SCIENTIFIC SERIALS

Poggendorff's Annalen der Physik und Chemie, 1875, No. 1. This number contains the following papers:—On the electric conducting power of solutions of the chlorides of alkalies and alkaline earths, and of nitric acid, by F. Kohlrausch and O. Grotrian.—On the gliding of electric sparks, by K. Antolik. The author published his first paper on this subject at the beginning of last year, and has since then been gaining much new experience on the subject; he had observed long ago that if the two discharge balls of a Holz electric machine are at a certain small distance from each other, the path of the spark is not in a zig-zag line, but straight, and that the spark is often strongly bent or broken in a certain point, which lies nearer the negative pole. Mr. Antolik's idea was that negative electricity leaves bodies somewhat slower than positive electricity, and that the bending point in the spark was the place where the two electricities united. He successfully tried to obtain an image of the spark by letting it pass over a blackened glass bulb; thus he found that the spark glides in three and often five parallel lines. The paper is very elaborate and highly interesting, the author having varied his experiments in all possible ways.—On a universal meteorograph for solitary observatories, by E. H. von. Baumhauer. The Dutch Scientific Society of Haarlem offered its gold medal and a purse of 300 florins in January 1872, for a sufficient means to determine temperature, density, and degree of moisture of the atmosphere at a considerable elevation above the surface of the earth, and in a manner which makes self-registration and constant repetition of observations possible. Herr Baumhauer's paper enters into the details of this problem and describes certain instruments which the author devised, and which go far to solve the question at stake, although certain modifications of the Society's demand became necessary, there being a great difference when the term "at a considerable elevation" is applied to a spot which is comparatively easy of access at any time, or when, for instance, it denotes a captive balloon. The author, however, describes instruments which would answer very well in both cases.—Continuation of researches on rod magnetism, by A. L. Holz (see vol. 151, p. 69 of these *Annals*).—On the measuring of angles by means of the eyepiece micrometer in astronomical telescopes, by Dr. Matern.—On the proportion of specific heats under constant pressures and in constant volumes, by J. J. Müller.—On some observations of the spectra of gases, by Eugen Goldstein. The author has made a series of experiments which tend to show that Wüllner's idea as to the independence of the gas spectra from differences in the temperature is an erroneous one. They principally consist in interpoisng a layer of air into the induction current, which lights up the spectral tubes filled with the rarefied gases, sometimes with a simultaneous insertion of a Leyden jar, and thus forcing the current to produce a spark. Mr. Goldstein then shows that in the whole circle of the current the discharge takes place in the same rhythm, therefore that the current passes the tube filled with the rarefied gas just as momentarily as any other part of the circle; from this he concludes that also in the tube the discharge takes place in form of a spark, that therefore the gas ought to show a line spectrum. Now, as this is not the case, and the gas on the contrary shows a band spectrum, the author thinks this a contradiction of Wüllner's explanation.—The next paper in the number is by Herr Wüllner himself, and explains the subject very satisfactorily, as he proves that not one of Herr Goldstein's experiments is contradictory to his theory of the different spectra of gases; the form of the electric discharge in the tubes containing the gases is the main point in question, and Herr Wüllner proves this to be in the so-called *dilated* form, and not as a spark.—Finally, the number contains a preliminary report by Dr. V. Dvorak, on the velocity of sound travelling in water.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, April 8.—"Experiments to ascertain the Cause of Stratification in Electrical Discharges *in vacuo*." By Warren De la Rue, Hugo W. Müller, and William Spottiswoode.

Some results obtained in working with a chloride-of-silver battery of 1,080 cells in connection with vacuum-tubes, appear to be of sufficient interest to induce us to communicate them to the Society in anticipation of the more detailed account of an investigation which is now being prosecuted, and which it is intended to continue shortly with a battery of 5,000 cells, and possibly with a far greater number.

The battery used up till now consists of 1,080 cells, each being formed of a glass tube 6 inches (15·23 centims.) long and $\frac{3}{4}$ of an inch (1·9 centim.) internal diameter; these are closed with a vulcanised rubber stopper (cork), perforated excentrically to permit the insertion of a zinc rod, carefully amalgamated, $\frac{3}{16}$ (0·48 centim.) of an inch in diameter and 4·5 inches (11·43 centims.) long. The other element consists of a flattened silver wire passing by the side of the cork to the bottom of the tube, and covered, at the upper part above the chloride of silver and until it passes the stopper, with thin sheet of gutta-percha for insulation, and to protect it from the action of the sulphur in the vulcanised corks; these wires are $\frac{1}{16}$ of an inch (0·16 centim.) broad, and 8 inches (20·32 centims.) long. In the bottom of the tube is placed 225·25 grains (14·59 grms.) chloride of silver in powder; this constitutes the electrolyte; above the chloride of silver is poured a solution of common salt containing 25 grammes chloride of sodium to 1 litre (1,752 grains to 1 gallon) of water, to within about 1 inch (2·54 centims.) of the cork. The connection between adjoining cells is made by passing a short piece of indiarubber tube over the zinc rod of one cell, and drawing the silver wire of the next cell through it so as to press against the zinc. The closing of the cells by means of a cork prevents the evaporation of water, and not only avoids this serious inconvenience, but also contributes to the effectiveness of the insulation. The tubes are grouped in twenties in a sort of test-tube rack, having four short ebonite feet, and the whole placed in a cabinet 2 feet 7 inches (78·74 centims.) high, 2 feet 7 inches wide, and 2 feet 7 inches deep; the top being covered with ebonite to facilitate working with the apparatus, which is thus placed on it as an insulated table.

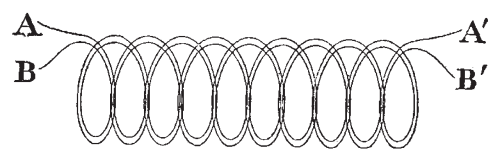

FIG. 1.

The electromotive force of the battery, as compared with a Daniell's (gravity) battery, was found to be as 1·03 to 1,* its internal resistance 70 ohms per cell; and it evolved 0·214 cub. centim. (0·0131 cub. inches) mixed gas per minute when passed through a mixture of 1 volume of sulphuric acid and 8 volumes of water in a voltameter having a resistance of 11 ohms. The striking-distance of 1,080 elements between copper wire terminals, one turned to a point, the other to a flat surface, in air, is $\frac{1}{263}$ inch (·096 millim.) to $\frac{1}{250}$ inch (0·1 millim.) The greatest distance through which the battery-current would pass continuously *in vacuo* was 12 inches (30·48 centims.) between the terminals in a carbonic acid residual vacuum. This battery has been working since the early part of November 1874, with practically a constant electromotive force.

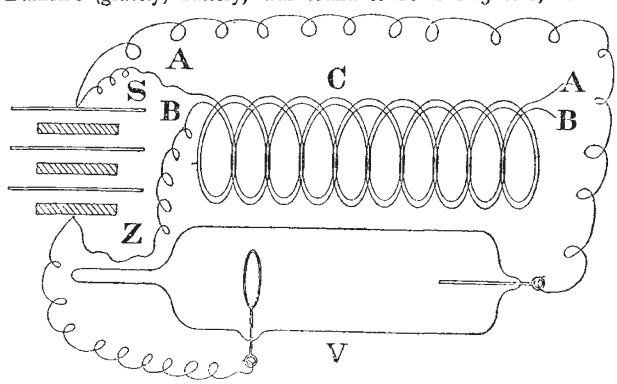

FIG. 2.

Besides 2,000 more cells like those just described, we are putting together 2,000 cells, with the chloride of silver in the

* Compared with a Daniell's battery, in which the zinc is immersed i dilute sulphuric acid in a porous cell, its electromotive force is about 3 pe cent. less than th Daniell.