ACCESSORIES FOR LOCATING MICROSCOPICAL FIELDS IN POLISHED SECTIONS

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Introduction

In the microscopical study of polished sections it is convenient to be able to indicate accurately the position of areas of interest in the sections: re-location of particular microscopical fields is thus facilitated. This can be achieved by applying a grid system to the polished surface by means of which a location on the surface can be assigned unique co-ordinates. The following is a description of several accessories for this purpose which are used in the author's laboratory for specimens embedded in either rectangular or cylindrical mounts. In addition, a method is described for converting co-ordinates determined on either a conventional ore microscope or an inverted microscope (Vickers 55) to co-ordinates for the other type of microscope, thus permitting the quick location of a selected field on either instrument.

Grid locators

Transparent grid locators were designed more than twenty years ago by Dr. M. H. Haycock, formerly of the Mines Branch, Ottawa, and have been employed here ever since for indexing the position of microscopical fields, using a standard ore microscope. They are prepared by photographing an indexed square grid chart and then photographically reducing the negative on a lantern slide plate to produce a positive transparency. The reduced grid should be large enough to cover the polished specimens, and grid squares approximately one millimeter in size are convenient. The lantern slide plate is then trimmed to a size slightly larger than that of the polished surface and a glass cover of the same size and thickness is cemented to the emulsion surface, to protect it from abrasion. To serve as positioning stops, two plastic or glass strips are then cemented to adjacent edges on the lantern slide surface of the "sandwich" and parallel to the grid lines (Figs. 1a, 1c and 2).

For cylindrical mounts a curved positioning stop may be used (Fig. 1b) and a notch filed on the top edge of the section as a fiducial point for positioning the locator. Alternatively, the cylindrical mount may be fixed in a brass holder with rectangular sides (Fig. 1f) and with this holder a large grid locator (Fig. 1c) is used.

To index the position of a selected area of the polished surface, the field is brought into focus under a medium-power objective and, with the section held firmly on the stage, the grid locator is positioned on the section (or on the sample holder, for cylindrical sections). The grid

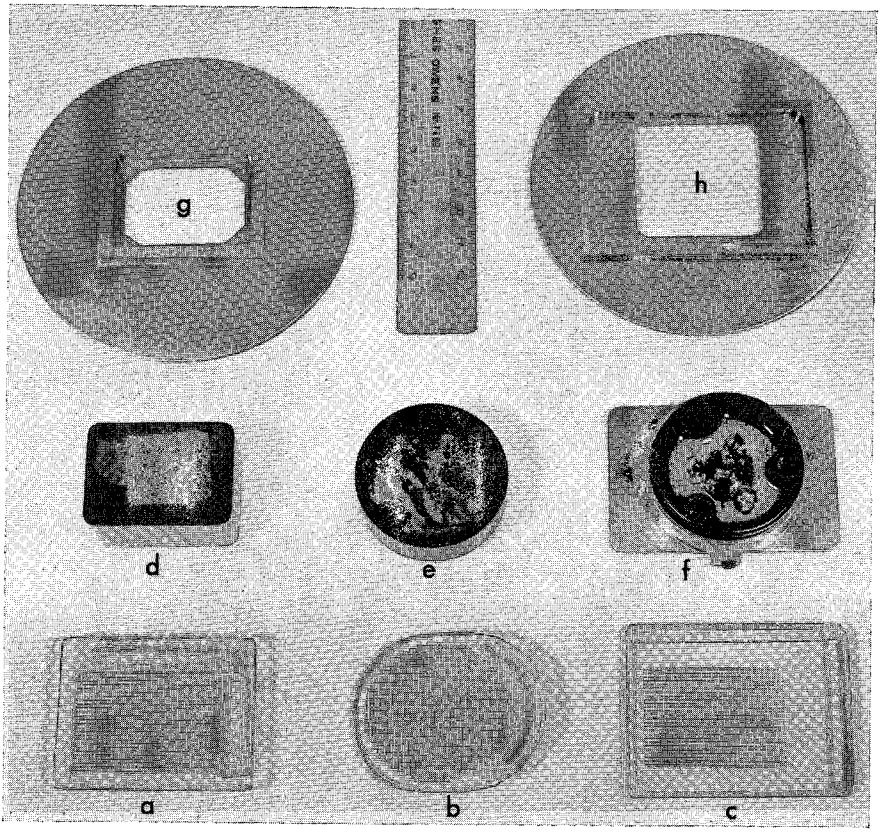

FIG. 1. Accessories for microscopical determination of grid co-ordinates in polished sections. Bottom row—transparent grid locators: (a) for rectangular mounts; (b) and (c) for cylindrical mounts. Middle row—(d) rectangular mount and (e) cylindrical mount; (f) holder for cylindrical mount used with grid locator (c). Top row—stage inserts for Vickers 55 microscope: (g) for rectangular mounts and (h) for cylindrical mounts held in (f).

co-ordinates of the field can then be read and recorded. Depending on the objective employed, it may be necessary to raise the microscope tube slightly to improve the focus of the grid.

Indexing on inverted microscope

With an inverted microscope the polished section lies face down on the stage. The readings of the two stage micrometers can be used to index the position of a microscopical field in a polished section if the mount is positioned uniquely and reproducibly with respect to the traversing stage. This has been achieved with the Vickers 55 microscope by providing a

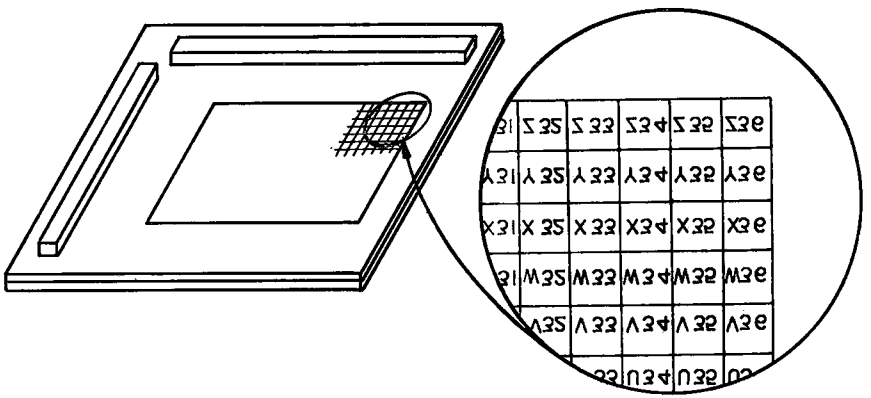

FIG. 2. Diagram of transparent grid locator showing surface adjacent to polished section (left) and detail of grid system (right).

brass stage insert for rectangular mounts (Fig. 1g), and also a stage insert (Fig. 1h) to accommodate the section holder for cylindrical mounts (Fig. 1f).

The polished section is positioned in the appropriate stage insert and the latter is oriented on the microscope by aligning a reference scratch on its top surface with one on the gliding stage. The gliding stage is locked to the mechanical stage. The position of a particular microscopical field can now be designated by its co-ordinates read from the micrometer scales.

Locating field on second microscope

When both an inverted and a conventional microscope are used it is often desirable to quickly find a particular field the position of which has been indexed on the other microscope. To permit conversion of co-ordinates the relationship between the co-ordinate systems must be determined and this can be accomplished by comparing the co-ordinates of reference grains in a polished section as plotted on indexed grid charts.

A grid chart is prepared for the inverted microscope and one for each transparent grid locator. All charts are drawn at the same scale—a scale of 10:1 is suitable. The chart for the inverted microscope is drawn in ink on transparent plastic sheet (or tracing paper) and since the traversing micrometer scales are graduated in millimeters the chart squares are made one centimeter in size. The chart for a transparent grid locator is prepared by inking the grid lines on metric cross-section paper: the grid squares are made ten times the size of the squares on the grid locator and are indexed so that the grid pattern conforms to that seen microscopically when the locator is employed on a polished section mount.

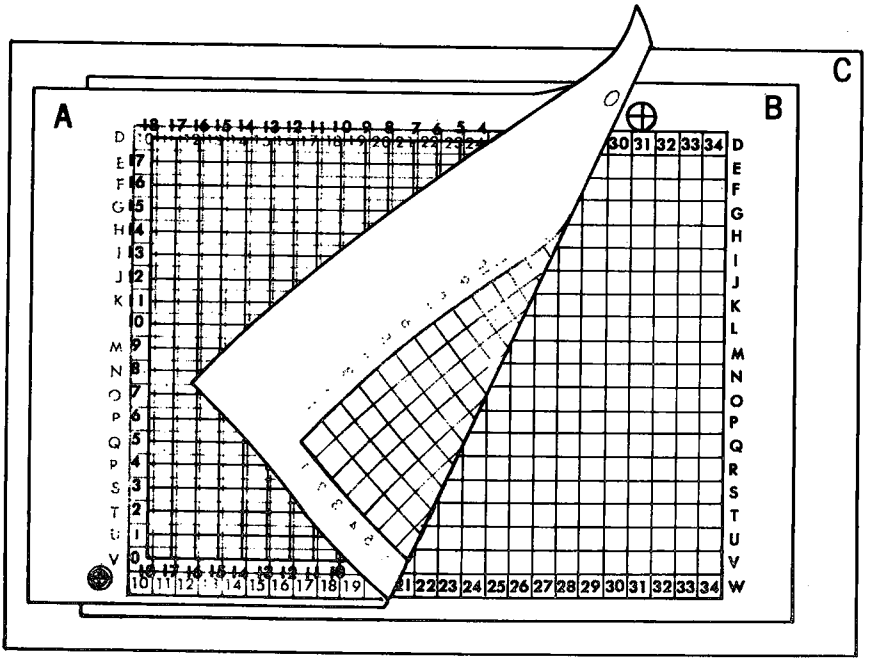

FIG. 3. Diagram to show use of indexed charts for conversion of co-ordinates: (A) chart for inverted microscope. (B) chart for grid locator. (C) masonite backing.

To relate a pair of grid charts, the co-ordinates of three or more reference grains in a polished section are determined on both microscopes and plotted on the two charts. The plastic chart (Fig. 3, A) is then placed on the paper chart (Fig. 3, B) so that the pairs of plotted points coincide, and this position of coincidence is marked by pressing a needle through the charts at two fiducial points. When the charts are placed in this relationship, co-ordinates determined on one microscope can be converted to co-ordinates for the other microscope.

It is convenient to cement one edge of the plastic chart to a sheet of thin plywood or masonite (Fig. 3, C): the appropriate paper chart is then easily positioned beneath the plastic chart.

Acknowledgments

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