

dressing processes and can offer an unusually comprehensive service to the mining industry that is of great value in the development of new supplies of raw materials, particularly of low-grade ores and unusual minerals which have now reached economic importance.

References

- (1) THE MINING MAGAZINE, June, 1935 ; Nov., 1948.
- (2) THE MINING MAGAZINE, Jan., 1951.
- (3) *Trans. Amer. Inst. Min. Engrs.*, **112**, 130 (1933).
- (4) *Rep. Inv. U.S. Bur. Min.* 3750 (1944) and 3844 (1945).
- (5) *Trans. Amer. Inst. Min. Engrs.*, **55** (1917).
- (6) *Trans. Amer. Inst. Min. Engrs.*, **115** (1934).

Simple Apparatus for Mounting Specimens in Bakelite

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Introduction

Comparatively recently Williams and Nakhla (1)² have shown that bakelite and bakelite-graphite mounts are very suitable

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² References appear at the end of this note.

for embedding fairly large mineral specimens and also mineral grains previous to polishing and examination by the chromographic contact printing method. A major snag to this method, however, is that the press required for making such mounts is comparatively expensive and it was to overcome

The author describes
the construction
of the apparatus
and outlines its uses

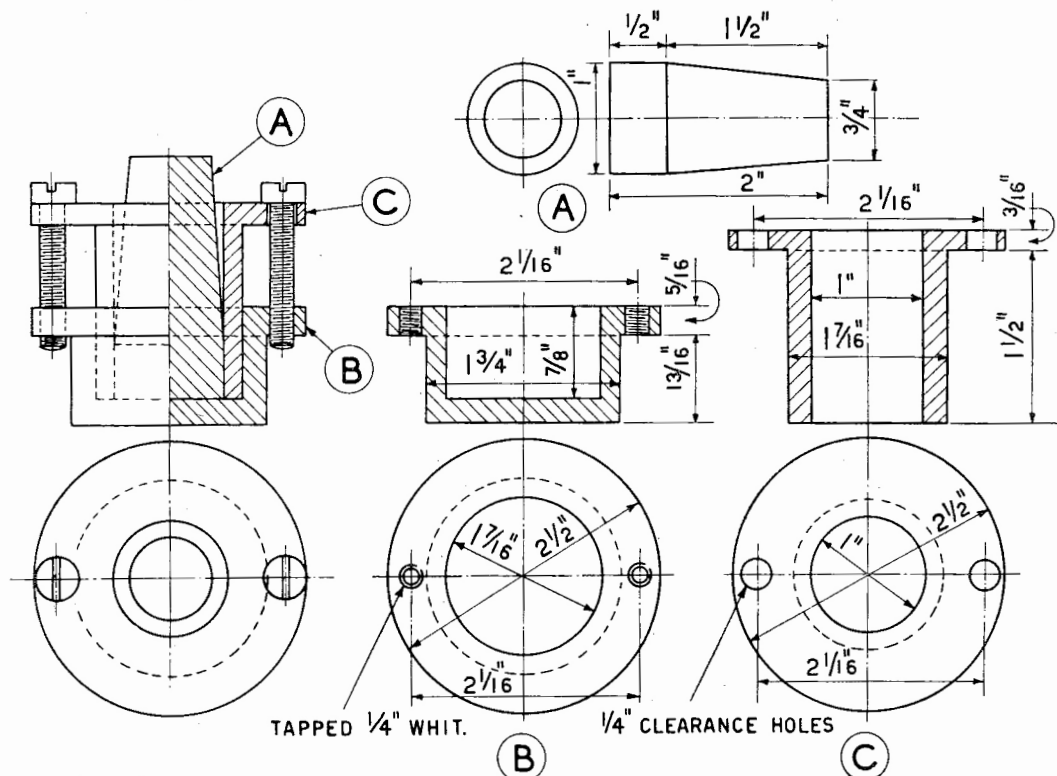


Fig. 1.—Constructional Details.

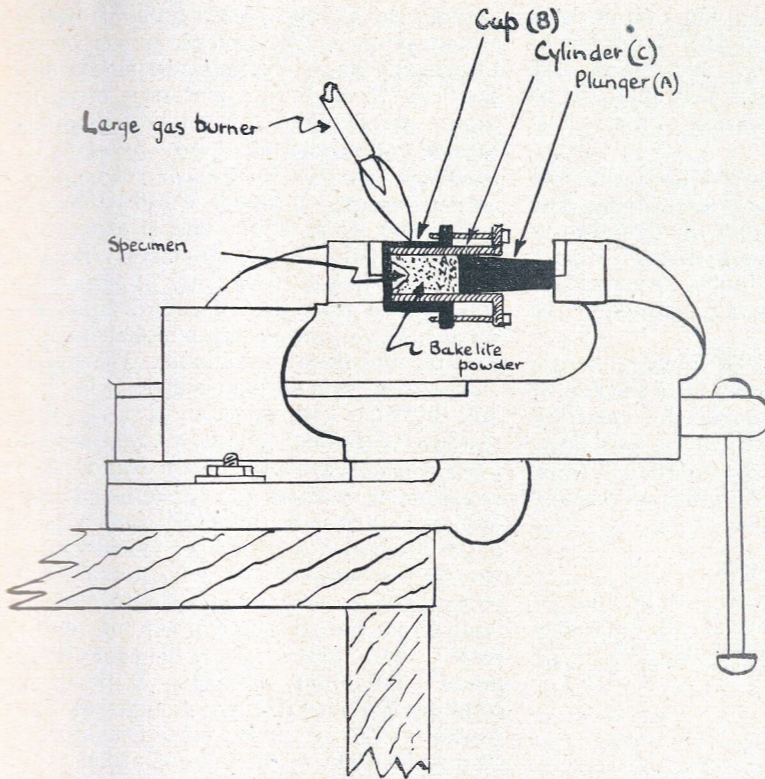


Fig. 2.—
Press
in Use.

this that the author designed the inexpensive piece of apparatus described in what follows.

The apparatus was constructed in the Camborne school fitting shop from mild steel and the accompanying drawing (Fig. 1) should enable one to make a similar one with little difficulty. It should be of use to workers on small mines who wish to study the characteristics of their ore in connexion with mineral-dressing problems by the chromographic contact printing method. Similarly it should be of value to small institutions lacking a bakelite press, who nevertheless wish to teach some metallography.

Method of use

The cylinder *C* (Fig. 2) is inserted into the cup *B* and is held in position by means of two screws. If the specimen is large a reasonably flat surface is prepared and the specimen is inserted into the cylinder so that the flat surface rests on the bottom of the cup. Sufficient bakelite or bakelite-graphite is then added to produce a mount of required thickness. If *plus* 90-mesh grains are to be examined they should be placed in the bottom of the mould and covered with bake-

lite or bakelite-graphite powder, while if grains between 90 and 200 mesh are to be mounted they should be mixed with the mounting medium in the proportion of approximately 1:10 as described by Williams and Nakhla (2). The amount of mounting medium it is necessary to add may be judged, providing its characteristics are known; thus the bakelite powder used by the author produces a mount of volume approximately a third of that originally occupied by the powder.

The plunger *A* is inserted on top of the powder and the apparatus is placed in a horizontal position between the jaws of a reasonably-large vice.

The side of the cup is heated by playing the flame of a large gas burner or blow-lamp upon it and at the same time the handle of the vice is slowly rotated so that the plunger gradually compresses the heated bakelite. It must be stressed that only comparatively gentle heating is necessary as the temperature of the bakelite should not exceed 200° C. However, no means of measuring temperature are necessary and the operation may be judged to be complete when further compression cannot readily be obtained. It is

only necessary to play the flame on about a third of the side of the cup in order to obtain good results and this makes the operation very much easier than it would be if carefully controlled heating of the whole surface were necessary.

The apparatus is removed from the vice when cold and the cup is detached. The mount is then released from the cylinder by gently knocking the plunger through with a hammer. Finally the mounted specimens or grains are polished as a preliminary to examination.

Should a bakelite film be found adhering to the interior of the cylinder after the mount has been released it should be carefully removed by scraping and when the apparatus is not in use its external and internal surfaces should be coated with a thin film of vaseline in order to prevent rusting.

References

- (1) WILLIAMS, D., and NAKHLA, F. M. Chromographic Contact Print Method of Examining Metallic Minerals and its Applications. *Trans. Inst. Min. Metall.* Vol. 60, 1950-51, part 7, pp. 257-295.
- (2) *Op. cit.*, pp. 281-282.

Ore-Dressing Notes

(19) General

New Chemical Method

For quite a few years direct reduction of sphalerite in an electrolytic bath and precipitation of a zinc coating has been practised in connexion with the "patenting" of wires for steel ropes. A new chemical method suitable for the extraction of pure metals from mill concentrates of metal scrap has now been reported¹ in America and it is also claimed as successful at the economic stage on scrap metal. Mill concentrates are prepared by standard flotation methods and then sent as a slurry into an autoclave together with water and a suitable leaching chemical. The resulting leach solution is then treated by suitable reducing agents and the metals in the ore are precipitated separately as pure powders which can be compacted or extruded as rod or pipe. The reagents are said to be recoverable.

The metals produced by this method include nickel, selectively produced from cobalt, and copper in a continuous operation.

¹ *Min. Engng.*, June, 1952.

Among the savings claimed for this method which is being introduced in one or two important plants, having now passed satisfactorily through the pilot scale of experiment, is reduction of the time lag between mining and marketing of pure metal from a matter of months to a matter of hours. A cobalt refinery is under construction near Salt Lake City, Utah, and is expected to increase world cobalt production notably. It will process 35 tons daily of 20% cobalt concentrate from the Blackbird Mine, near Cobalt, Idaho, and will produce about 2,000 tons of pure metal per annum. The steps in the process begin with an acid oxidizing leach and filtration with rejection of the insoluble residues containing gangue, iron, and arsenic; next comes cementation, reduction from ammoniacal solution, and separation of cobalt and nickel as mixed metals carrying 95% of cobalt and 5% of nickel. Finally comes recovery of ammonium sulphate. Another plant in Missouri is expected to make an important annual production of cobalt, nickel, and copper as well as fertilizer-grade ammonium sulphate. A third will combine the Sherritt-Gordon ammonia-leach process with a nickel-reduction process, aiming to yield 8,500 tons of nickel, 1,000 tons of copper, 150 tons of cobalt, and 70,000 tons of ammonium sulphate annually, at Edmonton, Canada.

It has also been found that this process promises to produce almost 100% recovery of pure copper from any form of scrap containing significant quantities of this element. The discovery in the last century of a chemical method of attaining gold by the use of cyanide first brought the chemist into the mill. To-day new fields seem to be opening for linkage of the plain mineral-dressing engineer with the chemical engineer working along lines alternative to those of our old metallurgy. It should be most interesting to review the position in a few years' time when these processes have had a chance to shake down and prove their worth in a more competitive world than the hungry re-armament market of to-day can provide.

(20) Coal

Froth-Flotation Considerations

The froth flotation of coal differs in many ways from that of ordinary minerals. Perhaps the most important consideration is that coal surfaces possess some strongly persisting quality which, for want of a better name, is