loidal or light-scattering nature (1)). These centers can be annealed out in a non-radiative process.

I am grateful to Dr. A. E. J. Engel, California Institute of Technology, for his interest in this study and to him and Mr. H. D. Miser, U. S. Geological Survey, for the donation of smoky quartz crystals.

REFERENCES

1. STRUTT, R. J. (1919), Scattering of light by solid substances: *Proc. Roy. Soc. London*, **95A**, 476–479.
2. HOLDEN, E. F. (1925), The cause of color in smoky quartz and amethyst: *Am. Mineral.*, **10**, 203–252.
3. MOHLER, N. (1936), A spectrophotometric study of smoky quartz: *Am. Mineral.*, **21**, 258–263.
4. COHEN, A. J. (1954), Regularity of the *F*-center maxima in fused silica and α quartz: *J. Chem. Phys.*, **22**, 570.
5. COHEN, ALVIN J., Mellon Institute (private communication).
6. HAMILTON, WARREN B. (1951), Granitic rocks of the Huntington Lake area, Fresno County, California: *Ph.D. thesis*, University of California, Los Angeles.
7. ENGEL, A. E. J. (1952), Quartz crystal deposits of western Arkansas: *U. S. Geol. Survey, Bull.* **973-E**, 260 pp.
8. BROWN, C. S., AND THOMAS, L. A. (1952), Response of synthetic quartz to *x*-ray irradiation: *Nature*, **169**, 35–36.
9. GRIFFITHS, J. H. E., OWEN, J., AND WARD, I. M. (1954), Paramagnetic resonance in neutron-irradiated diamond and smoky quartz: *Nature*, **173**, 439–440.
10. KÖHLER, A., AND LEITMEIR, H. (1934), Die natürliche Thermolumineszenz bei Mineralien und Gesteinen: *Zeit. Krist.*, **87**, 146–180.
11. DANIELS, F., AND SAUNDERS, D. F. (1950), The thermoluminescence of crystals: Final Report, *A.E.C. Contract AT(11-1)-27*.

A NEW PARALLEL RULER FOR ADAPTING THE UNIVERSAL STAGE FOR PETROFABRIC ANALYSIS

A. W. KLEEMAN, *Mawson Laboratories, University of Adelaide, Adelaide, South Australia.*

In adapting the universal stage for petrofabric analysis, it is necessary to fix to the upper hemisphere a parallel rule device to enable the slice to be moved into parallel positions across the field of view. (cf. Fairbairn p. 258, Fig. 20.4). Leitz has designed a special hemisphere mount with the "Schmidt Ruler" built in. In both of these devices the arm that holds the slice is parallel to the long axis of the hemisphere mount and is necessarily in contact with the shortest edge of the glass slip on which the slice is mounted. In order to cover a large area of the rock slice it is frequently necessary to change the Schmidt ruler from one end to the other of the slip, which means that the ends must be parallel.

A new type of parallel ruler in which the reference arm is at right angles to the long axis of the hemisphere mount, and hence parallel to

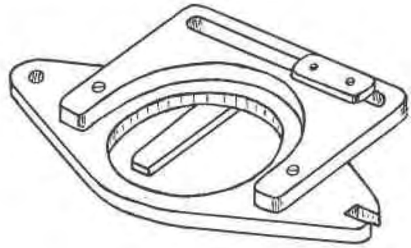

Fig. 1

the long edge of the slip has been designed in the Mawson Laboratories. An isometric sketch showing the parallel ruler attached to a standard Leitz hemisphere mount is shown in Fig. 1. In this sketch the hemisphere itself is not shown so that the position of the reference arm can be seen below the hemisphere mount. Figure 2 is a copy of the working drawing from which the device was built. Only a few dimensions are given, the rest can easily be scaled from the drawing. The dimensions will vary slightly depending on the exact size of the hemisphere mount to which the ruler is to be fitted. The horseshoe shaped yoke was made of aluminium alloy "dural" about 2.5 mm. thick but it could easily be thinner. The semi-circular opening can be as large as is consistent with the rest of the design, as well as being an opening large enough to clear the hemisphere. It should also give enough room for the microscope objective when the stage is tilted. This does not apply so much when objectives such as the Leitz U.M. series are used as it does when using the normal short mount objective (e.g. Leitz P2).

The reference arm must of necessity be thinner than the thinnest thin section used. In general the glass slip upon which the rock is mounted is

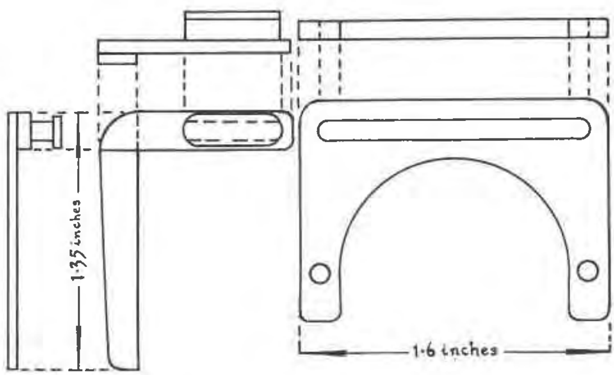

Fig. 2

1.0±0.10 mm.; to this must be added 0.20 mm. for the combined thickness of the slice and cover glass. The arm therefore was designed at 1.00 mm. This arm is fixed to another piece of dural, a little thicker than the hemisphere mount, in our model 2.0 mm. thick. Upon this is the cursor which runs in the slot of the yoke. This cursor should be just a little thicker than the yoke to allow for adjustment when the device is assembled. The top plate screwed above the cursor is necessary unless some other artifice is used to keep the cursor in place in the slot. The yoke is fixed to the hemisphere mount by two set screws, for which it is necessary to tap two holes in the hemisphere mount. These two screws should

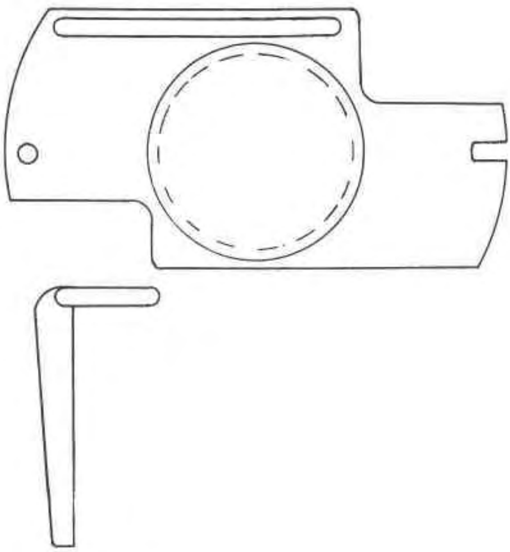

Fig. 3

be countersunk to prevent them coming into contact with the objective when the stage is tilted.

The new design has several advantages. As mentioned above, the reference arm is in contact with the long edge of the thin section and the whole available area can be traversed in one set-up. Also it is not necessary to cut the glass slip as short as when the Schmidt ruler is used. The device can be designed so that the reference arm does not prevent the thin section being moved into any position in which the design of the Leitz U.T.4 allows it to be manipulated, but in the original model the movement was limited slightly. Thin sections in the Mawson Laboratories are made in the first instance on 3 inch by 1 inch microscope slides and covered by $\frac{7}{8}$ inch square cover glasses. It was, therefore, decided to limit the movement of the reference arm to 0.90 inch, (23 mm.). The distance that the thin section can move parallel to the reference arm is limited by the length of the thin section because the corners hit the mounting of the inner circle of the universal stage during manipulation. For universal stage work thin sections are cut to length between 1.6 and 1.8 inches, i.e. producing 25 mm.×45 mm. to 25 mm.×40 mm. thin sections. With the larger size the square area that can be brought beneath the crosswires is 14×14 mm. and with the smaller 19×19 mm. Allowing for the fact that it is not necessary to bring the grains beneath the crosswires the use of the smaller (25 mm.×40 mm.) glass slip will permit as much rock slice as can be mounted below a $\frac{7}{8}$ inch square (22 mm.) cover glass to be examined.

This device is designed to be fitted on the normal hemisphere mount of the Leitz U.T.4 or similar universal stage. The same principle of having the reference arm at right angles to the long axis of the hemisphere mount can be adopted in making up special hemisphere mounts as is indicated by the sketch in Fig. 3. In this design the hemisphere mount is cut away to enable the thin section to be moved more easily.

Reference

Fairbairn, H. W. (1951), The Structural Petrology of the Deformed Rocks. Cambridge, Mass.

ACTIVATION OF PHOTOLUMINESCENCE IN ARTIFICIAL CALCITE BY STANNOUS ION

Stewart J. Carlson, *Tulsa, Oklahoma.**

Introduction

Activation of calcite fluorescence has received a great deal of attention in the past, although the results and interpretations have been contradictory. Headen (1906) suggested the yttrium group as possible activators but presented little definite evidence. Nichols (1918) confirmed manganese activation and suggested that heat might be necessary for fluorescence. Tanaka (1924), analyzing calcite cathodoluminescence with a spectrophotometer, decided the "active agent" was manganese and suggested as other "active agents," dysprosium, yttrium, thallium, samarium, and strontium. Brown (1934), analyzing natural calcite, found that 3.4 mole per cent manganese gave the most intense luminescence.

* Present address: Box 40, U. S. NAVCOMMFAC, Navy 214, c/o FPO, New York, New York.