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A GRINDING APPARATUS FOR THE ACCURATE REMOVAL OF
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ABSTRACT

A vacuum holder is fitted with carbide plates that limit grinding depth is adjustable to 0.001 inch.

During a study of the spatial extent of chemical equilibration of garnets in gneisses (Blackburn, 1968), it was found desirable to accurately measure the dimensions of individual garnet grains and their distribution within the samples. This operation was performed by sequential removal of thin layers of the rock slab by a "micrometer grinder" (Fig. 1) coupled with grain size measurements following each grinding. Further, if the positions of grain centers were also noted after each removal of material, both the measurement of absolute grain sizes and the spatial positioning of garnet centers within the rock were possible.

The grinding apparatus was built in the instrument shop of the Department of Geology and Geophysics at the Massachusetts Institute of Technology as an adaption of one described by Prof. D. L. Biggs of the Iowa State University of Science and Technology (pers. comm., 1966).

The apparatus, as illustrated in Figure 1, consists of three principal brass parts: (1) An inner threaded cylinder (20 threads per inch) whose lower face is milled out to form a suction chuck for a glass thin section slide. A central hole and nipple connect the chuck to a vacuum system. (2) An outer annular adjusting ring threaded to the inner cylinder. Its lower face is fitted with a series of 8 carbide face plates which limit the grinding action on the sample to the predetermined depth. (3) A brass cover fastened to the inner cylinder and overlapping the adjusting ring. The scale on this cover is graduated into 50 divisions which, when coupled with the cylinder threading, provides precision setting to 0.001 inch per division. A molybdenum-based lubricant is recommended to prevent seizing.

Dimensions other than those given are not not critical. As illustrated, the inner cylinder is 2.5 inches in diameter and 2.0 inches high. The adjusting ring is 3.0 inches in diameter and 2.0 inches high.

In use, a sample for serial grinding is mounted on a petrographic glass slide, placed in the chuck and vacuum applied. The vacuum system commonly used with thin section cut-off machines serves admirably. After facing off a parallel surface on the rock slab, serial surfaces at predetermined separations are then made by appropriate adjustments to the

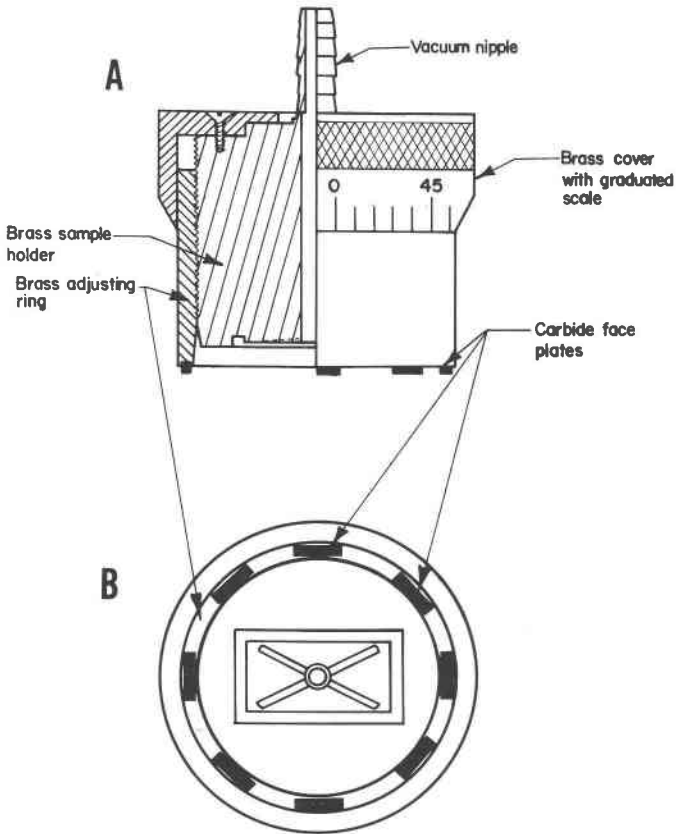


FIG. 1. (A) Side view of the micrometer grinder with a half-view cut-away. (B) Bottom view of the grinder showing the positioning of the carbide face plates and the suction chuck.

device followed by grinding. Both the facing off procedure and the serial grinding may be most efficiently done on a metallurgical lap using abrasives of desired grit.

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REFERENCE

- BLACKBURN, W. H. (1968) The spatial extent of chemical equilibrium in some high-grade metamorphic rocks from the Grenville of southeastern Ontario. *Contrib. Mineral. Petrology*, **19**, 72-92.