For the Scientific American.

The Electric Telegraph.

(Concluded from our last.)

1747.—Franklin communicated his observations, in a series of letters to his friend Collinson, and explained in a satisfactory manner the phenomena of the Leyden phial.

Dr. Watson, and others, conveyed the electric fluid across the Thames, at Westminster bridge, making the width of the river a part of the circuit. He proved that the ground also conducted the fluid, by an experiment with a wire 150 feet long, supported upon baked sticks, using the ground as half the circuit. In another experiment he made the dry ground a part of the circuit for a mile, and found it to conduct equally as well as water. The transmission of electric fluid was instantaneous.

Mr. Ellicott constructed an electrometer for measuring the quantity of electricity, and Mr. Maimbury, of Edinburgh, electrified two myrtle trees in the month of October, and they put forth small branches and blossoms sooner than those which had not been electrified. The same experiment was tried upon seeds sown in garden pots, with the same success. Mr. Jallibert, Mr. Boze, and the Abbe Menon, at Angers, tried the same experiment upon plants by electrifying bottles in which they were growing. They proved that electrified plants always grew faster, and had finer stems, leaves and flowers, than those that were not electrified.

1748.—Franklin and his friends held an *electrical feast* on the banks of the Schuylkill near Philadelphia, which was amusing as well as scientific. He gives an account of it to his friend Collinson in these words:—" Chagrined a little, that we have hitherto been able to produce nothing in this way of use to mankind: and the hot weather coming on, when electrical experiments are not so agreeable, it is proposed to put an end to them for this season—somewhat humorously, in a party of pleasure, on the banks of the Schuylkill. Spirits at the same time to be fired by a spark sent from side to side through the water without any other conductor than the water: an experiment which we sometime since performed to the amazement of many. A turkey is to be killed for our dinner by the *electric shock*, and roasted by the *electrical jack*, before a fire kindled by the *electrified bottle*: when the healths of the famous electricians of England, Holland, France, and Germany, are to be drank in electrified bumpers, and under a discharge of guns from the *electrical battery*."

1749.—Franklin first suggested his idea of explaining the phenomena of thunder gusts, and of the *aurora borealis*, upon electrical principles; and in

1752.—He completed his grand discovery, by experiments. He constructed rods, and brought the lightning into his house, to ascertain whether it was of the positive or negative kind. He succeeded in the experiment for the first time in April, 1753; when it appeared that the electricity was negative. On the 6th June, he met with a cloud electrified positively. His discoveries roused the attention of all Europe, and many distinguished electricians repeated them with success.

Towards the end of the 18th century, the science was extended by numerous and successful experiments.

1787.—Mr. Lomond, of France, invented the first electric telegraph of which we have an account. He communicated with a person in a neighboring chamber, by means of electricity: but it does not appear that it was used on extended lines.

1794.—Reizen made use of the electric spark for telegraph purposes, but never tested to any extent.

1798.—Dr. Salva, of Madrid, made a similar telegraph to that of Reizen. No description of his plans were ever seen, and probably were never given to the public.

Galvani, in 1890, and Volta in 1800, made as is well known, many very important discoveries.

1809.—Samuel Thomas Soemmering invented his voltaic electric telegraph.

1816.—Ronald invented an electrical telegraph, and tried it at his house, Hammersmith.

1832.—Prof. Morse was the inventor of the electro magnetic telegraph, and the first really practicable telegraph on the electric principle. All the telegraphs in Europe are invented subsequently.

1833.—The Baron Schilling, of Russia, constructed an electric telegraph, which was received with approbation by the emperor, who desired it established on a larger scale; but the death of the baron prevented it.

Counsellor Gauss and Prof. William Weber constructed one.

1836.—Taquin and Ettieyhausen made experiments with a telegraphic line over two streets in Vienna.

1837.—Alfred Vail invented an electro-magnetic printing press.

Wheatstone made an electric needle telegraph.

Steinhell (Dr.), of Munich, erected between that city and Bogenhausen, a magnetic electrical telegraph. In the account he gives of his own telegraph, he says, that Belancourt established, in 1798, a communication from Madrid to Aranjuez (26 miles,) by means of a wire, through which a leyden jar used to be discharged, which was intended to be used as a telegraphic signal.

Mason, Professor of philosophy at Caen, (France,) made trial of an electric needle telegraph, at the college of that city, for a distance of about six hundred yards. He has since endeavored to simplify and improve his apparatus.

1837.—Davy's needle and lamp telegraph.

1838.—Mr Amyott, proposed in Paris to construct an electric telegraph.

Edward Davy—electric telegraph.

1840.—Alexander Bain—electric printing telegraph.

1841.—Wheatstone's rotating disc telegraph.

Ultramarine.

(Concluded from our last.)

To prepare ultramarine or lapis lazuli for painting, the mineral is first made red hot in the fire and then thrown into water to make it easy to pulverise. The best way however is to heat it in a crucible to keep it clean and then quench it in vinegar and keep it therein for a few hours, when the vinegar is poured off and the lapis lazuli ground fine in a flint mortar, when it may be calcined again and treated in the same manner to make perfectly impalpable. A paste is then made of 9 ounces Burgundy pitch, 6 of white resin, 6 of Carolina or Georgia turpentine, a small quantity of wax and 2 ounces of linseed oil. This is mixed all together in a stoneware vessel and boiled therein until it will form a lump when poured into cold water. The cement thus formed may be poured out of the vessel into water and made into cakes for use. Take then an equal weight of this cement and the calcined lapis and melt all in a glazed earthen vessel adding the calcined matter by degrees, stirring with a glass rod till all is well mixed, when it is pretty well heated and thrown into a large basin of cold water. When it is cooled it is kneaded like the dough of bread and rubbed over with the hands with linseed oil till the whole are well incorporated. Then put this cake into an earthenware vessel, the bottom of which should be rubbed with oil, and pour on it water of the warmth of blood. Let this stand for a short time and as the water softens the cake, it will lose the finest part of the calcined matter, which on gently stirring the water, or separating any of the parts of the cakes, will be suspended in water, and must be poured off with it into another vessel. The quantity of water must be then renewed and the same operation repeated a second, or third time and as the mass appears slow in giving the color it must be moved or stirred in the manner of kneading with a glass spitula, but not broken into small parts and so much of the color is extracted as to render it necessary for obtaining more, the water is heated to a greater degree. The result of these washings is the *ultramarine.* These three washings are then mixed with a boiling hot solution of two ounces salt of tartar or pearl ashes dissolved in a pint of water and filtered through clean paper. This is cooled and when the powder has fallen to the bottom of the vessel, the clear must be poured off and the powdered must be washed until all the pearlash or tartar is carried away. The ultra marine is then dried and is duly prepared for use.

Another method of purifying the ultramarine from the cement may be used, which is by pricking the yolks of eggs and moistening the matter with what will run out and working them together in a flint mortar, after which the mixture must be put into a lixivium of the tartar, or pearlash and proceeded with as before directed.

In order to free the ultramarine from that part of the water which cannot be poured off from it without carrying away part of the powder, let it be put into a deep coffee cup, and put candlewicks so as to hang over the edge with one end in the liquor and the moisture will be removed by capillary attraction, when the matter may be dried on polished marble, or glass. Another method from the one above, is to use beeswax and white resin mixed together in equal quantities instead of the compound pitch cement, and which on its being infused in water very warm, will make the lazuli give out its color much sooner.

Ultramarine may also be prepared without any cement simply by calcining it and levigating with pearlash, and washing and then soaking it in distilled hot vinegar. A greater quantity will be produced in this way, but lighter in the color To make a fine ultramarine the lapis lazuli must be good, and to test this, if a small piece be made red hot and retain afterwards its hardness of color, it may be accounted good, but if it crumbles or turns brown, or dull and full of specks, it may be suspected. Ultramarine mixed with white flake and oil by the pallette knife can be compared with other parcels and judged of by its depth and clearness of color. Ultramarine from its great price is apt to be adulterated by a precipitation of copper and an alkali, and also fine smalt. Copper is a dangerous mixture, it will turn black in oils and green in enamels, as soon as fluxed. It is not so easy to adulterate with fine cobalt as it is difficult to mix on account of its hardness and is scarcely to be levigated by art to be as fine as the ultramarine rendered impalpable by the calcination it has undergone. The adulteration with smalt does not hurt it for enameling and it will stand as well for water painting, but it does not mix well with oil and it will fall from it if the mixture be very moisty, or become pasty if stiffer and never works freely. Copper adulteration may be easily detected by pouring some diluted nitric acid on a small quantity when it will soon dissolve and leave a greenish blue solution. Smalt may be detected, by trying it with oil, or mixing in water when the coarseness of the smalt will soon be detected.

The lapis lazuli is, when perfect, a very light blue color, with a transparent effect in oil, and in some degree in water, and will stand when used in painting without fading with whatever pigment it may be mixed. For these reasons ultramarine is of the highest value in every kind of painting, being equally serviceable in all, even in enamel, and though the Prussian blue on account of its cheapness may have lessened the use of it, yet this is to be considered as an injury to the art, as the skies of landscapes and many other parts of modern pictures shew their loss of it by their changing from a warm clear blue to a faint greenish tint.

Chemical Analysis.

The following is the plan pursued by Professor Loomis to detect prussic acid in the stomach of Mr. Matthews, murdered at Hallowel, Maine. The most volatile poison is prussic acid—therefore it was searched for first. He strained the substance through a linen cloth, leaving the solid parts in the cloth The fluid was placed in a retort, and heated, and the vapor condensed. Previously a small part of the fluid was taken on a piece of paper; and a drop of the solution of pure potassium, a drop of the solution of sulphate of iron and a drop of sulphuric acid put on the paper—this gave a blue color as far as it spread. It indicated the presence of prussic acid, though not with positive certainty. He then took the distilled portion and divided it into three parts. To one portion he added a small quantity of potassium, then a solution of iron, and a drop of sulphuric or muriatic acid. The potassium produced no effect—the sulphate of iron showed a turbid yellow—the acid showed a deep blue color. This indicated prussic acid. The second portion was tested with potassium, sulphate of copper—then with muriatic acid. The effect of the potassium of sulphate of copper was much as before; but when the acid was applied it produced a white color partially clouded, which soon subsided. This too, indicated prussic acid. The third portion was tested with nitrate of silver—it gave a white curdled precipitate. This white precipitate would be produced by prussic acid and by several other substances—but nothing but prussic acid would produce the curdy appearance. This precipitate was dried, heated, and a lamp applied to the retort. If there had been pure acid sufficient to fill the retort with cyanogen, it would have produced a peach-colored flame which in this case was not obtained. This experiment was repeated on the following Monday, and, during the intervening time, the retort was carefully corked. Then witness washed the solid portion left in the cloth. The washing having been added to the liquid before in the retort, from the whole there was now distilled nearly an ounce of transparent liquid. This was treated with nitrate of silver, which produced the curdy precipitate before described. This precipitate was dried, and placed in a glass tube an inch and a half in length, sealed at one end, and drawn out to a capillary tube at the other. On heating the precipitate, thus enclosed, cyanogen escaped from the capillary extremity, which instantly ignited, producing a distinct peach-blow flame. This flame is produced only by cyanogen gas, which is the base of Prussic acid. These tests are the ordinary and approved tests of Prussic acid. The first test applied was sulphate of iron. Hydrocianic acid is a compound substance. The substance that produces the blue color is cyanide of iron. Cyanogen is derived from Prussic acid. There is no other combination of the elements present that will give this color. Cannot say how long the tests now used for the discovery of narcotic poisons have been employed—know that there is no other combination of iron that will produce this color as well as he knows any other principle in science. The odor of Prussic acid owes its peculiarity to neither of the elements independantly but to the elements in their compound state. There is an odor to cyanogen—witness had experiments with it. It is always gas. The silver test produces a curdy precipitate which must be a compound of silver. Pure cyanogen will produce the peach blow flame It will combine with other substances.

The above experiments will be read with interest, as they contain important information relative to chemical analysis.

TO CORRESPONDENTS.

" J. O. of N. Y."—The reaction wheel would be the best for your purpose. We have been informed that Mr. Ross's improved reaction wheel is the best in use, but it is difficult for us to tell, as there is wanting a table of experiments to guide us. We have endeavored to get a table but cannot, except for Parker's which is now in our possession. A good plan for manufacturers to pursue would be to advertise for proposals, stating the work to be done, the fall and the amount of water.

" S. H. A. of N. Y."—We have not a draft of Mr. Egan's invention, and we have published in the article you refer to, all that we know of it. A *caveat* we believe has been filed for it, but we do not know of an application for a patent. We shall be happy to receive your description and sketch. When any discovery is made the best thing the inventor can do for himself is to get the leading features of it noticed in our columns. Thus a witness is had for the invention.

" E. A. D. of Madrid."—We shall give you communication due attention.

" L. W. D. of N. Y."—Your letter has just come to hand and we will attend to your request. The Balance is good because simple and correct.

" S. L. of Pa."—We shall get your engraving finished as soon as possible. You perceive the true way to let your invention be known. The benefit you will yet experience. As you have observed, " how can our people, now numbering 20 millions, know about machines