

This attenuated mist, rendered luminous by the transmission of electricity, ought to appear under a regular form, like an illuminated surface of greater or less extent, and more or less broken. It should spread outward from the pole, forming as a first appearance the auroral bank like a veil in the north. The tenuity of this veil is such that the stars may be seen through it, as has been remarked by all observers. MM. Bixio and Barral, in the balloon ascension which they recently made, suddenly found themselves,—although the sky was quite serene and the atmosphere without a cloud—in the midst of a veil or mist, which was perfectly transparent, consisting of a multitude of small icy needles so fine that they were hardly visible. Such are the needles which become luminous by the passage of the electricity, which determine the formation of halos as has been rigorously demonstrated, and produce by condensation the aqueous vapors in their passage through the air towards the earth, the fall of snow or rain, or sometimes under peculiar circumstances, hail.

Now if we inquire what should pass in the portion of the luminous mist nearer to the earth's surface, we shall conclude that the vicinity of the magnetic pole must exert a decided influence on this electrified matter,—for it is in fact a true mobile conductor traversed by an electric current.

In order to obtain a correct idea of this action, I have endeavored to imitate artificially the process of nature, and with this view, I contrived the following experiment.

Into a glass globe, 30 to 40 centimeters in diameter, I introduced through one of its two opposite tubulures, a piece of soft iron wire, about 2 centimeters in diameter, making it to terminate at the inner end very near the centre of the globe, while the other end was exposed out of the globe. The wire was covered through its whole length, excepting its extremities, by a very thick insulating bed formed first of shell-lac, then with a glass tube covered itself with shell-lac, then with a second tube of glass and finally with a bed of carefully applied wax. The insulating layer in all was a centimeter thick, giving 4 centimeters for the thickness of the bar thus covered. Within the globe, a ring of copper surrounded the bar and its insulating bed, at the part most distant from the tubulure. This ring was arranged to be put in communication with a source of electricity exterior to that of the bar by means of a metallic wire insulated with care which passed through the tubulure and ended without in a hook. A stopcock attached to the other tubulure of the globe, was arranged for obtaining a vacuum. When the air within is sufficiently rarified, the hook is connected with the conductor of an electric machine, and the outer extremity of the bar of iron with the soil; by this means the electricity forms within the globe a luminous sheaf, more or less irregular, which passes from the ring, and terminates at the inner extremity of the soft iron. But immediately on placing the outer extremity of the soft iron on the pole of an electro-magnet, the electric light takes a wholly different aspect. Instead of proceeding indifferently from different points of the upper surface of the cylinder of iron, it proceeds from all points in the circumference of this surface, so as to form around it a continuous luminous ring. This is not all: this ring has a movement of rotation around the magnetized cylinder, sometimes in one direction and sometimes in the other, according to the direction of the electric current, and the nature of the magnetization. Finally, jets of brilliant light are seen to proceed from this luminous circumference, which are distinct from the rest of the mass of light. When the magnetization ceases, the luminous phenomena return to

the condition familiar in the experiment, known under the name of the *Electric Egg*.

There is some advantage in using for the experiment here described Armstrong's hydro-electric machine, in which the boiler is made to communicate with the hook which is united by a metallic connection to the ring of copper within the globe, while the conductor which receives the vapor is put in connection with the bar of soft iron. Thus we have in the globe an electric current of great intensity which may be changed in direction, by inverting the connections.

(To be continued.)

The Mints of the United States.

BY PROFESSOR WILSON.*

The transmissions of gold from the new state of California have caused a corresponding increase in the gold currency of the States, and have invested the Mint operations with more general interest than under the previous ordinary circumstances they possessed. The same condition of things exists in this country; and as it is intended to establish a mint in the gold producing colony of Australia, I thought it desirable to obtain as much information as I could in reference to the organisation and working details of those in the United States.

The head establishment is at Philadelphia, and is called "The Mint;" there are also three "Branch Mints;"—at New Orleans, in Louisiana; at Charlotte, in North Carolina; and at Dahlonega, in Georgia, respectively. The Branch Mint in California, and the Assay Office in New York, are not yet completely organised.

At the Mint in Philadelphia, gold, silver, and copper, are coined; at New Orleans, gold and silver are coined; while the branches at Charlotte and Dahlonega coin gold only. At "The Mint," the executive staff consists of a director, treasurer, chief coiner, melter and refiner, engraver, assayer, and assistant-assayer. At the New Orleans Branch Mint the staff consists of a superintendent, treasurer, melter and refiner, and coiner; and at each of the other two branch mints there are but three officers,—superintendent and treasurer (combined), assayer, and coiner. The several duties of these officers, the remuneration they shall receive for their services, and the amount of security they shall give for the due performance of them, are duly prescribed by an Act of Congress supplementary to the Act entitled "An Act establishing a Mint and regulating the Coins in the United States;" this latter act giving all the details referring directly to the coinage of the country.

At the United States Mint at Philadelphia, the salaries are fixed as follows:—Director, £3500; treasurer, \$2000; chief coiner, \$2000; melter and refiner, \$2000; assayer, \$2000. At the New Orleans Branch Mint the salaries are, to the superintendent, \$2500, and \$2000 each to the other officers; and at the other branch mints the superintendents receive \$2000, and the other officers \$1500 respectively. In each of the establishments the appointment of assistants, subordinate officers and servants, is left entirely in the hands of the chief of the different departments.

In visiting the Mint at Philadelphia I had the advantage of being taken through the several departments by the chief coiner, Mr. Franklin Peale, and the melter and refiner, Professor J. C. Booth, who kindly furnished me with the following de-

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