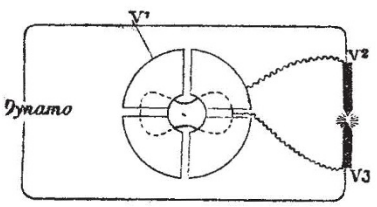
astronomical and geographical knowledge is but of recent date, and, as already stated, Dante formed many of his cosmographic conceptions chiefly from hearsay. N. PERINI

The Horse-Power given to any Part of a Circuit by Intermittent Light

SOME time ago, with Prof. Ayrton, I designed and constructed an instrument to measure the horse-power given electrically to any incandescent or arc lamp, or to any part of a circuit, an improvement on the instrument previously devised by M. Deprez; the pointer of a suspended coil moves at once to a mark on a scale which tells the horse-power. The instrument is dead beat, and, what is very important, by a special commutator arrangement it can be calibrated with much smaller forces than it is intended to measure. The current in the suspended coil is proportional to the difference of potential at the ends of a part of the circuit, and the fixed current which causes its deflection is the total main current in the circuit, so that the deflection represents the product of these two factors. The instrument was described at the Society of Arts in March last, and was exhibited at the British Association meeting at York. It will, however, necessarily only work accurately with non-reversed currents because of the self-induction of the suspended coil of fine wire, and it is very important to be able to make the same measurement for reversed currents.

At the Electrical Congress at Paris, soon after the reading of M. Joubert's paper, in which he showed how to measure the mean value of the square of the difference of potential at two ends of a part of a circuit in which reversed currents are flowing, Prof. Ayrton described to me a method of performing the measurement of the horse-power for reversed currents which seemed to have suggested itself to him and to Prof. Fitzgerald of Dublin simultaneously when hearing M. Joubert's paper. It was this: Let there be three points in the circuit at potentials V_1, V_2, V_3,



at any instant, and let there be a known resistance R (with no self-induction) between V_1 and V_2. Let V_3 be connected with the needle of a Thomson's electrometer, and let V_1 and V_2 be connected with the quadrants, V_1 being also connected with the outside of the Leyden jar; then the deflection of the needle measures the mean value of

$$(V_2 - V_1)\left(V_3 - \frac{V_2 + V_1}{2}\right).$$

Now let the needle and a pair of quadrants be connected with V_2, the other pair with V_1, and we measure the mean value of the square of $(V_2 - V_1)$. The difference of these measurements is easily seen to be R times the expended energy which we want to know.

I was not present when Professors Ayrton and Fitzgerald communicated their idea to one another, but immediately afterwards Prof. Ayrton explained it to Sir William Thomson and to me together, making sketches of the necessary connections. Sir William thought well of it, but feared that perhaps the present quadrant electrometer would not be sensitive enough for the measurements. We suggested, however, the use of our multireflex arrangement (see *La Lumière Electrique*, October 5, 1881) for creating greater sensitiveness, and as he was pleased with the idea, we have, since that time, in our very short intervals of leisure, been trying to arrange an electrometer which shall be sensitive enough for the purpose.

I observed to-day that M. Potier in the October number of the *Journal de Physique* publishes the same idea, and I wish to place it on record that the fundamental idea of the new process, which seems to me very feasible and of considerable practical importance, occurred to Messrs. Ayrton, Fitzgerald, and Potier independently. JOHN PERRY

Talgarth Road, West Kensington, December 6

The New Red Star in Cygnus

THE above star, which I found on the 22nd of May last, and which then appeared of the 9th magnitude, and reached 8 m. on June 8, seems now no more than 12 m. Estimations of very small magnitudes are, of course, very difficult, but I believe I am not under the mark in saying 12 m., as I found the star not easy with a 4½-inch O.G. At the same time its deep crimson seemed very striking by glimpses, and in its present state it is, perhaps, the smallest among the stars whose red colour has been observed. It will probably have to be classed among the most remarkable variables. J. BIRMINGHAM

Meteor

TAKING a look at the eclipse of the moon on December 5, about 5.44 p.m., I happened to see a meteor that is, I think, very noteworthy, though, perhaps from distance, its apparent size was so small that I might have scarcely seen it but for the temporary lessening of the light of the moon. Its motion was, throughout its visible course, horizontal and slow. When it met my eyes, it was just below the Pleiades. I followed its flight to the northern end of the eastern sky; there it seemed to go on out of my sight, without fall or collapse: for aught I know, I might have observed it even from the extreme south, had my eyes been turned thither at the outset; I would draw attention to this fact, as well as to its horizontal motion and its seemingly slow progress. The grandeur of the glories displayed by that night's clear sky was at its height as this mysterious stranger passed above our winsome satellite—then a thing of "eerie beauty," its glistening golden ring half-clasping, like "the old moon in the new moon's arms," the earth-shadowed orb over it, and the latter shimmering with the maroon ember-like sheen called by the French *la lumière cendrée*.

JOHN HOSKYNS-ABRAHALL

Combe Vicarage, near Woodstock, December 16

SEA-SICKNESS.—This must be declined as a subject for correspondence.

A NEW ELECTRICAL STORAGE BATTERY[1]

THE great utility of some thoroughly practical method of conserving electric force has caused a great deal of attention to be applied to the subject; no system of electric supply can be considered as perfect until some means is used to so store the force generated that it may be drawn off equally and regularly, and this whether the generator be on or off. If we take, as an example of electric supply, the present systems of electric lighting, it is at once seen, should an accident or stoppage take place in the machinery generating the current, the whole of the apparatus such as lamps or motor-machines are influenced; should there be a reservoir of electricity between the generator and the apparatus of whatever sort for utilising the force this inconvenience would not occur.

All the present systems of storing electricity depend on certain chemical changes produced by electrolysis.

I have gone through a long series of experiments on storing electricity and made many forms of cells, one being a porous pot containing dilute hydric sulphate and a sheet of lead, in an outer vessel containing a sheet of lead in solution of acetate of lead, the plate in the porous pot being made the positive electrode; this cell had the power of storing electricity, by peroxidising the positive electrode, and depositing from the acetate of lead solution metallic lead on the negative electrode, the hydrogen having combined to form acetic acid. On discharging the peroxide is reduced, and the oxide formed during discharge on the other plate dissolves in the acetic acid, forming the original solution of acetate of lead; by this means I eliminated the injurious effects of the hydrogen on charging.

During my experiments I found that red oxide of lead is a very bad conductor of electricity, and the peroxide a good conductor. I also discovered that by amalgamating lead plates with mercury a marked increase was

[1] "On a New Electrical Storage Battery." By Henry Sutton (Ballarat Victoria). Communicated to the Royal Society by the President.