that formed subsequently in the inner zones of the pegmatites. A search for conclusive evidence of the origin of the inclusions is now needed, for if inclusions of types (1) and (2) are truly primary, and if current theory of the origin of fluid inclusions is valid, the pegmatites formed in open systems, not in closed or restricted (Cameron, Jahns, McNair, and Page, 1949, pp. 99–105) systems. We suggest, however, that even if the inclusions are ultimately proved to be primary, the assumptions underlying current theory of liquid inclusions should be reviewed, and they should be tested by laboratory studies of liquid inclusions in crystals precipitated from polycomponent solutions. Both the development and the composition of the inclusions should be investigated.

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References

Cameron, E. N., Jahns, R. H., McNair, A. H., and Page, L. R. (1949), The internal structure of granitic pegmatites: *Econ. Geol., Mon.* **2**, 115 pp.

Cameron, E. N., and Shainin, V. E. (1947), The beryl resources of Connecticut: *Econ. Geol.*, **42**, 353–367.

Ingerson, E. (1947), Liquid inclusions in geologic thermometry: *Am. Mineral.*, **32**, 375–389.

Scott, H. S. (1948), The decrepitation method applied to minerals with fluid inclusions: *Econ. Geol.*, **43**, 637–654.

APPARATUS FOR THE SEPARATION OF MINERAL GRAINS

F. E. Senftle, *Department of Metallurgy, Massachusetts Institute of Technology, Cambridge, Massachusetts.*

It is often necessary to separate a large number of microscopic mineral grains from an assemblage of various mineral grains. For example, if one desires a sample of a very pure mineral, it is often necessary to separate the pure mineral grain by grain from the gangue-locked grains. The usual method of picking individual grains with a stylus and tweezer is laborious and time-consuming, especially when a large number of grains is required. The apparatus to be described was constructed to facilitate and speed up the picking method.

For the most efficient use of a grain segregating apparatus, a concentrated sample of the desired mineral should be used. Thus, a rough purification of the mineral should be made in the conventional manner with an isodynamic separator, a superpanner, or heavy liquid separation. The mineral should then be screened as closely as possible. In this work 65 to 100 mesh was used.

The apparatus consists of three parts; namely, the distribution drum, the turntable and air ejector (see Fig. 1) and the vacuum picker (see

Fig. 2). The mineral concentrate is charged into the distribution drum which is mounted on a revolving shaft. The mineral is admitted to the drum through a cork plugged hole in the side of the drum. On the opposite side of the drum is a 3/8″ hole covered with a thin piece of aluminum foil cemented to the wall of the drum. The foil in turn is punctured with a small hole about the average size of the mesh being separated. The exit

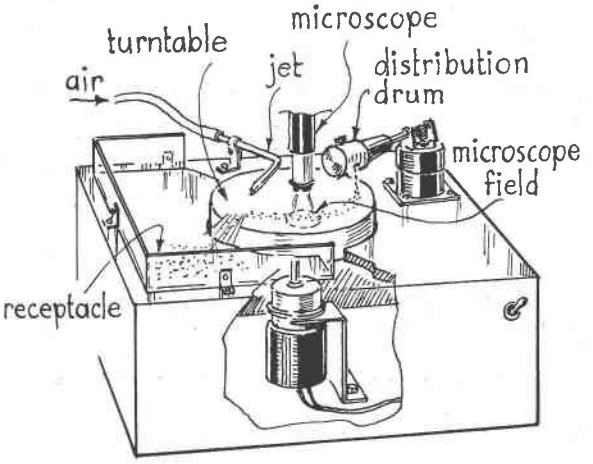

FIG. 1

hole was made in the foil rather than directly in the side of the drum for two reasons: (1) the wall is thick relative to the size of the particles and such a hole acts like a tube which is easily clogged, and (2) the foil facilitates the changing of the hole size if a different size mesh is to be separated. The number of grains spilled out onto the revolving turntable directly below on each revolution of the drum is controlled by the size of

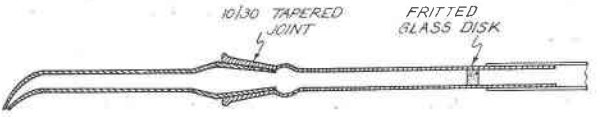

FIG. 2

the small hole in the foil. The most convenient size is found by trial and error starting with a small hole and enlarging it until the desired distribution is obtained.

The turntable on which the grains fall is a 3″ diameter stamped aluminum "can cover" mounted on a slowly revolving shaft. It carries the particles into the field of the microscope where the desired grains are picked. The undesired grains (locked grains, gangue, etc.,) are allowed

to remain on the turntable. As they are carried in front of the ejector, an air jet blows them into the discard receptacle. White or black paper is glued to the top of the turntable to facilitate identification of the desired grains.

As the assemblage of grains is brought into the field of the microscope, the operator picks the desired grains with the vacuum picker shown in the figure. This consists of a glass tube drawn out to a fine opening at one end and connected to a water filter pump at the other end. Close to the vacuum end of the glass tube is a sintered glass disk. As the grains are sucked up, they collect in the tube just in front of this disk. To remove the grains, the tube is made in two parts connected by a ground glass joint secured with small springs (not shown in diagram).

The apparatus is built on a $5'' \times 6'' \times 9''$ metal box. The turntable motor is geared to revolve at $3\frac{1}{2}$ turns per minute at 110 volts, and its speed is further reduced to about $\frac{1}{4}$ turns per minute by reducing the voltage with a Variac control. The distribution drum motor is also geared down and controlled by a Variac. Its speed will vary with the size of hole used. In this case 100 to 200 turns per minute was found to be a convenient speed. The discard receptacle is made from a plastic box cover cut to fit close to the turntable. It might be pointed out that the distribution drum should not be made of plastic material. The electrostatic charges built up on such a drum tend to clog the orifice restricting the flow of particles.

Where this type of work is to be conducted over an extended period of time, eye strain on the operator may be reduced by projecting the field on a small screen with a prism. To do this, however, requires stronger illumination than can be obtained with an ordinary microscope lamp.

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UNIT CELL OF SCHAIRERITE

C. W. Wolfe and Alice Caras, *Boston University, Boston, Mass.*

Schairerite ($Na_2SO_4 \cdot Na(F_{.814}Cl_{.186})$) was discovered in the Searles Lake complex of salts by Foshag and described by him in 1931. The mineral occurs with a pronounced trigonal habit with the suggestion of rhombohedral symmetry. Artificial crystals of the same substance had previously been synthesized by Schairer (1930) of the Geophysical Laboratory for whom the mineral was named. Dr. Clifford Frondel of Harvard in a paper on *Habit Variations of Sodium Fluoride* (1940) gave x-ray data