MAGNETIZATION AND THERMAL E.M.F's*

By S. R. Williams
Amherst College

THE thermal e.m.f. developed between transversely and longitudinally magnetized wires is shown in Fig. 1 for the case of iron and nickel. The experimental arrangement has been given in Fig. 1 of Seass' paper. This effect was predicted by Sir William Thomson.[1] A related phenomenon is the von Ettingshausen-Nernst effect in which a heat flow perpendicular to a

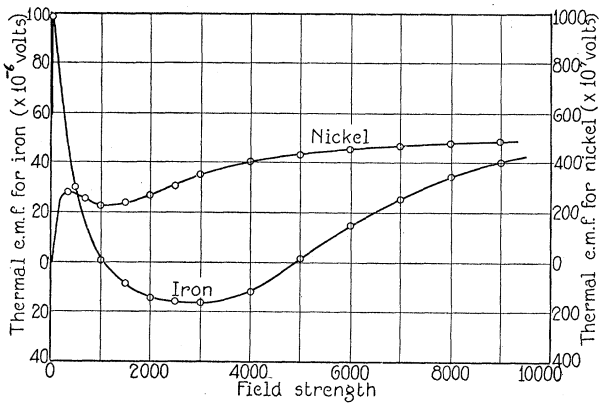

Fig. 1.

magnetic field is the conductor causes a potential gradient parallel to the heat flow. A correlation of the two effects for various conductors is of great interest, particularly for bismuth, antimony, and carbon, since these three have some interesting properties in connection with their conductivites.[2]

The present experiments show that temperatures determined by thermocouples in magnetic fields are not reliable unless the elements of the couple are unaffected by the field. A number of elements are displaced in the thermo-electric series by being in a magnetic field. Naturally, relations with magneto-striction[3] and magneto-resistance[4] will be sought.

* Some of the material of this presentation has since been published by S. Seass; Thermocouples whose elements are longitudinally and transversely magnetized ferromagnetic substances, Phys. Rev. **38,** 1254 (1931). Accordingly the present résumé has been shortened in such a way as to avoid unnecessary duplication.

[1] W. Thomson, Math. and Phys. Papers **2,** p. 286.

[2] Raman, Nature **124,** 412 and 762 (1929).

In addition, the e.m.f. in iron and nickel throughout complete hysteresis loops is to be studied.

[3] L. W. McKeehan, Phys. Rev. **36,** 498 (1930) and **28,** 146 (1926); Williams and Sanderson, Phys. Rev. **307,** 39 (1931).

[4] Rhoads, Phys. Rev. **15,** 321 (1902); Bidwell, Proc. Roy. Soc. London **73,** 413 (1904).

MAGNETOSTRAIN AND MAGNETORESISTANCE

By L. W. McKeehan
Yale University

THE dimensions and electrical conductivities of a ferromagnetic body are affected in two ways by its magnetization.