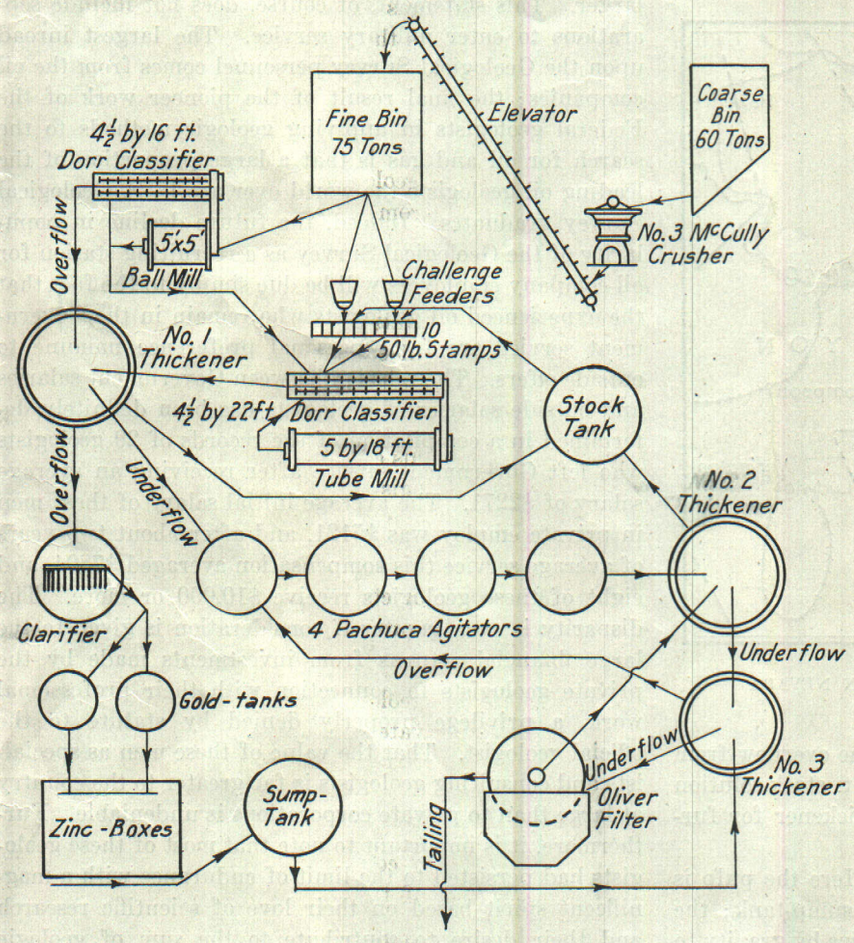
The Como Consolidated Mill

By F. BORZYNSKI

The Como Consolidated Company's property is situated in the Silver City-Palmyra mining district of Lyon county, Nevada. The mine and mill are about 12 miles south-east of Dayton, the nearest railway point. The mill has been recently remodeled and enlarged to treat the ores from the Como-Eureka, North Rapidan, and Lucky Sunday mines.

The ore consists of hard quartz with small amounts of calcite and other minerals. The valuable metals are gold and silver in approximately equal proportions, and both are so minutely disseminated that fine grinding is essential. The milling process consists of crushing in a gyratory machine followed by stamps and a ball-mill, both crushing in a 3½-lb. cyanide solution. The pulp from the stamps is classified and the coarse material re-ground to 85% minus 200-mesh in a tube-mill. The ball-mill will reduce the ore to the required fineness in one operation and is so arranged that it can be used as an intermediate grinder in place of the stamps. The capacity of the mill is approximately 100 tons per 24 hours. Only about 60 tons per day is being milled now, but the management expects to run the mill to its full capacity as soon as the ball-mill is ready for operation.



FLOW-SHEET OF COMO MILL

The ore from the mine is dumped into a 60-ton bin. It is then reduced to one inch in a No. 3 McCully crusher and elevated by a bucket-elevator to a 75-ton bin. The crushed material is fed by two Challenge feeders to ten 1050-lb. stamps. The stamps make 110 drops per minute. Three to five-mesh discharge screens are used. The capacity is about six tons of ore per stamp per 24 hours.

The ore fed to the 5 by 5-ft. ball-mill will be delivered from the fine-ore bin onto a 20-in. conveyor. The belt has a variable speed, so that the rate of feeding can be regulated at will. To the ball-mill is connected a 4½ by 16-ft. duplex Dorr classifier working with the ball-mill in closed circuit. The ore is to be reduced from one inch to 85% minus 200-mesh in one operation. The overflow from the classifier will join the overflow from a 4½ by 22-ft. duplex Dorr classifier working in closed circuit with a 5 by 18-ft. tube-mill, and the united overflow will be pumped by a 2-in. centrifugal pump to the No. 1 Dorr thickener.

The pebbles used in the tube-mill are made from local material. One of the mine stopes contains a large number of very hard and tough quartz boulders, which are separated at the coarse crusher and broken with a sledge-hammer to the required sizes. About 10 lb. of pebbles per ton of ore is required, and although consumption of these pebbles is high, the grinding results are satisfactory. The cost of the pebbles is 7½ cents per ton of ore milled, and is much lower than the cost of Danish pebbles. Besides the home-made product contains about $7 per ton that is recoverable.

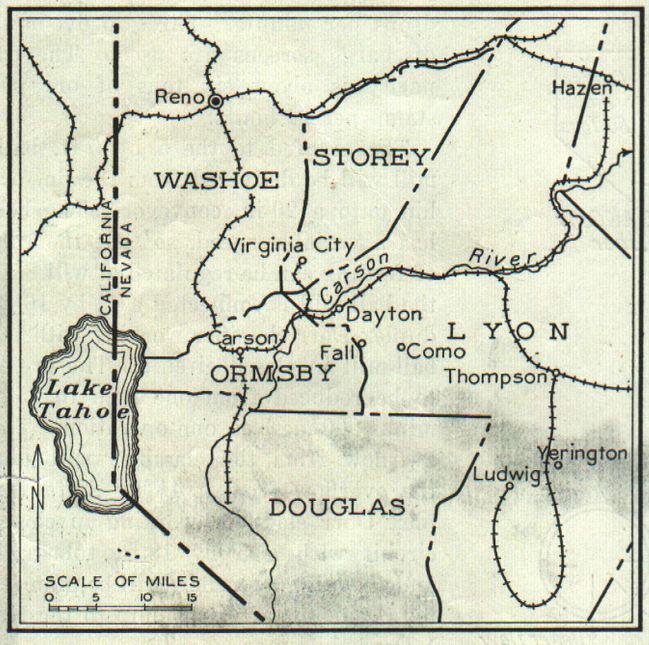
The No. 1 thickener is 30 by 10 ft. and the mechanism makes 12 r.p.m. Most of the overflow is sent by gravity to a clarifier and the remaining flows to the stock-solution tank.

The clarifier-tank is 20 by 10 ft. and contains eighteen 8 by 5-ft. leaves. The leaves are connected to a 9½ by 8-in. vacuum-pump and the solution so clarified flows to

two 10 by 10-ft. gold-tanks and from there to nine 8-compartment zinc-boxes. The zinc heads average $1.50 per ton in gold and silver, and about 3.5 lb. of cyanide. The zinc tails flow through measuring orifices into a 20 by 8-ft. sump-tank.

The overflow from the No. 1 thickener is raised with an air-lift into four 12 by 36-ft. Pachuca agitators. The air for agitation is supplied by two 10 by 12-in. compressors at 25 lb. per square inch. The thickness of the agitated pulp is 33% solid. Cyanide is added to the No. 1 agitator, where the solution is raised to 4 lb. of cyanide per ton of solution.

The discharge from the No. 4 agitator flows to the No. 2 thickener. This is 30 by 10 ft.; here the pulp is washed by the addition of the filtrate from the Oliver filters and



MAP SHOWING POSITION OF COMO, IN NEVADA

the overflow from the No. 3 thickener. The overflow from the No. 2 thickener goes to a 20 by 10-ft. stock-solution tank, and the underflow to the No. 3 thickener for further washing and thickening.

The No. 3 thickener is 24 by 10 ft. Here the pulp is washed with barren solution from the sump-tank; the thickened overflow of about 55% solid flows by gravity to 12 by 12 ft. and 8 by 12 ft. Oliver filters where it receives final washing and dewatering. About 19 tons of fresh water is used per 24 hours, this being sufficient to replace the solution lost in the tailing. Only one filter is used at a time, the other being kept in reserve.

The consumption of cyanide is nearly 2 lb. per ton of ore. Eighty-nine hundredths of a pound is the mechanical loss, the remainder being chemical. The chemical loss is exceptionally high owing to the copper content of the ore. The amount of lime used, however, is very small, owing to the low acidity of the ore and its fast-settling rate. About one pound of lime per ton of ore is all that is required.

Charles La Kamp is the general superintendent and Mr. Warner the mill superintendent. Their combined efforts are producing good results. The milling cost, at first high, steadily diminishes, and is near the $2 mark at the present time, which is very good for the locality and existing conditions.

THAT the personnel of the U. S. Geological Survey is facing serious deterioration is indicated by the following statement of the Director of the Survey in his annual report: "The fact that there have been 77 resignations from the scientific force of the U. S. Geological Survey during the last year—17% of the force—suggests inadequacy of compensation, and the percentage of resignations in the clerical and non-scientific force was even larger. This statement, of course, does not include separations to enter military service. The largest inroad upon the Geological Survey personnel comes from the oil companies; the final result of the pioneer work of the Federal geologists in applying geologic methods to the search for oil and gas is that a large proportion of the leading oil geologists the world over are U. S. Geological Survey graduates. Indeed, the future decline in popularity of the Geological Survey as a recruiting station for oil-company employees will be due simply to the fact that the experienced oil geologists who remain in the Government service are from personal preference immune to outside offers. The relation between Government salaries and outside salaries of geologists has been definitely determined in a compilation of the records of 29 geologists who left Government service after receiving an average salary of $2271. The average initial salary of these men in private employ was $5121, and after about two years of average service this compensation averaged $7804, and eight of these geologists receive $10,000 or more. The disparity is even greater if consideration is given to the large financial returns from investments made by the private geologists in connection with their professional work, a privilege properly denied by statute to the official geologist. That the value of these men as specialists and consulting geologists is far greater to the country at large than to private corporations is undeniable. Furthermore, it is important to note that most of these geologists had persisted to the limit of endurance with a magnificent spirit based on their love of scientific research and their desire to contribute to the sum of geologic knowledge. Most of them have been forced out of the service by sheer financial necessity. Unless adequate measures are taken to ameliorate the situation, the geologic staff is destined to suffer far greater deterioration of morale and depletion in its ablest, most responsible, most experienced, and most valuable members. The Geological Survey is passing into a stage when, with greater need than ever for systematic geologic work in the country, it is ceasing to be attractive to the young men of greatest ability, training, and promise. This situation deserves prompt and effective remedy, for it threatens most seriously to cripple this branch of the public service."