subjected to a comparison with a box calibrated by a build-up process.

Dr. HARKER asked if the resistance of the eight mercury cups in series had ever been measured, and, if so, what was the magnitude of the result and what the uncertainty?

Mr. GLAZE BROOK said he had investigated the resistance of the mercury contacts, and it was negligible. In answer to Mr. Campbell, the author said he had no experience of manganin coils himself, but he had seen some figures for German coils which agreed very closely over a considerable period of time.

XXIII. *Note on Crystallization produced in Solid Metals by Pressure.* By W. CAMPBELL.*

[Abstract.]

THE effect of hammering a button of slowly-cooled tin is to produce a fine crystalline structure, the original structure of the tin being almost completely destroyed.

In the preparation of sections of tin, it is found that particles cling to the file and, if allowed to remain, tend to tear the surface of the metal. The effect is not immediately noticeable; but on etching the polished surface there appear besides the usual structure of the tin, lines of much smaller crystals, with irregular boundaries but possessing different orientation. If the tearing effect of the file has been extreme, these crystals may blot out the initial crystallization, produced by the original cooling. If the surface be gradually worn away by continued polishing, these crystals gradually disappear and the usual structure of the tin appears, showing that the effect is only on the surface.

A similar crystallization is set up when a section is cut with a saw. If in the process of polishing the metal thus modified is not cut away, the fine crystalline structure comes out on etching.

* Read June 8, 1900. (Communicated by Sir W. Roberts Austen.)

Exactly the same effects were produced in case of a copper-tin alloy containing 1 per cent. of copper. Thus it would appear that a metal or even an alloy will rearrange itself under the slight pressure exerted by a file.

DISCUSSION.

Prof. S. P. THOMPSON suggested that the effect might be due to local heating caused by tearing rather than to pressure.

Mr. CAMPBELL said the effect was not due to the heating of the file, because if the file were kept perfectly clean no crystals formed.

Prof. S. P. THOMPSON asked if scratching the surface with a diamond produced crystallization.

The AUTHOR said he had tried with a sharp knife without success, but cutting with a blunt chisel produced crystallization along the chisel-mark.

XXIV. *An Application of the Method of Striæ to the Illumination of Objects under the Microscope.* By Prof. R. W. WOOD *.

[Plate I.]

HAVING recently made considerable use of Toepler's "Schlieren-Methode," it occurred to me to see to what extent this most sensitive means of rendering visible minute differences in refractive index could be applied to the illumination of objects under the microscope. The deflexion of a long ray of light by the striæ in the object to be observed, being the fundamental principle of the method, it seemed at first sight quite hopeless to get results in the short space between the microscope-objective and the object, and I was much surprised to find how well the method worked, even under these unfavorable conditions. On looking over the 'Beiblätter' of the *Annalen* I found, after finishing my obser-

* Read June 8, 1900.