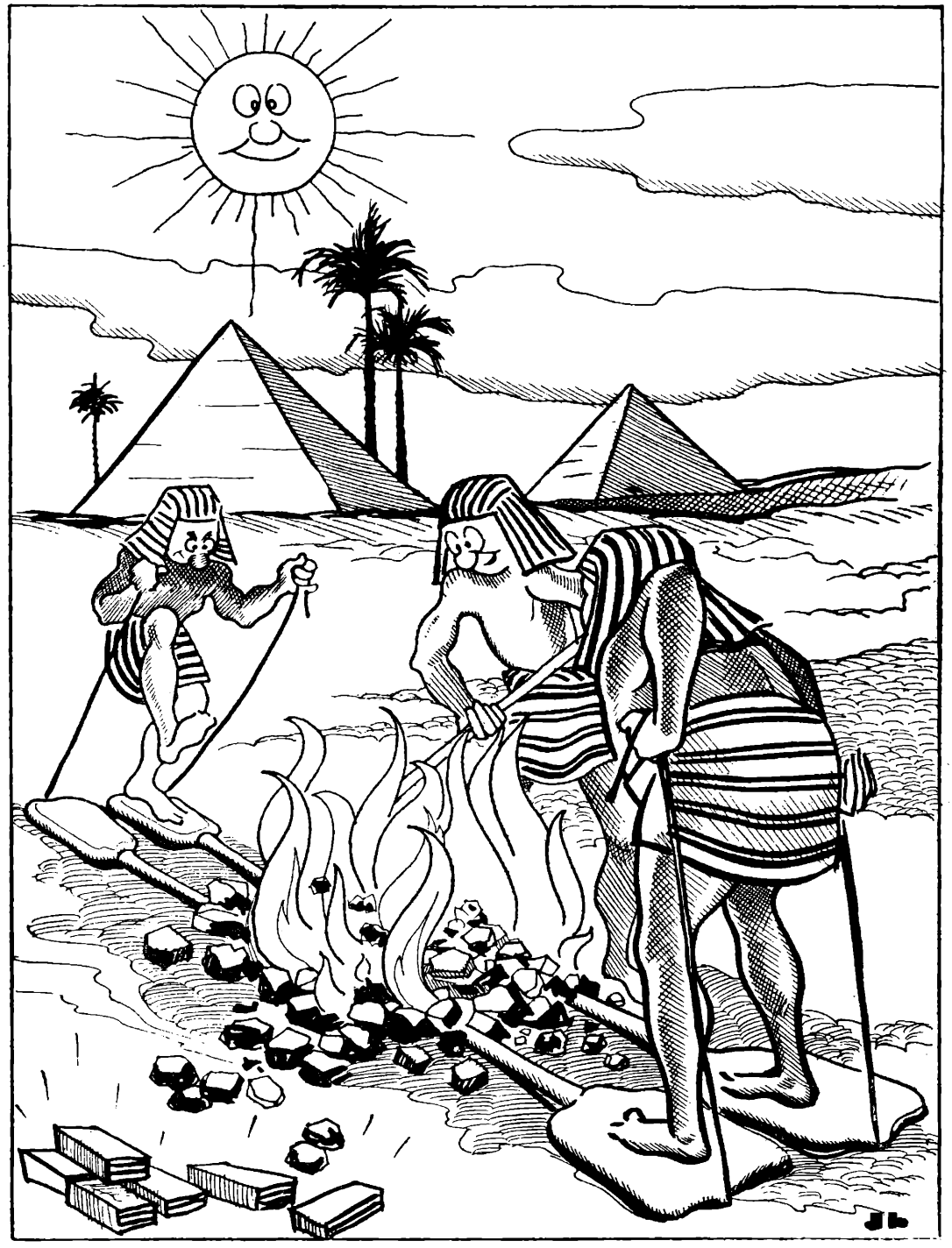
MYSTERIES OF MINING

This is the thirteenth in a series of features describing various interesting phases of mining and the mining industry.



The Egyptians were probably the first real metallurgists; their work contributed much to the science of the time of extracting metals from ores. Here the artist shows a primitive furnace; the workers on each end of the poles are stepping up and down to create an artificial draft, by means of which high temperatures could be attained.

THE PHILIPPINES NEW SMELTING INDUSTRY

Modern smelting is not an intricate, complicated process—it is simply concentration of metals by fire. Chemically, it is the union of an acid, silica with a base, iron and lime, forming a waste product, slag. The precious metals gold and silver, are collected by a carrier, which is heavier than the slag and settles to the bottom, where it is tapped off. The usual carriers are matte (an artificial sulphide of iron and copper), copper or lead, according to the character of the ore.

The only type of smelting carried on at present in the Philippines on a commercial scale is gold, silver, copper smelting, and the only smelting plant is that of the Philippine Smelting Company, a Marsman organization, at Mambulao.

When the Paracale district was reopened by the Marsman engineers, in 1933, most of the ore blocked out was not particularly difficult to treat, being composed chiefly of oxides. As the San Mauricio mine was opened, however, and as development at United Paracale progressed, the ore became more and more complex. Several new mines came into production in the area, and most of the ore treated in the whole area is complex in nature, being more or less similar in character.

For some time it was necessary, in the Paracale district, to ship the flotation concentrates to the Tacoma smelter. The approximate cost of this method was around ₱100 per ton of concentrate. In addition, there were other disadvantages: the uncertainty of shipping facilities, the necessity of maintaining a large labor crew for the periodical loading and the storage space, trucks, lighters and other equipment necessary for the handling of the large quantities of concentrates produced each month.

Accordingly, the Marsman engineers, after a careful discussion of the problem, decided on the installation of a smelting plant; it was constructed during late 1937 and early 1938. Now functioning as an adjunct to the mining industry it serves the entire district. It is of distinct advantage to the various mining companies, and also it permits the new mines to process their high grade ore obtained during development work thus making funds sooner available for further work. It has resulted in the inauguration of an entirely new industry in the Philippines, a further step in the economic advancement of the Commonwealth. Presently the Philippine Smelting Company affords employment to more than two hundred men and has a payroll of approximately ₱10,000 monthly.

Smelting as practised at Mambulao can be described simply as follows:

Flotation concentrates from United Paracale and San Mauricio, and from other plants in the district in addition to those, as well as high grade ores, are trucked to the smelter bins. After careful weighing, and sampling, the material is then mixed with the required flux (depending upon the chemical composition of the material) and conveyed to the sintering machines. The work of the sintering machine is two-fold: first, to roast out the excess sulphur and second to fuse the concentrates and fluxes together into a "clinker" which is called sinter. The amount of sulphur burnt off controls the ultimate grade of the matte produced. The charge goes on to the sintering machines with about 24% sulphur and the resulting sinter contains about 6% sulphur—some 75% of the sulphur having been eliminated.

The sinter cake is broken into pieces ranging from 1 to 4 inches in diameter, and is then fed to a blast furnace along with silica, lime, slag, and other ingredients which may be required to make a liquid and free-flowing slag. Alternate layers of coke and charge material are added to the blast furnace as required. Air is blown through the charge to supply the necessary oxygen for the combustion of the coke and the reduction of the sulphur.

The charge melts and flows continuously from the furnace into a brick-lined settler where the matte and slag separate. The matte is tapped from the bottom of the settler into matte moulds, and the slag overflows the top of the

settler into portable slag pots and sent to the slag dump.

The matte contains about 50 ounces of gold and 150 ounces of silver per ton; it is around 55% copper. Thus the main object of smelting locally, which is to convert a large tonnage of concentrates into a small bulk of matte, thereby saving the mining companies sacking, transportation, and treatment charges on a large tonnage of valueless material, is achieved.

The ratio of concentration, which depends on the grade of material received is about 15 to 1. In other words, from 15 tons of concentrate received about one ton of matte is produced and is shipped to the copper smelter at Tacoma, Washington, for further treatment and refining.

At the present time the Philippine Smelting Co. acts as agent in the further processing of concentrates of ores for the following companies: United Paracale Mining Company, San Mauricio Mining Company, Santa Rosa Mining Company, Paracale Gumaus Mining Co., Gumaus Goldfield, Inc., Santa Ana-San Joaquin Mines, Inc., and several leasers.

COCO GROVE, INC.

During December the two dredges handled 348,450 cubic yards of gravel, from which ₱126,964.78 was recovered. The total output was around ₱20,000 higher than that of November, and it brought the 1938 production figure to 2,215,337.99 from the 3,908,792 cubic yards of material handled.

The dredge Mary Angus handled 171,760 cubic yards, and recovered ₱69,157.33. The area dredged was 112,115 square feet, and the average depth was 40.3 feet.

The dredge Anne Petronella recovered ₱57,807.45 from the 176,690 cubic yards handled. The area dredged was 80,095 square feet, to an average depth of 59.5 feet.

Results of December operations checked well with the drill hole logs. In general the dredge operated smoothly, without any serious repairs or overhaul being necessary. Both dredges are working in general accordance with the dredging program, and at the end of the year both had reached the positions expected.