Methods & Machines

ibratory Micro-Sluice for ineral Separation

ENTLY developed in the Minerals neering Dept. of the University of ingham, U.K. is the vibratory micro-e, an instrument for the mineralogical ation of small particulate samples h utilises the concept of separation by eaming current in a narrow channel.

e micro-sluice is expected to fulfil the for a separator capable of treating les down to 0.05g in weight and pro-ng separate fractions of the constituent rals.

e micro-sluice has already been used a wide range of separations including e required for geological and mineral essing purposes. For example galena 7.5), cassiterite (s g 6.9), pyrites (s g sphalerite (s g 4.0) and siliceous ue minerals have been separated in r into individual products. Similarly, concentrates of very high purity, as ired for rock dating, have been ob-d from a range of geological samples.

he separator is a small compact unit, m long by 26cm deep by 20cm high weighs 11.5kg. It is of rugged con-ction with few moving parts, and ld give trouble-free operation for y years.

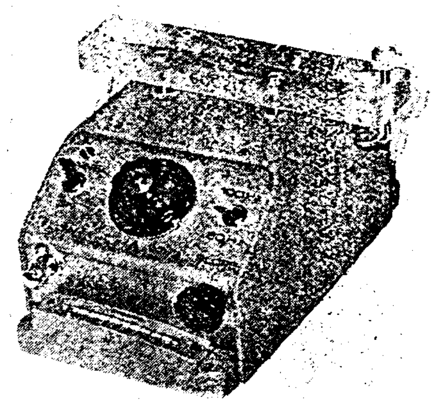
he sluice is of a modified V-section h is precision machined from cast y resin. Provision is made at the dis-ge end of the channel for collection discrete fractions of the products in l sample vials. These are rapidly inter-geable to allow any desired number of les to be collected.

s an alternative, sample tubes approxi-ely 80mm long by 2mm bore may be d. In these the products are stratified rding to density thus allowing for the le and rapid visual assessment of the eral constituents.

practice only three variables need be each of which is controlled from the t panel of the separator. The slope of sluice may be adjusted to any value o 10° by means of a fine screw, the al angle being read on an integral t reading clinometer. Intensity of ation is controlled by means of a vari-transformer. Liquid flow is adjusted gh a fine needle valve. The liquid nally water to which a suitable wet-agent has been added) is fed to the at constant pressure. The reservoir, stand and sight glass for the observation of flow rate are supplied with the separator. In practice, flow rates in excess of 200ml/h are rarely required, hence heavy liquids may be conveniently used if desired. Each of these controls may be precisely adjusted.

In normal operation the sized sample is introduced at the bottom of the sluice and the highest density mineral moves up the channel against the slope and direction of liquid flow. Since this transport does not depend upon the stratification of minerals, which is usually required in other separators, the vibratory micro-sluice can be adjusted so that the second most dense mineral is still retained at the bottom of the channel. Thus the minerals may be separated as discrete fractions in order of density with very little cross-contamination.

As an alternative, when the minerals of lowest densities are required or where the shape factor is important (e.g. mica) it has been found advantageous to reverse the sluice on the separator and feed the sample to the top of the channel. Under these conditions the required minerals travel down the sluice and are collected at the bottom.



Vibratory micro-sluice.

TRANSPORTATION

Bulk Weighing of Railroad Cars

A SOPHISTICATED automatic scale system for measuring the weights of bulk material in railroad cars is operating at the Decker Coal Co.'s Colliery at Sheridan, Wyoming. The Decker operation combines a weighing system for cars coupled and in motion developed by Railweight, Inc., of Northfield, Ill. with an electronic scanning system perfected by A.C.I. Systems Corp. of South Holland, Ill. Without the touch of a human hand, this system weighs a whole trainload of 100 empty cars as it enters the colliery and memorizes the car identification number, and tare weight of each. After the train is loaded it recrosses the scale system which associates the gross weight of each car with its tare weight and computes the net weight of the coal.

This information is printed on a teletypewriter located in an office remote from the scale site.

Operations have shown that train weight accuracies within 1 lb (usually within 0.5 lb)/1,000 lb weighed are assured with the Railweight system. Over 150 weighing installations of various types are currently in use by railroads and industrial weighers throughout the world.

When not in use the system of sensors and amplifiers checks its own state of readiness every 20 min. If a slight drift (as little as ten lb in 80,000 lb) is found the system corrects itself through an automatic calibration and zeroing facility. Should the system be unable to correct itself, a red signal light replaces the green light that is visible to the locomotive engineer.

The whole train including engine is run over the scale at up to 5 mile/h. The scanner is automatically turned on to read from striped identification labels on the cars. Sensors located along the tracks are triggered by the engine's approaching wheels and the system recognizes axles as those of an engine and prints zeros instead of weight.

As each car passes over the 5ft 6in scale, its axles are individually weighed. They are instantaneously added together and the total car weight and car number are printed on teletype paper roll. The data is stored in a memory bank.

The speed limit for accurate weighing is 5½ mile/h. As the train reaches 5 mile/h a signal light flashes to warn the engineer that he is approaching the limit and to slow down. Should speed exceed 5½ mile/h the weights will be recorded but distinguished by a special symbol indicating they are likely to be inaccurate.

As the train leaves the scale on its way to the loading hopper, the computer calibrates and balances itself, checking its accuracy against the known standard. The weighing technique is identical even