For the Scientific American.

The Voltaic Battery.---Precipitation of Metals.

NUMBER V.—(Continued.)

Being now provided with a battery, we may proceed to make the solution of gold :—Into a well glazed bowl or large tumbler, put one pint of rain water, and dissolve in it one ounce of cyanide of potassium; hammer out a five dollar piece to extend the surface, and solder a wire to the edge ; connect to the silver end of the battery of four pairs ; let the gold be placed at the bottom of the solution of cyanide, and let a wire from the zinc end of the battery dip into the solution for half an inch. In a few hours a black sponge will gather round this wire, which will indicate that a considerable portion of the gold has been dissolved. The operation may now be ended, but it will be better to continue it until at least half the gold is dissolved.

The method of making a solution as given above, is far more cleanly expeditious, and inexpensive than by first reducing the gold to oxide, but as it looks to having the gold in a plate, and it may sometimes be desirable to use fragments and old jewelry, we must first dissolve the metal in nitro-muriatic acid ; this will be a troublesome process, for the alloy in the coin or jewelry coats the pieces with an insoluble chloride ; generally the process can be greatly expedited by first alloying the gold largely with zinc, the resulting mass will be vigorously acted on by nitric acid, which will dissolve all the base metals or reduce them to oxide and leave the gold and silver as a fine sediment, which subsides after the action has ceased, when the fluid may be poured off and the sediment washed. The nitro-muriatic acid will readily dissolve the gold in this comminuted state and form chloride with the silver, which, being insoluble, can be easily separated from the acid solution of gold. The gold solution should now be slowly evaporated at a gentle heat until it solidifies on cooling, when it must be dissolved in water, and a solution of cyanide of potassium should be gradually added until the yellow color of the chloride of gold disappears. This may be used direct for gilding, but it will perform better after freeing it from the chlorine, as follows :—Dilute sulphuric acid is to be added to the solution until the brown cyanide of gold ceases to fall down, after which the precipitate may be washed and dissolved by adding a solution of cyanide of potassium. We will now have a pure solution, which will give a deposit of pure gold, but gold, when pure, does not look as well as when alloyed with some copper ; a small quantity of cyanide of copper should be added to give a red tinge to the gilded article. Cyanide of copper is easily made by adding cyanide of potassium to a solution of sulphate of copper, the cyanide of copper will subside, when it may be washed and dissolved with cyanide of potassium.

The next process in order will be to clean the watch case : silver articles are easily cleaned by putting them for a few hours in soft soap, and after well brushing with chalk and laid in a weak solution of cyanide of potassium for a few minutes, then well rinsed in hot water and connected to the zinc end of the battery and immersed in the gold solution ; from the silver end of the battery there should be a piece of gold, which should be as far removed from the watch as the vessel will allow. If the solution has been made by the first method, the residue of the coin will answer for the piece from the silver end ; this piece is generally called the solvent pole. As the gold is precipitated on the watch this pole will be dissolved proportionate to its size : if larger than the article receiving the deposit, more gold will be dissolved than deposited ; but if much less in size, then more will be deposited than dissolved.

Only a synopsis of the process of gilding is now given, for there are many particulars which will equally apply to silvering, and can be more forcibly brought to the attention when we are treating of silvering or electro plating, which is a difficult process, while gilding has but one obstacle, which we will now consider :—After the watch case has been under the battery influence for a few moments it will appear of the ordinary color of gold, but in five minutes or so, most likely it will look as if it had been smoked over a lamp —here is the difficulty : the gold, instead of going down with its metallic hue, goes down as a black powder. This is what is called the "black deposit," and in the early applications of electro-gilding it was thought to be insuperable ; but a few moments' consideration will show the cause of this blacking, and having once comprehended the cause, the difficulty can be easily obviated. When the case is first immersed in the solution it comes in contact with the cyanide of gold and potassium, in a few moments the battery will secrete all the gold from the solution in immediate contact with the case, and leave the case enveloped in cyanide of potassium ; this stratum of cyanide of potassium commingles with the other portions of the solution, and thus brings more gold in contact with the case, and this gold is quickly deposited, and the cyanide of potassium again envelopes the case. If the battery urges the gold faster than it can be brought to the case, the gold will be precipitated on the envelope of water and cyanide of potassium ; that this is the true cause of black deposit, may be made evident by taking the case from the bath and thoroughly cleaning off the black gold with a stiff brush and chalk, and again exposing it to the battery action and briskly agitating the solution ; while the gilding is going on the agitation will carry the cyanide of potassium from the case as fast as deprived of its gold, and keep the cyanide of gold and potassium in contact with the ease. If we keep up the agitation it will be much longer than at first before the black deposit appears, or most likely it will not appear at all. It is now evident that the battery was too strong for the quantity of gold in the solution.

(To be Continued.)

Foreign Correspondence.

RESPONSIBILITY OF CAPTAINS, OVERSEERS, &C.

GLASGOW, Oct. 18, 1850.

Since I wrote to you last, several affairs have occurred here which may have a special interest for some of your readers. The tragedy of the Orion, in the Scotch waters, has been repeated by the Superb, trading between France and the Channel islands ; twenty lives were lost. The captain and chief officer were held to bail in £100 (too small I think,) to stand their trial. Their conduct seems to have been extremely bad : but the point to which I would direct your attention is this—the steamer was taken into dangerous waters from mere curiosity, to show the passengers the wreck of another steamer. The tide in the channel runs, I think, forty feet, which, on one side of the Atlantic, is deemed a high rise at any part of the coast. She struck a rock, stuck there, and was suspended on the recession of the waters. The crew and passengers all got off in boats : but the boats had plugged openings, and the plugs were lost again ! So they filled, capsized and sunk. One man swam for three hours, but we can't all swim so long, and those who could not swim at all were drowned. You are inclined to say, I have no doubt, what is quite true, that, 1st, slides would answer all the purposes of plugs in boats—would never be out of the way, and any person could shove them in with the heel or toe of his boot. 2nd, That when people are immersed, a cork pillow, which may be packed into a portmanteau, or a light cork jacket, would support them. 3rd, That water-proof, or cork pillows or mattresses, would cost little more than those in common use, and are useful from their resistance to all "verminage," which are more annoying, I should think, in your Western States, than with us. But can you say why these ordinary precautions are not adopted ?

The overseers of a coal pit, in which eighteen to twenty lives were lost a few months since, in this neighborhood, were tried at the Criminal Court a few days ago. One was acquitted not guilty, the other dismissed "not proven." The difference is peculiar to Scottish law—the first settles the case for ever ; the second verdict leaves the accused party open to another trial, if more evidence be found. The charge against them was negligence in ventilating their mine.

I find here a great neglect or deficiency in proper fog signals for railways. In consequence ten or twelve lives were recently lost on the Eastern Counties, English line. We have fog signals, but they seem to be troublesome and are often neglected. Could you not help the world to something cheap and easily arranged ?

We have no news here. Politics are as still as a bug in a storm : nothing moves. The next eruption will be a commercial question—currency, reciprocity, and so on. The Chancellor of the Exchequer has a large balance in his favor, and is paying off "the debt" therewith. But it will take a "long while's" practice ere we feel the difference.

The French are likely to afford some excitement by-and-bye : their President wants to be Emperor, and as a step, to get elected for ten years. He will be successful in the first move.

Trade here is duller within a week than I have observed it for some time. I cannot ascribe any particular cause. Iron is selling (pigs) here, good brands, mixed Nos., for 42s. 6d ; State 45s. to be the average price of production. Cotton goods are evidently not paying the makers, from the high price of cotton. Regarding this matter, I have already told you that great exertions are being made to increase the cultivation on the African coast, of which we have just bought a large slice from the Danes ; in Hindostan, in the West Indies, and, I may now add, that some splendid samples of cotton are to land from Australia, which seems the most prosperous part of the world at present.

Several large screw steamers are building for the trade from this country to Cape Town, South Africa. The line will probably be soon extended to Australia. Screw steamers are, I can see, in great demand. The Clyde builders are all pre-occupied.

The City of Glasgow steamer was sold for £40,000 to the Liverpool and Philadelphia line of screws, which is largely owned in Glasgow. She will be succeeded by large vessels on this line next year. The Cunard Line of steamers is owned in Glasgow, although sailing to Liverpool, to the extent of five-eighths or three-fourths. A line is proposed to St. Johns, Newfoundland, thence to Quebec, and from the small quantity of coals required at once on board, will probably pay.

The accounts from the expeditions in search of Sir John Franklin's ships and men are unsatisfactory. Vestiges have been found which plainly show that they were once encamped not far from the entrance to Prince Regent's Inlet, but why, whether from necessity or in taking observations, does not appear. I do not expect that they will ever be recovered ; and I hope that these absurd efforts to find a northern passage, that must be valueless, are past. We have spent more money on them than would have half sufficed to run a line of rails from Halifax to Van Couver's Island, which is one proper North-west passage—taking us to Australia without being once out of a temperate region. * *

Booth's Patent for the Reduction of Gold.

The nature of my invention consists in the preparation of a solution of gold alloyed with silver or other metals, so as convert them into chlorides ; and a precipitation of metallic gold upon the chloride of silver and other insoluble chlorides, and in the subsequent reduction and extraction of the silver or other metals from the insoluble chlorides, or the direct extraction of their chlorides, by solution, in the manner hereinafter set forth, so as to leave the gold pure. To enable others to make and use my invention, I will proceed to describe the manner of conducting the process and its operation.

First, I make a solution of gold, containing silver and other metals, so as to convert them into chlorides.

Second, I precipitate gold in the metallic state from the solution so that it mixes with undissolved chloride of silver and other insoluble chlorides.

Third, I dissolve out the chloride of silver and other insoluble chlorides from the gold by means of a special menstrum herein described, or I reduce the chloride of silver and other insoluble chlorides, to metals, by zinc or iron and sulphuric or muriatic acid, and dissolve out the metals reduced from their insoluble chlorides from the gold by nitric or sulphuric acid. The process for making the solution is thus : to one part, by weight, of granulated gold, that is, gold melted and cast into water, I take about one part of common salt about three-fourths, or about three-fourths of one part of nitrate of potassa, or one-half of one part of nitrate of soda, and about one and a half parts of oil of vitriol ; I put the salts and gold into a wooden vessel, to be presently described, and covering them with water, I admit steam into the liquid until it attains a boiling heat. The wooden vessel may be any ordinary vessel or vat made with staves, or otherwise, of any convenient size, the best proportion for which is a depth as great, or greater, than its diameter, having about one-fourth of the cover fastened on the top and provided with a wooden trough passing into a chimney or other flue, and the test of the cover moveable so as to charge or empty the vat more conveniently. The object of the trough is to carry off any fumes that might arise to annoy the operator during the process, although little or none can arise except steam. Instead of the arrangement of the cover and trough here indicated, the vat or a series of them may be set into a horizontal flue which is connected with a chimney and the vat or vats covered loosely with boards during the process. A stout piece of wood bored through its entire length and open at each end is secured vertically to the inner side of the vat and a steam pipe or tube passed into the upper opening. The steam admitted through the tube, passes down through the wooden pipe, and escapes freely into the liquid, heating it to any temperature required for the process. When the water is sufficiently heated, the oil of vitriol previously diluted with several parts of water is added by degrees in successive portions, according as I observe the action to progress. The gradual addition of sulphuric acid generates muriatic and nitric acids or their elements slowly so that they spend their full force upon the gold without escaping, thus preventing any annoyance to the operator from injurious vapors, while at the same time their more powerful nascent is employed in effecting combination and solution. I thus continue the addition of sulphuric acid, and the admission of steam, say for three or four hours, or until all or nearly all the gold is dissolved. The solution will then contain per chloride of gold and the sulphate of soda—or sulphate of soda and potassa while chloride of silver and other insoluble chlorides will remain undissolved and if the process shall be conducted too hastily, also a small amount of gold.

Sulphates or chlorides of other metals if present, are also insoluble. The advantages of the above method of solution are the use of cheap materials avoiding the cost of previously preparing muriatic or nitric acid. Cheapness in the use of vessels of wood in which solution or combination is effected. The use of steam for heating which is safe, economical and under control and when blown directly into the liquid, also prompts solution by agitation. The gradual developement of the acids with its attendant advantages as previously mentioned.

The precipitate is thus : the precipitation of metallic gold is effected in the same manner in which the solution is produced and may be performed as soon as the solution is completed.

For the above proportion of gold, say one part, I employ about five parts of chrystallized copperas, which I prefer putting into the liquid gradually in the state of powder, although it may be dissolved in water and poured in, and continue the application of heat by blowing in steam until all the precipitant has been added, occasionally pouring in a little muriatic or sulphuric acid to prevent the precipitation of the peroxide of iron or a basic salt of the peroxide. In this way the whole of the gold will be precipitated in the metallic state as a fine powder, which a continuance of heat will collect into a closer and more compact precipitate.

(To be Continued.)