

From the experiments I have performed on it, I find the composition to be different from what is stated by the above-named chemists; its component parts being copper, zinc, nickel, and iron; the last of which, however, is but small in quantity.

The basin in the possession of Dr. Howison is of a whitish colour, approaching to that of silver; and is very sonorous. When held in one hand, and struck with the fingers of the other, the sound is distinctly heard at the distance of an English mile: it is also highly polished, and does not seem to be easily tarnished. The piece that was sent me I found was malleable at a natural temperature, and at a red heat; but when heated to whiteness, it was quite brittle, breaking with the slightest blow of a hammer. By great caution, it was rolled into thin plates, and was drawn into wire of about the thickness of a fine needle. When fused in contact with the atmospheric air, it oxidated, and burned with a whitish flame, in the same way as zinc does. Its specific gravity at 50° was 8.432.

Five grains of it were subjected to analysis, with the view of ascertaining the proportion of its ingredients: the result was,

Copper	-	-	2.02 or in the 100 parts, 40.4	
Zinc	-	-	1.27	25.4
Nickel	-	-	1.58	31.6
Iron	-	-	0.13	2.6
			<hr/>	<hr/>
			5.00	100.00

The method which is practiced in preparing white copper is not known in this country; though it seems to be the general opinion that it is procured by the reduction of an ore, containing the ingredients of which it is composed. In a letter I received from Dr. Howison, he mentions, that Dr. Dinwiddie, who accompanied Lord Macartney to China, showed him, when at Calcutta, several specimens of the ore from which he was told the white copper was procured, and which he obtained at Peking. The basin in the possession of Dr. Howison cost in China about one-fourth of its weight in silver; and the exportation of utensils of this alloy is prohibited. These circumstances also render probable the opinion that the white copper is obtained by the reduction of a metallic ore; for in China labour is cheap; and the metals composing it are said to be found in great abundance.

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On Various Processes employed in Jewellery. By THOMAS GILL, Esq.

THE jewellers are in the habit of performing many operations, in the formation of their delicate and beautiful works, in a manner which is highly deserving of adoption in other branches of manufacture. It is with this view that we have determined to lay before our readers some of the more important of these processes; and, first,

On soldering, in jewellery.

In soldering with silver solder, the thinly laminated solder is scraped perfectly clean, and then cut with hand-shears into very small square bits, by first dividing the sheet into narrow slips lengthwise, and then cutting them again across. The lump of borax, which is employed as a flux, is rubbed with water, to a thick consistence, upon a flat piece of black slate, scored all over crosswise, to cause it to act upon, or abrade, the lump of borax the more readily. When the pieces to be joined are ready for soldering, with a small camels'-hair pencil, having a slender ivory handle, flattened at its point, they take up some of the prepared borax, and apply it by means of the pencil, to the parts to be united; they next mix, upon the thumb-nail of the left hand, some of the small square bits, or pellets, of solder, taken up on the hair-pencil, with borax, so as to cover them perfectly therewith: these pellets are then carefully applied, by the help of the point of the ivory handle, to the parts to be soldered: and they are then laid upon charcoal ashes, contained in a small crucible, and are submitted to the action of the flame of a lamp, urged by the blow-pipe; carefully, however, avoiding to heat them too suddenly, or before the borax has ceased bubbling, during the driving off its water of crystallization (which, however, in this mode of employing it, is considerably less than in the ordinary practice.) lest the pellets should be displaced. When the solder has flowed, they very carefully avoid heating the article more, lest it might melt.

In case they wish to prevent the solder from spreading over the surrounding parts, they previously coat them with a layer of Indian ink, applied with another camels'-hair pencil.

In the soldering of filagree-work, the process is different. The gold or silver solders are previously reduced, by filing, to a state of minute division, and are then put into proper small cylindrical metal-boxes, with lids closely fitted to them, and having near their bottoms slender pipes, to allow a little only of the powdered solder to escape at a time, by the action of the finger-nail, rubbed upon a serrated piece of metal, affixed upon the pipe.

The articles to be soldered require to be treated according to their nature and forms. If, for instance, a number of similar twisted wire rings are to be united in a flat circular form, they are to be laid upon a piece of charcoal, sawn and rubbed flat, and are arranged and kept in the required form, by the application of a thick solution of gum-tragacanth, brushed over them and the surface of the charcoal: they are then either laid by, to afford the gum time to dry leisurely; or, if haste prevents that, they must be exposed to a very gentle heat. When dry, the thick mixture of borax before mentioned, must be brushed over them, and the solder be sprinkled upon them in the manner just described: they are then exposed to the action of the flame of the lamp, whilst lying upon the surface of the charcoal;—great care and address, however, is requisite in the management of this very delicate operation, as the least excess of heat would inevitably fuse the whole into a solid mass.

When such an arrangement has been thus formed, and other parts

are to be soldered to it, a solder of a more fusible nature must be employed; and the parts are either to be arranged upon charcoal, in the manner above described, or they may be held and supported upon the branched extremities of a congeries of jewellers' twisted fine iron binding-wire, formed as follows:—Several similar lengths of wire are first twisted together, three at a time, leaving a portion of each untwisted: these are again united together at one end, in three or more sets of three each, leaving their exterior ends at liberty, and, lastly, these combined sets all are united by twisting them together. The mass forms an exceedingly convenient support for the infinite variety of different articles of jewellery, which require to be soldered together; and their union is effected, as before described, by the application of the borax and solder, and exposure to the flame of the lamp.

On the boil, for gold work.

It is a very curious circumstance, that the best workmen in this branch of jewellery have at this day no other menstruum for giving the last high finish in colour to their beautiful articles than the employment of the compound salts of alum, nitre, and common salt, wherewith to form a sort of aqua-regia, or nitro-muriatic acid; instead of employing the nitro-muriatic acid itself:—such, however, is the fact.

They put into a crucible one part, by weight, of alum (sulphate of alumine,) two parts of nitre (nitrate of potash,) and one part of common salt (muriate of soda,) with a very little water; and make it boil over the fire in the forge-hearth. When the salts are dissolved, chiefly in their own water of crystallization, the articles, previously strung upon a platina wire hooked together at its ends, are put into the boil, as it is termed, and frequently taken out from time to time, and washed in water, to see when the proper effect is produced; which is longest in taking place in those parts which are united by soldering.

In this mode, the copper, or silver, which entered into alloy with the gold forming the articles, are dissolved; and the surface of the articles appears of a true gold colour only.

This process, or one differing from it only in the proportions of the three salts, has long since been published in Smith's "*Laboratory, or School of Arts,*" as a solvent for gold; equal parts of each salt being employed: and in this way the Editor succeeded in readily dissolving leaf-gold; the salts becoming tinged of a deep yellow colour, and the fumes of the nitro-muriatic acid extricated most copiously. He also succeeded, by the employment of French brandy, in taking up the gold from its solution, leaving the salts perfectly white; and thus forming, as it were, an ethereal solution of gold. It is, however, most certainly an improvement, to double the quantity of the nitre.

To recover the gold from the washings of the boil.

Strange as it may appear, yet it is a fact, that, till very lately, the jewellers constantly threw away the water into which they had dipped

the articles taken out of the boil, without being at all aware of the quantity of gold they also threw away with it! Latterly, however, a person possessed of more chemical knowledge, has made a considerable benefit by instructing the jewellers, at the price of five guineas each, in the method of recovering that gold which heretofore they had so very thoughtlessly wasted. His process is as follows:

The water is put into a large earthenware pan, kept constantly covered, and a solution of copperas (sulphate of iron) is added to it: the gold soon appears, in the form of an impalpable powder; and, when a sufficient quantity is separated (in a week's time, for instance,) and when no turbidness is produced on adding more of the solution of copperas, the water is poured off, and the sediment put by to dry; the sediment being preserved from time to time, until a sufficient quantity is collected to be fused in a crucible, with the addition of nitre to oxidate the iron. The gold is thus obtained in a state of purity.

On forming the gold beads used in filagree-work, &c.

These are made by boring shallow conical holes with a toothed rimer, all over the surface of a piece of flat charcoal; and, according to the intended size of the beads, putting into each hole, two, three, or more rings of gold wire, formed by wrapping the wire around a cylinder of about a quarter of an inch in diameter, and then cutting the helical coil of wire into single rings, each containing a similar quantity of gold, which is the object of coiling and cutting the wire into rings. These being submitted to the action of the flame of the lamp, urged by the blow-pipe, quickly fuse, and unite together into small globular beads.

On melting gold and silver on charcoal, and casting them into shape.

The jewellers avail themselves of the exceedingly slow conducting power of charcoal for heat, to melt a considerable quantity of gold or silver occasionally, without the employment of a crucible, or the use of a forge-hearth or wind-furnace. To effect this, they saw asunder, lengthways, a cylindrical piece of sound charcoal, and rub flat both faces. The charcoal ought to be at least two inches in diameter, and seven or eight inches long. Near the end of one of the pieces, they excavate a hemispherical cavity, large enough to hold the scraps of gold or silver which they intend to melt together with a sufficient quantity of borax to flux them. Between the two prepared surfaces of the charcoal, a flat piece of copper, or other proper metal, is then put, of a thickness equal to that of the mass to be cast, and having a cavity made in the end of it, of the shape to be given to the gold to be cast, and opening at the end, outwardly: this is smoked all over, by being held over the flame of a lamp, previous to its being placed between the two pieces of charcoal; and the whole is bound firmly together with iron binding-wire.—It should be observed, however, that, previously to placing the metal mould between the pieces of charcoal, a slit or channel must be cut, leading from the hemispherical cavity in the charcoal to the mouth of the mould.

When all is ready, the flame of the lamp is directed, by means of the blow-pipe, upon the gold or silver in the cavity; and the heat continued until the metal is melted; when, by inclining the charcoal, it flows directly into the mould.

A variety of moulds are of course provided; and thus small quantities of gold or silver are cast into various forms, with great convenience.

Of the Jewellers' Lamp.

This is of a very simple and convenient form, being made on the principle of the bird-fountain; that is, having an air-tight reservoir at its back, to hold a supply of oil, and a cup to receive it; and always containing an equal depth of oil, which is regulated by the situation of the hole made at the bottom of the reservoir, where the oil enters the cup. In the front of the cup, a spout is fixed to receive the cotton-wick of the lamp, which is of the thickness of a finger. The front of the spout forms a tube; but the back of it is open at the top, for the purpose of pushing the wick outwards, by means of the beak of the blow pipe, when the lamp is to be used; or of retracting it nearly within the end of the spout, to keep it merely alight during the time it is not in use, and thus avoiding a useless waste of oil. This lamp is supported upon a stand or foot, of a convenient height for use.

[*Tech. Repository.*]

*On the Affinage (or Refining) of Gold and Silver, in France.**

In the arts, the name of *affinage* (or refining) is given to the purifying of different substances; but this expression is more especially employed to designate the purification of gold and silver.

In many of the employments of gold and silver, it is necessary that these two metals should be in a state of absolute purity, because it is only then that they possess the malleability requisite for the purposes they are designed for. The leaves, so light and thin, which the gold-beater obtains by hammering, are the product of a metal entirely free from copper; the smallest portions of alloy communicates such a hardness to these two metals, that it becomes impossible to give them that extreme degree of tenuity which is necessary in many of the arts. Gold and silver do not waste in this process, because they possess nearly the same degree of malleability; but the great difference which exists in their respective values, renders them not capable of being sold in commerce, until after they are completely separated the one from the other, and which is the principal aim of the refiner.

If the alloy which is proposed to be refined contains only gold, with silver, or copper, it becomes useless to submit it to a preliminary purification; but as it almost constantly happens that the fused masses contain tin, and often even lead, acquired in the operation of refining,

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