We are grateful to Professor Maurer and Professor Seitz for drawing our attentions to the problem posed by Compton's results and one of us (C. W. McCombie) is indebted to the Commonwealth Fund for financial support.

* On leave of absence from the University of Aberdeen, Aberdeen, Scotland.

[1] W. D. Compton, preceding Letter [Phys. Rev. **101**, 1208 (1956)].

[2] E. Koch and C. Wagner, Z. physik Chem. **B38**, 295 (1937).

[3] F. Seitz, Acta Cryst. **3**, 355 (1950).

[4] J. Bardeen and C. Herring, in *Imperfections in Nearly Perfect Crystals*, edited by W. Shockley (John Wiley and Sons, Inc., New York, 1952). Professor Bardeen points out that a factor 2 is omitted from terms after the first on the right-hand side of Eq. (A.2) and the error persists through the paper.

[5] The correction to the Einstein relation proposed by E. Katz [Phys. Rev. **99**, 1334 (1955)] is not consistent with this requirement and must in principle be zero.

[6] I. Ebert and J. Teltow, Ann. Physik **15**, 268 (1955).

Photographs of the Stress Field Around Edge Dislocations

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Past attempts to "see" individual dislocations in transparent crystals by means of polarized light have always been frustrated by the sheer density of of these dislocations. However, such perfect silicon crystals are now grown that the dislocation density is low enough to make the inspection of individual dislocations possible by working in the near infrared where silicon is transparent. If one calculates from the stresses around dislocations[1] what the intensity distribution should be for observation between crossed Nicols, one gets, for an edge dislocation seen "end on" (assuming an isotropic medium), curves of equal intensity as shown in Fig. 1. Here it is assumed the slip vector of an edge dislocation makes an angle of 15° with the polarizer axis. Using measured values of the stress birefringence constants for the infrared, we find that the intensity 50 microns from a dislocation is about one thousandth of what it would be in the absence of Nicol prisms. In the absence of Nicols, a picture of a metal screen requires an exposure of about one second when a carbon arc is used. Hence a dislocation could be photographed in about a quarter of an hour. Figure 2 is such a photograph taken on an Eastman I plate, sensitized for the infrared.

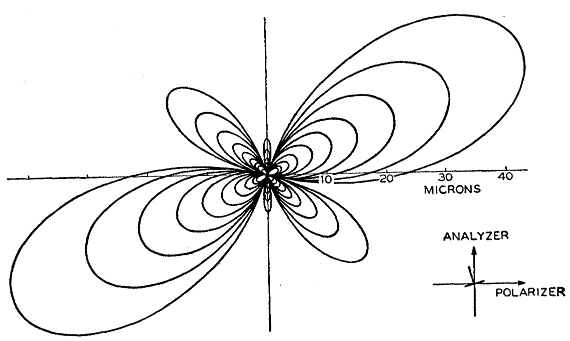

Fig. 1. Intensity of light around a dislocation the slip plane of which is turned 15° to the polarizer axis. The contour intervals are half-values.

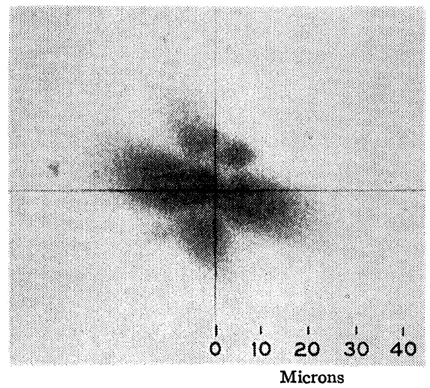

Fig. 2. Photograph in infrared through silicon.

Figure 3 is a picture through a twinned specimen. The specimen is a 110 plate so the twin boundary, a 111, is seen "edge on." The contrast between the two parts is caused by an externally applied stress. A number of dislocations are seen "end on" along the twin boundary. A number of slip planes are to be seen, each with dislocations most of which are somewhat tipped. The slip planes make the correct angle with the twin boundary to be 111 planes as they should be. The dislocations repel each other so that the ones on the boundary are caused to stand erect, in which position they are most readily seen.

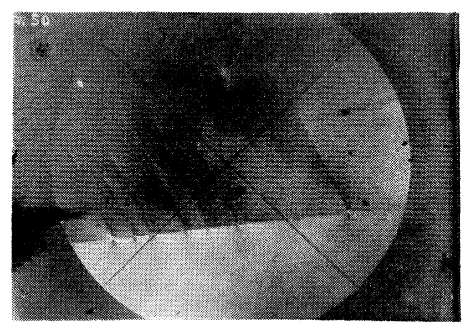

Fig. 3. Array of dislocations around a twin boundary.

Computations also show that screw dislocations cannot be photographed along the axis and perpendicular photographs of either kind should take exposures of many days.

[1] W. T. Read, *Dislocations in Crystals* (McGraw-Hill Book Company, Inc., New York, 1953), p. 116.

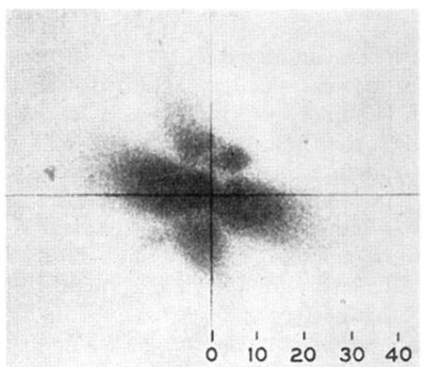

Fig. 2. Photograph in infrared through silicon.

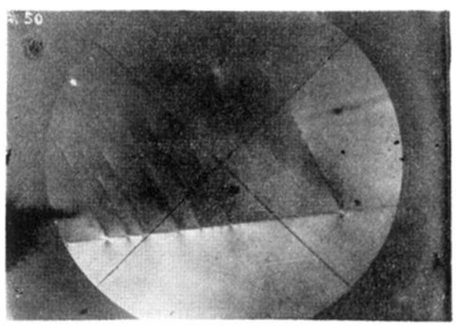

FIG. 3. Array of dislocations around a twin boundary.