# Scientific Museum.

**On the Recovery of Gold and Silver from the Fluids employed for Electro-Plating and Gilding.**

The following method of recovering gold and silver from the fluids employed in electro-plating and gilding is described by Prof. Bolley, in the "Centrablatt," (German magazine of science.) They will be of interest to those engaged in this business:—

The cyanide of gold, dissolved in an excess of cyanide of potassium, resists most means of separation; even sulphuretted hydrogen produces no precipitate in it. The complete separation of the gold cannot be effected in the humid way; and this has given rise to the propositions of Bottcher, Hessenberg, Elsner and others, to evaporate the fluid, mix the dry residue with an equal quantity of litharge, fuse the mixture at a strong red heat, and dissolve the lead from the fused mass by hot dilute nitric acid; by this means the gold is left as a loose sponge. A more recent proposition is that of Wimmer, by which the mass left by evaporating the fluid to dryness on the water-bath is mixed with one and a half times its weight of nitrate of potash, and thrown in small portions into a red-hot Hessian crucible. The explosions must be waited for, and the process continued until the entire mass runs smoothly. The first process has nothing against it, except the necessity of a strong fire and the employment of nitric acid; the second, on the contrary, is very unpleasant and unsafe in its performance. It is sufficiently well known that there is no substance with which nitrate of potash detonates so violently when heated as with cyanide of potassium. If the portions of the mixture employed be only a little too large, very violent explosions are produced, which cannot take place without loss.

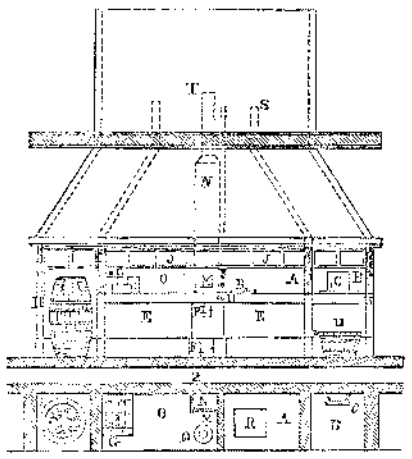
The following process may be adopted in small operations with a platinum crucible over a spirit-lamp. The dried mass of salts is mixed with an equal quantity of powdered muriate of amnonia, and gently heated. The ammoniacal salts decompose the cyanides of the metals, forming cyanide of ammonium, which is decomposed and volatilized, whilst the acid of the amoniacal salt or the halogen combined with the ammonium unites with the metal which had been combined with cyanogen. In the present case, muriate of ammonia forms chloride of potassium, chloride of iron (when ferro-cyanide of potassium has been employed) and chloride of gold. The latter is readily decomposed, with formation of metallic gold; the other, at least partially, with separation of peroxyde of iron, in fine crystalline scales. Undecomposed chloride of iron, as well as chloride of potassium, may be extracted with water after complete decomposition, for which a slight red heat is sufficient; the gold forms a coherent spongy mass; the iron fine light scales, which are readily separable by mechanical means. If any gold remain in the form of dust with the peroxyde of iron, it may be dissolved out with nitromuriatic acid (the calcined oxyde of iron long resisting the action of the acid), and the gold thrown down by protosulphate of iron. In most cases this mode of separation will be unnecessary.—The author has convinced himself by the employment of measured volumes of the same solution of gold, evaporation, heating with muriate of ammonia, and so forth, that even the quantity of gold in such solutions may be determined with sufficient exactness.

The same process may be adopted with plating fluids; chloride of silver is obtained together with oxide of iron (from the ferrocyanide of potassium); the chloride is readily dissolved by ammonia; metallic silver, of which however but little or none is formed, is extracted by nitric acid. It is unnecessary to say that the residue is operated upon in the usual manner to obtain the silver; nevertheless, as the decomposition of the plating fluids may be effected in the humid way by means of sulphuretted hydrogen, this process may not be so frequently adopted for silver.

Lastly, it may be useful to inform those persons who occupy themselves with electro-plastic processes, that the employment of chloride of ammonium or a salt of ammonia in this manner, furnishes a ready means of testing the composition of such fluids as are used in the formation of a galvanic coating. For solutions of copper the author employs sulphate of ammonia, because when muriate of ammonia is employed, chloride of copper is formed, which is partially volatilized with the undecomposed sal-ammoniac, producing a loss of copper.

**Gilding---No. 3.**

(Continued from page 88.)



3rd.—The annexed figures represent an outline of a gilding factory at Paris, as described by Dr. Ure.

Figure 1 is a front elevation, figure 2 is a plan view. This is for fire gilding as described in No. 1.

F is the ash-pit of this furnace; N is the chimney of this furnace constructed of bricks, as far as the contraction of the great chimney, S, of the forge, and which is terminated by a summit pipe rising two or three yards above this contraction; B is the forge for annealing the pieces of bronze; for drying the gilded pieces, &c. C is the chimney of communication between the annealing forge, B, and the space, D, below the forge. This chimney serves to carry the noxious fumes into the great vent of the factory. U is the bucket for the brightening operation; A is the forge for passing the amalgam over the piece; R is a shelf for the brushing operations; E E are coal cellars; O is a forge for the deadening process; G is a furnace for the same; M is an opening into the furnace of appel, by which vapors may be let off from any operation by taking out the plug at M; I is a cask in which the pieces of gilded brass are plunged for the deadening process. The vapors rising thence are carried up the general chimney. J J is a casement with glass panes, which serves to contract the opening of the hearths, without obstructing the view. The casement may be rendered movable to admit larger objects; H H are curtains of coarse cotton cloth, for closing at pleasure, in whole or part, one or several of the forges or hearths, and for quickening the current of air in the places where the curtains are not drawn; Q is an opening above the draught furnace, which serves for the heating of the deadening pan.

4th.—Gilding on Polished Iron and Steel.—If a nearly neutral solution of gold in muriatic acid be mixed with sulphuric ether, and agitated; the ether will take up the gold, and float above the denser acid. When this auriferous ether is applied by a hair pencil to brightly polished iron or steel, the ether flies off, and the gold adheres. It must be fixed by polishing with the burnisher. This gilding is not very rich or durable. In fact, the affinity between gold and iron is feeble, compared to that between gold, copper, or silver. But polished iron, steel, and copper, may be gilded with heat, by gold leaf. They are first heated till the iron takes a bluish tint, and till the copper has attained to a like temperature; a first coat of gold leaf is now applied, which is pressed gently down with a burnisher, and then exposed to a gentle heat. Several leaves, either single or double, are thus applied in succession, and the last is burnished down cold.

5th.—Cold Gilding.—Sixty grains of fine gold, and twelve of rose copper are to be dissolved in two ounces of aqua regia. When the solution is completed it is to be dropped on clean linen rags, of such bulk as to absorb all the liquid, they are then dried, and burned into ashes. These ashes contain the gold in powder.

When a piece is to be gilded, after subjecting it to the preliminary operations of softening or annealing and brightening, it is rubbed with a moistened cork, dipped in the above powder, till the surface seems to be sufficiently gilded. Large works are thereafter burnished with pieces of hematite, and small ones with steel burnishers, along with soap water.

In gilding small articles, as buttons, with amalgam, a portion of this is taken equivalent to the work to be done, and some nitrate of mercury solution is added to it in a wooden trough; the whole articles are now put in, and well worked about with a hard brush, till their surfaces are equably coated. They are then washed, dried, and put altogether into an iron frying pan, and heated until the mercury begins to fly off, when they are turned out into a cap, in which they are tossed and well stirred about with a painter's brush. The operation must be repeated several times for a strong gilding.—The surfaces are finally brightened by brushing them along with small beer or ale grounds.

Gold wire is formed by drawing a cylindrical rod of the metal, as pure as may be, through a series of holes punched in an iron plate, diminishing progressively in size. The gold, as it is drawn through, becomes hardened by the operation, and requires frequent annealing.

Gold thread, or spun gold, is a flatted silver-gilt wire, wrapped or laid over a thread of yellow silk, by twisting with a wheel and iron bobbins. By the aid of a mechanism like the braiding machine, a number of threads may thus be twisted at once by one master wheel. The principal nicety consists in so regulating the movements that the successive volutions of the flatted wire on each thread may just touch one another, and form a continuous covering. The French silver for gilding is said to be alloyed with five or 6 pennyweights, and ours with twelve pennyweights of copper in the pound troy. The gold is applied in leaves of greater or less thickness, according to the quality of the gilt wire. The smallest proportion formerly allowed was 100 grains of gold to one pound, or 5,760 grains of silver; but more or less may now be used. The silver rod is encased in the gold leaf, and the compound cylinder is then drawn into round wire down to a certain size, which is afterwards flatted in a rolling mill.

**Artificial Production of Diamond Powder.**

Some considerable sensation has been produced in the scientific circles of Paris, by the announcement of the artificial production of diamond powder. M. Despretz has made two communications to the *Academie des Sciences*, upon carbon. In these he states that placing at the inferior pole of a voltaic battery, a cylinder of pure charcoal (its purity being secured by preparing it from crystallized white sugar candy) and at the superior pole a bundle of fine platinum wires, so arranged that the charcoal was in the red portion of the electric arc, and the platinum in the violet—he found the carbon volatilized, and collected on the platinum wires in a changed state. In these experiments the current has been continued a month in activity and the powder collected on the wires has been found to be sufficiently hard to polish rubies with great rapidity, and when burnt it left no residue. M. Despretz asks himself: Have I obtained crystals of carbon which I can separate and weigh, in which I can determine the index of refraction and the angle of polarization without doubt? No; I have simply produced by the electric arc, and by weak voltaic currents, carbon crystallized in black octohedrons, in colorless and translucent octohedrons, in plates, also colorless and translucent, which possess the hardness of the powder of the diamond, and which disappear in combustion without any sensible residue. A similar result has been obtained by decomposing a mixture of chloride of carbon and alcohol, by weak galvanic currents. The black powder deposited was found to possess equal hardness with that which was sublimed and rubies were readily polished by it.

We noticed some of M. Despretz's experiments in Volume 5: he will yet make *the diamond*.

The Eighth Avenue Cars have a sign "Crystal Palace," on them, and they do not run within three blocks of the Exhibition. Strangers coming to this city are often deceived by such a sign.

## LITERARY NOTICES.

The New Year, 1854.—On the first of January next, "Gleason's Pictorial" will commence its sixth volume, and will appear vastly improved in all respects, with a superb new heading, new type and dress throughout, and will be printed upon the finest paper. As the proprietor of the "Pictorial" has purchased the entire good-will of Barnum's New York "Illustrated News," and has merged that journal in the "Pictorial," the public will reap the advantage of this concentration of the strength of the two papers upon one, both in the artistic and literary departments. The same brilliant host of contributors and artists will be engaged on "Gleason's Pictorial," as heretofore, and a large addition is also made to the corps, both in talent and number. The most liberal arrangements have been completed, and such as will enable the proprietor to produce by far the finest illustrated journal yet published, and much superior to the present issue of the paper. The columns of the "Pictorial" will constantly be beautified by all that can please and instruct in art and nature, and its literary department will fully sustain the reputation it has so long enjoyed. The pages of "Gleason's Pictorial" will contain views of every populous city in the known world, of all buildings of note in the eastern and western hemisphere, of all the principal ships and steamers of the navy and merchant service, with fine and accurate portraits of every noted character in the world, both male and female. Sketches of beautiful scenery, taken from life, will also be given, with numerous specimens from the animal kingdom, the birds of the air, and the fish of the sea, and will present in its mechanical execution an elegant specimen of art. It will contain 1664 square inches, giving a great amount of reading matter and illustrations—and forming a mammoth weekly paper of 16 octavo pages. Terms $3 per annum. Published every Saturday, by F. Gleason, corner of Tremont and Bromfield sts, Boston, Mass., and S. French, corner of Nassau and Spruce sts, New York, agent.

The Electric Telegraph—With an historical account of its rise and progress, by Lawrence Turnbull, M. D.; published by A. Hart, Philadelphia. This is the second edition of Dr. Turnbull's work, and is the best general history of the Telegraph published. It is revised and improved from the first edition.

Templeton on the Steam Engine—This is a very neat volume of the "Practical Series," published by Henry C. Baird, Philadelphia. The author is Wm. Templeton an English engineer, and is very useful as a pocket companion for engineers.

The Illustrated Magazine of Art—For November, contains a large number of beautiful engravings of scenes in the old world, a fine portrait of Henry Clay, besides several engravings of articles on Exhibition at the Crystal Palace. The artistic and literary character of this work is of a superb order, and evinces good taste and much ability. A. Montgomery, publisher, 17 Spruce st, N. Y.

Graham's Magazine—For December, is a very superb number. It contains several fine illustrations. Those representing scenery in Wales are accompanied with an article in continuation from the last number. The articles are all very ably written. A new volume of Graham commences with the January number. It is a capital magazine and deserves well of the American reader. Stringer & Townsend. 222 Broadway, agents.

Putnam for December has been received. It is as usual full of interesting matter. With the new volume they promise increased attractions.

"Jane Seton, or the King's Advocate," by James Grant.—This very interesting novel has just been issued from the press of Messrs. Stringer & Townsend, of this city; it is an ingenious and gifted production, and must have many readers.