands, I remain, A. G.

New York, 1850.

The Arkwrights as they Are.

The following from the London Morning News will be read with interest by our readers engaged in the cotton manufacture:

Some months ago, when the head of the Arkwright family died, and his will came to be proved, the public were astounded, and some of them not a little alarmed, at finding the enormous extent of his wealth. The personal property was sworn to be under five millions! Under five millions! Why, five millions yield, at a rate of five per cent. interest, an annual income of not less than two hundred and fifty thousand a year. Not more than two or three men in England are known to possess such incomes. And then the rate at which it must be increasing! The Arkwrights don't live like Nugents. Their establishment, though Hillersly Castle is grandly situated, is remarkable for the modesty of its furnishings and the simplicity of its entertainments. The heirs of the family are devoted to no costly extravagances. They keep neither horses nor yachts, opera boxes nor Belgravian palaces. On the contrary, the visitor at any hour in the day, at any day in the week, will find them in the mill, in the workshop, or in the counting-house. The untiring energy of the founder of the family, lives in his descendants; the splendor of wealth—the attraction of a gay world—political or literary ambition—all these things fail to draw them for a moment from the daily routine of spinning and weaving, the fingering of yarn, the examination of bad cuts, and the casting up the accounts. They have no pride of birth, no political dignity to support, like the Southerlands, Westminsters, and other noble millionaires. Their millions have only to lie by and gain more millions—a process which many fear may result in the contingency suggested by the great Thellusan case; from which it would require the momentary ascendency of the Old English doctrines of the levellers to set us free. But the Arkwright family is already a very numerous one. The four or five millions were broken up into more than half a dozen portions. A few more years will see these divisions again divided, so that unless Masson mills, and the other factories belonging to the family, should spin their golden thread faster than hitherto, two or three generations hence will find a numerous colony of the Arkwrights, most of them blessed with moderate fortunes, but none of them rich enough to endanger the industrial or monetary stability of the country.

Mills for South America.

The Baltimore Sun says:—The bark George and Henry, bound from this port for the west coast of South America, carries out with her some matters of more than ordinary freight. Among her cargo is the machinery for two complete flour mills; one of them was built by Mr. Alfred Duvall, and the other by Mr. Thomas J. Mathews. All the iron work was made by Wells and Miller. The mills are to be run by water, no steam being used. Messrs William Wiker and Chas. Thomas, millers, from Baltimore, also go out, with three millers from the Brandywine Mills, in Delaware, whose names we could not learn. One of the mills is for Delano, Ferral & Co., at Conception, Chili.

The Tobacco Business.

There are in operation at the present time, in Richmond, Va., forty-three tobacco factories, in which are employed over 2,300 hands, and which produce, in manufactured tobacco, fourteen millions five hundred thousand pounds annually.