

condition during that time. Preliminary observations with this instrument show that even in comparatively moist weather the total evaporation during twenty-four hours is great enough to be easily measured.

The instrument is intended primarily to be used for determining the total evaporation from tanks and other free surfaces of water. For this purpose it will be used first in connection with an atmometer, devised by Mr G. K. Winter and myself, by means of which we hope to determine with greater accuracy than has yet been done the total evaporation from the surface of a tank. By this means the constant of the hygrometer will be obtained, and future determinations can be made with the hygrometer alone.

Other uses of the instrument will at once suggest themselves, but it is not necessary to go into details till more complete observations have been made.

Monday, 7th April 1884.

ROBERT GRAY, Esq., Vice-President, in the Chair.

The following Communications were read:—

1. On the Philosophy of Language. By Emeritus
Professor Blackie.
2. On the Principles of Economics. Part III., Biological
and Psychological. By Mr P. Geddes.
3. Note on a New Form of Galvanometer. By Professor
James Blyth.

This instrument consists of a close spiral of insulated copper wire bent into the form of an anchor ring, so as to form an endless solenoid. The spiral is placed in a rectangular groove turned on the

edge of a wooden or brass ring of suitable thickness and diameter. Short lengths of wire at both ends of the copper spiral are left straight. These, after being well insulated, are twisted together and led to two terminals, which serve as electrodes. The ring containing the spiral is fixed on a base board with its plane vertical, and at right angles to the magnetic meridian, when the instrument is in use. A short magnet, rigidly attached at right angles to the lower end of a stiff wire, is suspended from a silk fibre, so that its centre is in the circular centre line of the anchor ring. Near the upper end of the wire a long glass fibre pointer is attached, which moves over a horizontal disc graduated to degrees, and the whole is so enclosed so that the magnet, fibre, and pointer are free from currents of air. Fig. 1 gives a sketch of the arrangement, showing, however, the convolutions of the wire much too far apart. These are in reality quite close together on the inner side, the spiral being tied tight into the rectangular groove by means of a cord.

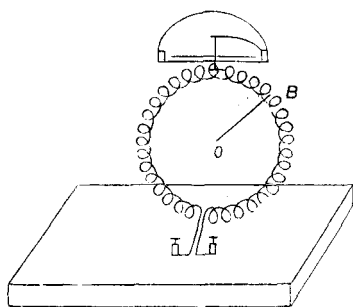


Fig. 1.

Let n = the number of convolutions in the spiral,

r = radius of circular axis of coil = OB,

C = current strength ;

then, if θ be the deflection, and H = horizontal intensity of the earth's magnetism, we have

$$\frac{2nC}{r} \cos \theta = H \sin \theta ,$$

$$\therefore C = \frac{Hr}{2n} \tan \theta .$$

From this formula it will be seen that the galvanometer constant can be very easily determined, since it depends only upon r and n .

Since the endless coil, when carrying a current, forms a closed

magnetic shell, it can exert no magnetic force outside the shell; and hence the current will have no effect upon any system of permanent magnets that may be employed to produce a stronger magnetic field surrounding the needle.

PRIVATE BUSINESS.

Mr James Tait Black and Mr E. Peirson Ramsay were balloted for, and declared duly elected Fellows of the Society.

Monday, 21st April 1884.

SIR WILLIAM THOMSON, Hon. Vice-President,
in the Chair.

The following papers were read by Honorary Fellows now in Edinburgh:—

1. On Galvanic Currents passing through a very Thin Stratum of an Electrolyte. By Professor H. von Helmholtz.

If one closes a galvanic circuit containing a small battery, the electromotive force of which is not able to decompose water, and a voltmeter with two platinum plates dipping into water acidulated with sulphuric acid, the current has a great intensity in the first moment, and diminishes at first very rapidly, afterwards slowly. At last its intensity approaches to zero more and more, but it never ceases completely. The more sensitive the galvanometer by which you measure its intensity, the longer the time during which you are able to observe the deflection of the needle. If the electrolytic fluid is in contact with atmospheric air, it is easy, even with a galvanometer of simple construction and moderate sensibility, to observe that at last a feeble residue of current remains, keeping a nearly constant intensity. This intensity, however, is increased by the slightest motion of the fluid, also by feeble motions produced by changes of temperature. Under these conditions, it is nearly impossible to determine by measurement regular relations between the electromotive force,