

being over-exposed. Mr. T. Bolas inquired whether Mr. Warnerke had tried adding bichromate of potash to his emulsion. The addition of bromide of silver in the case of a carbon print was supposed to increase its sensitiveness, but whether it did so he could not say. Mr. Warnerke in the course of his reply, said he had not found the yellow colour spoken of by Captain Abney, in the enamels which he had made. It was possible to eliminate all the silver by the use of ferric salts. With regard to Mr. Davis's suggestion, he was afraid he must throw cold water upon it, for he did not think it could be realized unless he used a developer for the clouds different from that used for the foreground. He had not tried bichromate of potash as mentioned by Mr. Bolas.

ESTIMATION OF FAT IN MILK.

The plan I adopt is as follows:—10 grms. of milk are evaporated in a platinum boat (of suitable construction), to near dryness (to complete dryness if you wish to determine the total solids) in the water-bath; the boat is now inserted into the extraction tube (which is plugged with a little cotton-wool and contains a stopper in the narrow part of the tube), and then connected to an upright Liebig's condenser. A small tarred flask is now fixed on to the end of the extraction tube (50 to 100 c. c. capacity) containing ether. The ether is evaporated by means of hot water, and when sufficiently condensed in the tube above, so as to completely cover the platinum boat, the stopper of the extraction tube is turned and the ether allowed to remain for about six hours or all night if convenient. All that now remains to be done is to cautiously open the stopper and allow the ether and oil to flow into the tarred flask; boil the ether repeatedly until extraction is complete. Disconnect the flask, evaporate the ether dry, and weigh the oil. The platinum boat may also be taken from the extraction tube, dried in water-bath, and weighed, which will give the solids not fat, then ignited and weighed, and we have the ash. If there is any doubt in the mind of the operator that the ether has not been able to penetrate the residue, after there have been several extractions made, the boat may be withdrawn from the extraction tube, the residue detached from its sides by means of a small platinum spatula, and the whole again returned to the extraction tube, and the operation of extraction repeated. When the extraction has been conducted as described, there is no fear of any fat being left undissolved in the residue. The following duplicate analyses are the results I have just obtained from a sample of milk I have reason to believe is genuine or unadulterated. The amount of milk operated upon was 10 grms. Specific gravity, 1.0273.

Total solids.....	10.2440	10.2448
Fat.....	1.9940	2.0001
Solids not fat.....	8.2500	8.2447
Ash.....	0.6940	0.6960

WILLIAM JOHNSON, F.I.C., F.C.S., &c.

THE ELECTRIC RAILWAY.

One of the novelties at the Crystal Palace, London, on Easter Monday, was the opening of an electrical railway, constructed by the Société Anonyme d'Electricité of Brussels, on the Siemens system. On the upper terrace of the Palace grounds, overlooking the charming scenery of Sydenham, a miniature circular line of railway, consisting of three lines of metals, has been laid down, surrounding one of the ornamental ponds, and a small wooden hut erected beside it as a passenger station. On this railway, which is about 300 metres in length, and has a gauge of about 50 centimetres, or 19 inches, between the outer rails, stands the electrical locomotive. Its length is about four feet; its breadth about a metre; its height about as much, and its weight some three-quarters of a ton. It is, in fact, a Siemens dynamo-electric machine, neatly boxed in, and mounted on a truck with four metal wheels, and provided with a break and alarm bell for its control by the man in charge. A stationary engine of about eight horse-power nominal, in a shed about thirty yards from the railway line, drives a stationary dynamo-electric machine, from which the electro-motive current is primarily obtained. Two wires

are connected with this fixed dynamo-machine. By one of them the current flowing out is conveyed to the mid-rail of the railway, to which it is attached by an iron plate bolted on. The second or return wire is attached to the exterior rail of the railway. The mid-rail is supported upon wood blocks, and is thus in a certain degree insulated. Beneath the electrical locomotive a brush of iron wires sweeps the mid-rail, and the electrical current is thus taken up into the locomotive, where it passes through the mounted Siemens machine within it, the large bobbin of which is thereby caused to revolve, and the current passing away by the wheels of the truck to the exterior rails of the road, is conveyed back to the stationary dynamo-machine. As the current thus circulates, and the bobbin of the mounted machine revolves, it drives the four wheels of the truck as the locomotive moves on, hauling after it a load of nearly three tons with ease at the speed we have named.

NOTES.

INTERNAL DISCHARGES OF ELECTRIC CONDENSERS.—B. Villari.—The author's conclusions are that the heat evolved by the internal discharge may be neglected in case of feeble discharges; beyond certain limits it manifests itself and increases very rapidly with the discharges themselves; thus the first means to augment this internal heat is to make use of jars charged to a very high potential. The internal discharge is sensibly augmented if the exterior spark is produced between two small balls of 20 to 30 mm. in diameter; it decreases, on the contrary, by almost one-half if the spark is taken from a point and one of the balls. The inverse is the case for the heat produced by the external exciting spark. For a given charge the internal discharge increases if the inner coating of the jar is diminished.

RESEARCHES ON THE CHANGE OF STATE IN THE NEIGHBORHOOD OF THE CRITICAL POINT OF TEMPERATURE.—L. Cailliet and P. Hautefeuille.—The authors remark that near the critical point there are witnessed for very slight variations of temperature, phenomena which have led Andrews to regard the gaseous and the liquid states as distant terms of one and the same state of matter, which may pass from one to the other by a continuous series of changes. It is impossible to know what is the state of the matter which gives rise to the moving and wavy striæ which displace each other above the mercury on operating in the vicinity of the critical point. A slow decrease of pressure often shows if a tube is filled with a liquid or a gas, for in the latter case the release gives rise to a general mist and to liquid drops; but this procedure furnishes no clue to the nature of these striæ. The authors have overcome this difficulty by coloring carbonic acid with the blue oil of galbanum. They have found that these undulating striæ dissolve the oil, and are consequently produced by liquefied carbonic acid. They conclude that matter does not pass by insensible degrees from the liquid to the gaseous state.

ON THE ACTION OF THE SELENIUM RADIOPHONE.—M. E. Mercadier observes that the sounds produced in the selenium receivers which he has studied result chiefly from the luminous radiations. The rays of the spectrum act from the limit of the blue, on the indigo side, as far as the extreme red, and even a little beyond the red. The indigo, violet, and ultra-violet rays are without perceptible action in the conditions under which he has experimented. The maximum effect is always produced in the yellow portion of the spectrum. Radiophones with glass tube-receivers containing air, in contact with a smoked surface, give a different result, the action being principally thermic.—*Comptes Rendus*.

LAW RELATING TO CABLES.—*L'Electricité* says that there is some idea of appointing a commission to inquire into the state of international law relating to submarine cables. The Minister for Foreign affairs in France, M. St. Hilaire, has stated that, in case the forthcoming Congress of Electricians should arrive at any decision on the subject, he will send a circular to the various Governments suggesting the holding of an international conference.