For the Scientific American.

The Voltaic Battery.---Precipitation of Metals.

NUMBER v.—(Concluded.)

A volume might be written on the black deposit, and the various modes of preventing it, but it will be sufficient to give the practical method of correcting it. The operator provides six coils of covered copper wire, the first one to contain one yard, the second two, the third four, and so on ; these coils are interposed in the battery circuit until the battery is brought to a state that will enable it to make the work gild clear ; after this point has been attained, any thickness of metal may be deposited.

The length of time required to attain a given thickness of gold, will depend altogether on the rapidlty of the battery action, and this must be regulated to the strength of the solution, and also its temperature With a hot and very strong solution, kept briskly acetated, the thickness of ordinary letter paper can be attained in ten minutes.

Some metals will not receive the deposit of gold, or if they do receive it, the deposit does not adhere ; such metals must be first coated with copper or silver before gilding.

As the solution is deprived of gold it becomes less dense, and rises to the surface, hence there is always an ascending current of exhausted solution around the article being gilded. Any projecting ledge which may retain this exhausted solution will blacken, although the body of the work may gild clear. Continued agitation of the solution will go far to obviate this, but will not entirely prevent it.

The first deposit of gold has all the polish of the article receivingit, but as the thickness of gold increases, the polish is lost, and ultimately, if the process has been conducted very slowly, the surface will attain that beautiful dead appearance called frosted gold.

It is well, in depositing a thick film of gold, to take the article several times from the bath and brush it well with chalk, on a stiff brush ; this removes the incipient roughness, and causes the gold to be deposited very evenly; this should invariably be done after the least appearance of the black deposit.

The solution used in gilding may work very handsomely when new, but in a few days, if exposed to the air, it will become deteriorated, and ultimately, if continued exposed to the air, it will not work at all. When the deterioration has gone so far as to be troublesome, the solution may be washed as follows :—add dilute sulphuric acid until the brown deposit of cyanide of gold ceases to appear, then wash well the precipitate and re-dissolve in cyanide of potassium ; this will generally restore the solution to its pristine qualities.

The solution, when not in use, should be kept in a well corked bottle.

As the cyanide of potassium, when dissolved in water, forms prussic acid, which is the most fatal of all poisons, too much care in keeping the gilding solutions from the reach of children, and others unacquainted with its nature, cannot be used ; this substance is not only poison when taken internally, but by merely handling the articles when taken from the bath, the fingers sometimes become badly ulcerated. There is no necessity to get the solution on the hands ; there should always be a vessel of water to rinse the article as soon as taken out. When the amount of solution thus transferred to this vessel becomes of value, the cyanide of gold, or other metal, may be recovered by adding sulphuric acid, and after collecting the precipitate, it may again be restored to the bath.

New Jersey Elections and Railroad Monopoly.

The democracy have carried everything in the recent elections in New Jersey, and the old whig monopolists have been entirely defeated throughout the State. It is now expected that a great and successful effort will be made in the next Legislature of that State, backed by popular opinion, to throw off the railroad monopoly, or to modify itat least. We want, however, to see no violation of vested rights. Let justice be done to all parties, and, while monopoly is abolished, do not injure the just rights of property.

Booth's Patent for the Reduction of Gold.

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After stopping off the steam, a sufficient repose of the liquid of from one to several hours will allow all the metallic gold and chloride of silver to collect at the bottom of the vessel.

The liquid above the precipitate is then decanted, or drawn off by a syphon or some other convenient manner, and run into a suitable vat, to be further treated, if considered desirable, as will be described below.

The precipitate may be once or twice washed in the same vessel used for solution and precipitation, by pouring water, allowing the precipitate to settle, and then decanting or drawing off the liquid ; or it may be directly thrown upon a filter and then washed with water until the water passes off colorless, and gives a neutral test.

The advantages of this mode of precipitation are economy in the use of the cheap material of copperas, rapidity of execution, complete precipitation of all the gold found in the solution, and in such a state that it will yield a soft and malleable gold, free from brittleness, when it is subsequently fused ; the avoidance of all danger of loss which would result from drawing off or decanting a solution of the gold from the chloride of silver, or of transferring it to another vessel.

By this method of precipitatien the copperas or proto-sulphate of iron, is converted into a mixture of sesqui-sulphate and sesqui-chloride of iron, which are in the liquor drawn off.

Copperas may be again obtained from the liquid, after being drawn off, by putting into it bars or scraps of metallic iron, by which the sesqui-oxide of iron is reduced to protoxide and then chrystallizing out the copperas, and adding either the chrystallized copperas or the concentrated liquid without chrystallization,to the next solution of gold in order to precipitate it.

Although there is scarcely any economy in re-preparing copperas chrystalized or dissolved from the solution, yet it may have this advantage, that if the least particle of gold or of chloride of silver, through carelessness in operation or through accident, should have been drawn off with the liquid, it will then be recovered.

But any possible loss of gold in this way, or of chloride of silver in solution, may also be entirely obviated by drawing off the liquid in to a large vat, and then diluting it largely with water, whereby chloride of silver will precipitate, and will collect together with the gold at the bottom of the vessel after sufficient repose.

The process of dissolving out the chloride of silver and other insoluble chlorides, is thus : —The mixed metallic gold and chloride of silver are either partly washed in the solution vat, or wholly washed on a filter and then thrown into a wooden vat lined with lead.

Granulated metallic zinc, or scraps of iron, to the amount of about one-third of the quantity of silver, and other metals forming insoluble chlorides originally in the gold, is then thrown into the lead-vat, and water and sulphuric acid are added, and the whole is occasionally stirred.

The chloride of silver is thus reduced to metallic silver; the gold is net attacked, and the excess of zinc or iron, if any, is dissolved out by sulphuric acid.

If iron has been used to reduce chloride of silver, the solution of copperas thus obtained may be used to precipitate another solution of gold.

After drawing off the solution of zinc as closely as convenient from the reduced silver and gold, the latter are thrown upon a filter and thoroughly washed with water until the water ceases to give an acid re-action. The mixed metallic gold and silver are next treated in a vessel of glass or stone ware, by pure nitric acid, which dissolves out the silver and other metals, if present, and leaves the gold

By drawing off the liquid and filtering and washing the remaining gold, the gold is separated from silver and other metals, if present. The gold is melted in the usual manner. The silver is precipitated from its solution by common salt, as chloride of silver, which is reduced by zinc or iron and sulphuric and muriatic acid, as in the usual parting process.

Instead of dissolving out the reduced silver by nitric acid, it may also be dissolved out by heating the mixed silver and gold with oil of vitriol, in cast iron vessels. The solution of silver is precipitated by common salt or metallic copper, according to usual known methods.

Although I prefer and claim as part of my invention, the use of vessels made of wood for making solutions of alloyed gold, yet vessels of porcelain, stone ware, or glass, may be used, which may be heated by steam, in a a water bath, in a sand bath, or over the naked fire.

Moreover, the form of the vessel may be varied, it might be made square, oval or round ; it may be shallow or deep, but I prefer the form that I have described.

The solution of gold may also be effected in a similar manner to that above described, in vessels of wood, as follows :—I take one part of alloyed gold, about three parts of strong muriatic acid of commerce, and three-fourths of one part of nitrate of potassa, or one half of one part of nitrate of soda.

I put the salt and gold, with a little water, into a wooden vessel like that before described, and pass steam into it ; I then add about one-third of the muriatic acid, still heating it, and after that add the remaining two-thirds of the muriatic acid gradually until solution is effected, as before.

The precipitation of metallic gold, reduction of chloride of silver and dissolving out the metallic silver and other metals, are effected as before described.

Vessels of porcelain, stone ware or glass may also be employed in this variation of the process, and heated in the manner described. It is not necessary that the salt should be first put into the vessel, for the whole of the muriatic acid may be put in at once, and steam applied until it is well heated, and then nitrate of potassa or of soda gradually added.

The mode of dissolving the gold may be further varied by putting one part gold and one part common salt, into a vessel of wood, porcelain, stone ware or glass, with a little water, heating the whole, and then adding strong nitric acid gradually until two and a half parts of nitric acid have been added. The subsequent precipitation of metallic gold, reduction of chloride of silver, solution and separation of metallic silver, are the same as have been described. Another known method of dissolving gold may also be employed by the use of a mixture of muriatic and nitric acids, which process requires the use of vessels of porcelain, stone ware or glass. Or if wooden vessels are employed, muriatic acid may be first put into such vessels, heated, and nitric acid gradually added.

The subsequent steps of the process are the same as have been described. The above processes may be still further varied by the use of chlorate of potassa instead of nitrate of soda or of potassa.

The second stage of the process—the precipitation of metallic gold in the solution, may also be effected by adding to the solution containing one part of gold, one part of sugar, molasses or starch, and a quantity of carbonated or caustic potassa, soda or caustic lime sufficient to super-neutralize the free acid, keeping the whole in a boiling state until all or nearly all the gold is precipitated.

If the precipitation be not immediately complete, it will complete itself by standing for some time; the liquid is drawn off from the gold after settling, the precipitate is washed and then treated as above described for the separation of gold and chlorides.

The third stage of the operation may be so varied that the chloride of silver and other insoluble chlorides, are directly dissolved out from the metallic gold by any convenient solvent, such as hypo-sulphate of lime or of soda or caustic aqua ammonia. The washed gold is melted as usual. The silver is obtained from the solution by known methods, and if it contains gold they may be separated by nitric or sulphuric acid.

Some of the advantages of this invention for refining alloyed gold are—that the largest quantities may be operated upon in a shorter time than is now practicable, when acids alone are used—that this is the cheapest known method of refining gold, as the materials or chemical agents employed in this invention are of less cost than those used in any known plan, —that the apparatus is one of easy and economical construction.

That the cost of previously preparing muriatic or nitric acid, or both, may be saved by the use of the salts from which these acids are generated, instead of the acids themselves. That the process under this invention may be conducted in cities and densely populated places and districts, without inconvenience or injury to the inhabitants ;—that they will yield a soft and malleable gold, entirely free from silver and other metals, which is not the case in the usual parting methods. That this invention obviates the loss of interest attendant upon the keeping a large amount of silver on hand for the purpose of refining gold as is required in the usual processes ; for in my invention the use of silver is not required.

That by preventing the too rapid generation of volatile acid, all waste in that article is avoided, and the workmen are enabled to proceed in their labors without any injury from the acids.

Besides all these advantages, the gold when refined by this invention, is left in a suitable soft state, free from all brittleness, and ready at once for alloy for coining, which is frequently not the case with the known processes.

I do not claim the solution of gold in a mixture of nitric and muriatic acids, previously prepared, nor the methods of precipitation by copperas, nor by sugar and alkali, nor the reduction of chloride of silver by zinc and acid, unless the solution and precipitation be made in the same vessel without transfer. Small quantities of gold have been refined by a mixture of nitric and muriatic acids, but this method has not been carried out on a large scale, and has been deemed impracticable to any great extent on account of the cost of these acids, the noxious fumes arising from the process of solution and the liability to loss in carrying or transferring a solution of gold.

In the usual sorting process, nitric acid always leaves small quantities of silver and other metals, when they have been melted with gold, unless a very large excess of acid is employed, and in that event there would be no advantage in the process, as it would be too costly in manufacturing on a large scale.

Family of Patrick Henry.

The distinguished Virginia orator, Patrick Henry, had five sisters, Jane Meredith, Anne Christian, Lucy Wood, Susan Madison, and Betsey Russell. The last mentioned lady was the grandmother of the Hon. W. C. Preston, President of the South Carolina College.

William Henry was his only full brother.

Patrick Henry's mother was Sarah Winston. His father was John Henry, of Aberdeen, Scotland. John Henry's mother was Jane Robertson, sister to Dr. William Robertson, the Historian.

[If the above is correct, Lord Brougham is nearly related to Patrick Henry's descendants. Two such orators from the same race is not to be found in all history.]

Emigration.

So large is the yearly emigration from Great Britain to this country and other places, that many will suppose the population of that Kingdom must be gradually falling off in numbers. Mr. Laing in his "observations on Europe," says that there are about 28 millions of inhabitants in Great Britain. That the regular annual increase is 420,000 ; whereas the greatest amount of emigration being in the famine year 1848, was only about 270,000. From this annual addition to an already overcrowded people, where wretchedness increases or elbow-room grows scarce, Mr. Laing argues that at some period not distant, the present organization of the British Government must come to a violent end, unless a peaceable revolution shall provide a speedier remedy.

[The best remedy for the evils of overcrowding the British Isle, is, to take some money from their well paid officials, and assist in the formation of colonies in their distant possessions—not to send out beggars, but yeoman