USING THE THREE-COIL GALVANOMETER.

234. The E. M. F. of a cell can be approximately measured by means of the 3-coil galvanometer. For this purpose the cell, whose E. M. F. is required, and the cell whose E. M. F. is known, are successively connected in simple circuit with the 1000-coil of the galvanometer, and the deflections noted. Let P_x and P' be the unknown and known E. M. Fs., ρ and ρ' the corresponding liquid resistances.

Then

$$C = \frac{P_x}{\rho + 1000}, \quad C' = \frac{P'}{\rho' + 1000}$$

But the ratio $\frac{C'}{C} = a$ can be found from the measured deflections δ and δ', by means of the data given in Table II. Hence

$$P_x = \frac{\rho + 1000}{\rho' + 1000} . a P'$$

Generally, ρ and ρ' can be neglected, so that

$$P_x = a P'$$

This last equation is applicable when the E. M. F. of "firing" cells is required, if the instruments for the more accurate methods be not available.

The galvanometer should be placed at right angles to the magnetic meridian, so that the index may point accurately to zero. The galvanometer should be gently tapped whilst taking a reading, as the needle is liable to stick.

Example.—Let $P' = 1.96$ volt., $\delta = 57°$, and $\delta' = 66°$; then, from Table II, $a = 0.71$, hence

$$P_x = 0.71 \times 1.96$$
$$= 1.39 \text{ volt.}$$

BY THE FUSION OF FINE WIRE.

235. If a cell, or battery, be capable of fusing fine fire, an approximation to its E. M. F. can be found when the current required to just fuse the wire, is known.

For this purpose the cell, or battery, is connected in simple circuit, with the Firing resistance coils and the thermo-galvanometer. The resistance through which the cell, or battery, can just fuse the fine wire, placed in the clips of the thermo-galvanometer, is then found by trial, as explained in § 214. Then

$$P_x = (r_b + \rho)C$$

where r_b is the resistance unplugged in the box of coils, and ρ is the liquid resistance of the cell, or battery, which, if not known,