LV. Rotating earth-inductor without sliding-contacts

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LV. *Rotating Earth-Inductor without Sliding-Contacts.*

By J. J. TAUDIN CHABOT*.

THE solenoid of the earth-inductor is divided into two parts, shown at a and a_1 . Both these parts are mounted on an axis xx , the middle portion of which rests in a bearing which

* Communicated by the Author.

is rigidly connected with the end of the axis yy . At b there is a bevel-wheel connected to the stationary base of the instrument; at b_1 there is a similar wheel, having an equal number of teeth, fixed to the axis xx . At c there is an oil-reservoir for lubricating the bearings. A flexible thin-wire cable is used as a connector; this is at one end joined to a point in the prolongation of yy , and at the other, after being led through the hollow axis xx , is connected at $\alpha, \beta, \gamma, \delta$ to the windings in a_1 and a .

If now the axis yy is made to rotate, then the axis xx must, on account of its being geared through $b b_1$, make one revolution for each revolution of yy , so as to leave the flexible cable *untwisted*. Hence if the yy axis be placed vertically or horizontally in the magnetic equatorial plane of the earth's field, its rotation will induce currents in the a and a_1 windings; the simultaneous rotation about xx does not in any way affect the results.

As will be seen, the uncertain sliding-contacts are by this means entirely eliminated.

Degerloch (Wttbg.), June 27, 1902.

LVI. *The Jacobian of the Primary Minors of an Axisymmetric Determinant with reference to the corresponding elements of the latter.* By THOMAS MUIR, C.M.G., F.R.S.*

(1) **I**T would appear that in certain recent work of Professor Karl Pearson's he had occasion to make use of a determinant $|r_{1n}|$ in which $r_{ij} = r_{ji}$ and $r_{ii} = 1$, and from which was formed another determinant $|\rho_{1n}|$ such that in every case $\rho_{ij} = R_{ij} / \sqrt{R_{ii} R_{jj}}$, the special problem which presented itself being the evaluation of the Jacobian

$$\frac{\partial(\rho_{12}, \rho_{13}, \dots, \rho_{n-1, n})}{\partial(r_{12}, r_{13}, \dots, r_{n-1, n})}$$

Mr. Arthur Berry, to whom the problem was transferred, successfully solved it, and communicated the result to the Cambridge Phil. Soc. in October 1898 †. His process consisted in showing that the Jacobian required was obtainable from two other Jacobians of lower order

$$\frac{\partial(\rho_{12}, \rho_{13}, \dots, \rho_{n-2, n-1})}{\partial(r_{12}, r_{13}, \dots, r_{n-2, n-1})}, \quad \frac{\partial(r_{1n}, r_{2n}, \dots, r_{n-1, n})}{\partial(\rho_{1n}, \rho_{2n}, \dots, \rho_{n-1, n})},$$

* Communicated by the Author.

† Pearson and Filon, "On the Probable Errors of Frequency Constants," Phil. Trans. A. exci. pp. 229-311 (1898); Berry A., "On the Evaluation of a certain Determinant," Proceedings Cambridge Phil. Soc. x. pp. 2-10; Crawford L., "On the Evaluation of a certain Determinant," Proceedings Edinburgh Math. Soc. xviii. pp. 25-27.