For the Scientific American.

The Voltaic Battery.

NUMBER II.

It is invariably the case that after science has given birth to a new art and nurtured it for a while, that it passes over to the industrial world, where it is baptized in a new name, clothed in a new garb, and set to work. Here the scientific world loses sight of it; all future improvements remain with the artizan. Science feels the alienation and can no longer even correctly describe its offspring;—that which was an experiment of the laboratory or the lecture table, has become a trade.

Electro metallurgy has been described in almost every paper published in the country, and there is not, perhaps, even a village where silvering and gilding has not been attempted by ingenious persons, but it has always failed except to bring an outcry against what is termed galvanizing. This has been because chemists describe an immatured art, in language which one professor of chemistry would use in speaking of another; or the general principles alone were treated of, and scientific technicalities profusely offered in the place of experience.

The electro arts are yet in their infancy, and their importance is but beginning to be appreciated. Silver is the only metal suitable for many table articles, but it is too scarce to be employed generally for this use; but the articles can be made of a metal superior to silver in mechanical properties, and kept plated with pure silver for less than the interest of the money they would cost if made of silver; and the facility with which electro-plating is executed, has entirely changed the method of producing them. Articles greatly excelling in boldness of design and grace of execution, have been so cheapened, that it gives even to the laboring classes an opportunity to possess some specimen of artistic skill to grace the festive board or garnish the picture of home.

The voltaic precipitation of copper is of great importance, for the voltaic metal is not as liable to corrode as the ordinary metal. Culinary articles formed of it must soon take the place of the wretched tin pans, now so generally found in the kitchen. It is highly probable that steam boilers formed of it would not be liable to incrustation, and, from non-corrosion, would last many times longer than those made from impure copper.

The formation of coin from voltaic metal would have such advantages that our government should no longer make cents from any other, for this is the coin generally found in the hands of children, and is handled more, perhaps, than any other; it is constantly gathering a coating of poisonous matter, which readily adheres to the fingers; children frequently put these coins in their mouths, and death has not unfrequently ensued. Cents made of voltaic metal would always remain clean.

The electrotype art is, however, rapidly rising to importance, and its advantages being appreciated; large engraved plates, which have required as much as three years to produce them, are now coming into use; it is known that 1,000 prints from one such plate, if the work is delicate, will wear it out; if the plate has cost $5,000, the 1,000 prints must pay this between them; this would be an insuperable obstacle to this kind of engraving, but the plate can be multiplied to any extent by the electrotype art, and thus any number of prints obtained, without using the original plate to print from.

The voltaic battery is an apparatus used for obtaining an uninterrupted current of electric power.

In the article on the Battery, the best form will be given, together with the relative expense of all the various batteries in use—a description given of the Reservoir Voltaic Battery, in which any amount of the voltaic force can be stowed away and drawn off as wanted, with the certainty and facility that liquid can be retained and drawn from a cask, and which will maintain its action for any length of time—consumes nothing when not in use, and is always ready for use, it not being liable to get out of order until exhausted of material, and which has never before been published.

The art of electro-gilding consists in depositing, on a metallic article, a film of gold of a rich color and firmly adhering to the basis. In the article on Gilding will be given infallible directions for preventing the occurrence of the black deposit, and producing firm adhesion; directions will also be given for producing firm adhesion between the basis and deposited silver, and a method described of making pure cyanide of silver and potassum, free from admixture of potash or its acid salts.

VOLTA.

Compressed Air Engine.

The following is a description of a "Compressed Air Engine," employed near Glasgow, taken from the "Daily Mail" of that city, which is celebrated for manufactures and engineering. The engine is employed in a coal pit of Messrs. Allen & Man, at Little Govan, near Glasgow:

"The compressed air is only employed on this occasion as the most convenient form of transmitting power to a great distance and at a great depth, under ground; and not as a merely economic mode of obtaining or generating power.

The object sought and so successfully applied in the present instance, is the working of winding engines, placed at a depth of nearly 100 fathoms under ground, and at a distance of about half a mile from the pit-mouth, where the steam engine is fixed.

To work an ordinary steam engine at such a depth, and in a remote part of the mine, would be next to impossible and highly dangerous, owing to the inflammable gases in constant course of extrication from the workings, which might at any time explode by coming in contact with the furnace fires of the boiler. Besides, pure air is too valuable down in the galleries and workings of a pit, to have it destroyed or contaminated by the results of combustion from a large steam engine furnace.

Many attempts have been made on the continent and elsewhere to transmit power from a convenient prime mover to long distances, by means of pipes; but the principle almost always adopted was that of exhaustion. Where the distance was great, the result was next to nothing; and even within certain limits, the inward leakage of the pipes in a great measure destroyed the effect of the vacuum obtained by the prime mover.

Another mode is, by employing the pressure of a column of water, instead of steam or compressed air; but the want of elasticity in that fluid operates injuriously upon the working machinery.

It was these considerations which induced the engineers to devise the present most successful effort at overcoming difficulties, hitherto deemed nearly insurmountable.

The apparatus may be divided into two parts—first, the prime mover, which is a non-condensing steam engine, above ground, at the pit-mouth, working two air-pumps for compressing the air; and second, the winding-engine, some 600 feet below the surface, and half a mile away, which receives its power from above ground.

The latter is, in all its parts and details, precisely like a non-condensing steam engine, but only actuated by compressed air, instead of steam. This engine is employed in winding the coals from workings at a still lower depth than the main pit.

But it is in the prime mover that the engineers have struck out several new features in the application of scientific mechanics. The engine, which works with steam, at a pressure of 40 lbs. to the inch, has a walking beam, consisting of two plates, about 30 inches apart, rocking in plumber-blocks placed between them, and fixed on the top of a very massive column, about 3½ feet in diameter at the base. The steam-cylinder, of 21 inches diameter, and 42 inches stroke, is at one end of the beam; and the connecting-rod, crank shaft, with fly-wheel, at the other.

There are two inverted air-pumps on either side of the centre, and midway between it and the ends of the beam. They are elevated about 4 feet above the framing, and are both exactly alike. Each piston projects downwards through a stuffing-box in the cylinder cover; and on the end of the piston rod is fixed a cross-head, which is connected with the walking beam by side-rods passing upwards to each leaf.

The column on which the bearing of the walking beam is fixed is hollow, and forms a receptacle for the condensed air before it passes into the exit-pipe; and there are two large ports connecting it with the upper part of each air-pump.

Each air-pump is single-acting, compressing the air only during the upward stroke, and forcing it into the great centre column or air-chamber. Instead of any of the ordinary forms of valve, the engineers designed an extremely simple but effective application of the spherical or ball valve. The pump cover, the piston, and a diaphragm, which is placed a few inches from the top of the pump cylinder, are each perforated with about fifty circular holes, an inch and a half in diameter. In each of these holes a ball rests, ground to fit water-tight, and all opening upwards. As, however, it is of great importance that every inch of compressed air should be ejected at every stroke of the pump, an arrangement is contrived by which a quantity of water, more than equal to the necessary clearance between the piston and the ends of the cylinder, always rests upon the piston, the diaphragm, and the cover—so that every particle of air is expelled at each stroke; and if there is any overplus of water, it finds its way, along with the air, through the air-port into the air-chamber, whence it is forced by the pressure of the condensed air, through a small pipe, back to the piston, during the return stroke. The air is condensed to a pressure of 30 lbs. on the inch; and the contents of the pipes, extending to the winding-engine, below, are sufficient to keep it at work for several minutes: but the engine man takes care that the pressure is always kept up in the air-pipes; and as soon as it begins to blow off from a safety-valve in the engine-room, the pumping is discontinued. The air-pipe is ten inches diameter, and, passing down the shaft, is carried along a horizontal gallery for half a mile, until it is connected with the winding-engine; but there is sufficient capacity and power to work several winders, which will be added as the mine extends in the new workings."

This engine was constructed by Messrs. Randolph, Elliott & Co., engineers, Glasgow. The air-engine is kept in a room cut out of the solid rock, 600 feet distant from the pit bottom.

Foreign Correspondence.

GLASGOW, Sept. 6, 1850.

The trial of the Captain and two mates of the steamship Orion, for the loss of that vessel at Portpatrick, as previously stated, occupied the High Court of Justiciary, at Edinburgh, for three days of last week, and closed with a verdict of "guilty," against the Capt. and Second Mate. The First Mate was discharged, as the accident did not occur during his watch, and sentence of eighteen months imprisonment was passed on the captain, and seven years' transportation for the second mate. I cannot rest pitulate the voluminous evidence. The result establishes the principle of the captain's responsibility during the entire voyage, which may, on an average, occupy twenty hours. He was in his cabin, and is imprisoned, because, being in good health, he should have been on deck. The second mate was in charge; his conduct was inexplicable: two seamen warned him that he was too near the shore; the vessel struck within two hundred yards of it. One experienced captain said he always kept off one and a half miles. Others alledged that they might pass safely within half a mile. It was put in as palliation, that the night was obscured by a fog, which was not true, as the ship was seen by men from the land, and others on the ship observed the land. Then it was alledged for the second mate, that he shaped his course by the binnacle compass, which was found not to agree with another ship's compass, in consequence, as is thought, of iron being stowed in the afterhold; and it was also argued that the influence of iron ships on the accuracy of the compass was not fully understood. All these statements may be true, but a man's eyes are preferable to his compasses—so thought the jury.

We shall have a trial of a kindred character by-and-bye:—six persons were killed on the Edinburgh and Glasgow Railway, in consequence of some delay in running trains down the declined tunnel into Glasgow; the second part of the Perth train ran into the first. I am told that the second train ran in only at the rate of 3 or 4 miles per hour, but could not be entirely stopped in time. A train going at the rate of 30 miles per hour cannot be stopped by the ordinary appliances under 400 yards. In this case the train had not been running at 20 miles per hour, and although slowed considerably, was still moving from 3 to 4 miles when the engine struck the preceding carriage. I believe the signal men are to blame.

Considerable hopes are entertained here of the finest quality of cotton being cultivated in Ceylon. It is found to grow better there than in any other part of the East. The price of cotton in the Deccan is not over 1d., and 1⅜d. the lb. At Port Natal, the few bales hitherto prepared, have not brought over 2d. on the spot; the quality was good, and sold in England for 6d., 7d. and 8d. A company is going to advance money for the purchase of cotton on all the west coast of Africa, where it is indigenous and grows wild. Some speculations exist respecting the probability of growing it in Asia Minor and you will soon hear of cotton plantations on the Euphrates and Tigris.

The imports to London, from India, during a period from January to 1st September last, for the past and present year, have been 69,680 bales in 1849, in 1850 172,200 bales—increase 102,520 bales. But the greatest rise was in the four last months, and I should not be surprised to find, before the first of January 1851, an advance of 150,000 to 200,000 bales on the quantity received in 1849—a matter of small importance at first sight, but one which makes a great difference as to price.

The Egyptian yield of corn and cotton is remarkably good for the season. The difference with the Brazils may affect importations from thence of coffee and cotton. Your journals speak of the proceedings in Brazil; do they know that we paid £400,000 (nearly $2,000,000) for the treaty? We merely require it to be observed as a measure of common humanity. This money should be returned if she is dissatisfied with her bargain. Great progress has been made in the excavations of Nineveh. The records of the Assyrian empire have been found in a huge chamber, engraven on plates, which have been apparently hardened after the characters were written:—the writing is in a cuneform character. The discovery is of immense interest, and when Layard and Richardson have done with their decyphering, you will have, I am told, a cheap edition of the Assyrian Records, as complete, at last, as those of Athens and Sparta.

At present the Court and Cabinet are in Scotland—the Queen at "Loch na Gar"—the Premier at Dunkeld—the Chancellor of the Exchequer in Lochabar; we have, therefore, no political news. Poor Louis Philippe has found a temporary grave in England. General Haynau was nearly demolished by Barclay & Perkins' brewers, on last Thursday—he should not have come to a free country where his acts are known, as in England. X. X.

Tea Cultivation.

The tea cultivation in South Carolina is still successful in its results. Dr. Junius Smith says that the tea nuts received by him from China in May were planted in June, and that on the 5th of the present month of September many of them were from one to three inches in height—"strong, healthy, beautiful plants from the original China seed, germinating so as to lift themselves above ground in less than three months from the time of planting the nuts."

Washington Irving's British Copyright.

By foreign papers, it is believed that Washington Irving will be able to keep his copyright in England, for though born in New York, his parents were born in Scotland, and this makes him, according to law, a Briton, entitled to take out a copyright.