

J. S. COUPAL* reports

Famous Tip Top Mine Reopened and in Production

From 1876 to 1884 Tip Top, Tombstone, and Wickenburg were the three most active mining camps in Arizona. After 40 years or more of comparative idleness the camp of Tip Top has been rehabilitated, a 50-ton flotation mill has been installed and is now operating, the mine has been reopened, and the property is maintaining steady shipments of high-grade silver concentrates to the smelter at El Paso.

The property was discovered in 1875 by John Corning and Jack Moore. They had been working in and around Prescott and had been interested in the reports of rich strikes in the then active gold placers on Humbug Creek. It was slow travel in the early days and they spent the night at the Swilling ranch—at the junction of the Black Canyon and Agua Fria rivers—where Canon is now located.

Early next day they took the Indian trail for Humbug Creek which crossed Boulder Creek and then over a pass into Cottonwood Creek. After making the pass and going down hill to Cottonwood Creek, they noted high-grade silver float on the hillside. They decided to make camp on Cottonwood Creek where they found good water and abundant shade.

The float was traced up hill and the outcrop of the ledge from which it had come was located. Three claims were staked out, the discovery work done, and some of the high-grade specimens taken to Prescott. At Prescott they took in two partners and returned to work the property. Within a year's time, they took out and shipped about \$80,000 in high-grade silver ore.

The ore was packed by mule back to the Black Canyon road and thence by mule team and wagon to Ehrenburg, on the Colorado River, where it was shipped down stream to the Gulf of California, and from there to the smelter at San Francisco.

These shipments of high-grade ore, which ran from 500 to 1,000 ounces silver per ton, attracted the attention of Haggin, Head, and Hearst interests in San Francisco. After looking it over they purchased the property for \$60,000 cash and worked it from 1876 to 1884. An inclined shaft was sunk to a depth of 500 feet and levels were driven on the ore every 100 feet, opening up an ore body 600 feet in length. A 10-stamp chlorination plant was erected at Gillette, on the Agua Fria River, a distance of about six miles from the mine. The ore was packed mule back part way to a receiving bin from which it was hauled by wagon to the mill. During this time a production of between \$2,500,000 and \$3,000,000 in silver is claimed.

The ore body raked to the northeast and out of the shaft and the lower workings did not develop the high-grade bonanza ore which had been found above the 500-foot level. The mine and mill were shut down and the property abandoned in 1884. The owners did not keep up any assessment work and the property was relocated by Dan Wright and Tony Beauchamp in 1885-1886. They also took in two partners and flourished in the workings above the 200-foot level for about a year's time.

The property was then sold to St. Louis interests for \$15,000 and a company or-

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Production has been resumed and regular shipments of concentrates are being made from the old Tip Top silver mine, one of the camps which made early-day history in Arizona.

ganized called the St. Louis-Yavapai Mining Company. The four men who had sold the property received a lease on the ground above the 200-foot level and they worked continuously up to 1893, taking out about \$85,000 in ore.

The St. Louis-Yavapai Company dismantled the mill at Gillette and moved and re-erected it at the mine. The inclined shaft was sunk to a depth of 830 feet and a level made at 800 feet. The ore shoot had passed out of the shaft due to it's rake, at about the 800-foot level so a drift was driven to the northeast and the ore picked up again. About 100 feet from the shaft a winze was sunk 50 feet deep on the ore and it continued to the bottom. Ground between the 500 and 800 levels was partially stoped.



The 50-ton flotation mill recently completed by the La Bajada organization at the old Tip Top mine.

No figures as to the production at this time are available, and the company shut down in 1888. The leasers continued to work until 1893 when the price of silver dropped and the camp was practically deserted. In 1895 the property was again relocated, this time by Frank Wager and his brother who held it until 1920, when it was taken over by Frank L. Carlisle of Pittsburgh, Pennsylvania, on a mortgage.

In the early days when the ore was closely hand sorted before shipping, a heavy black mineral, considered to be blackjack or sphalerite, was discarded with the waste and second-class ores. Frank Wager, who was an assayer, noted the characteristic needle-like crystals, tested and found it to be wolframite, the tungsten mineral.

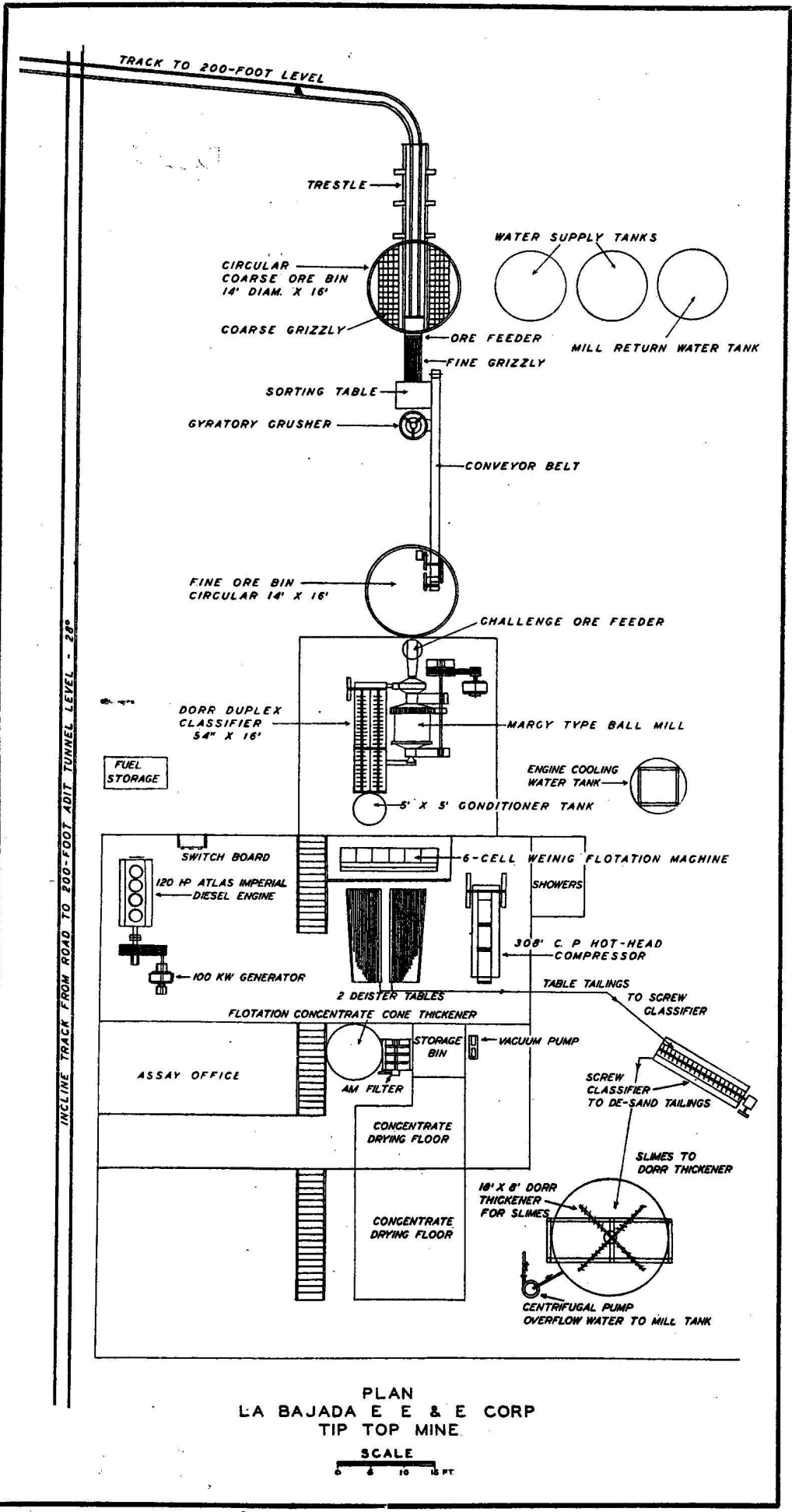
When tungsten soared to high prices during the war, Elliot and Muter put in a Denver quartz mill and worked the dumps and stope fills above the 200-foot level for tungsten. The property was partially unwatered in 1919 by the writer. Oklahoma and St. Louis interests took an option on the property, did some development work, excavated for a mill, and quit. Since then little or no work was done until this year.

The district is located in the extreme southern part of Yavapai county, about 10 miles west of the Black Canyon highway at a point 42 miles north of Phoenix. It lies at the southern end of the Bradshaw batholith, the higher altitudes of which show the rugged outcrops of the Bradshaw granites. The margin or border phases of the batholith as exposed in and around Tip Top include gneisses, schists, and abundant pegmatite dikes.

The district is traversed in an easterly and westerly direction by a series of rhyolite dikes, dipping northerly. These dikes are cut out by a fault system along and in which mineralization has taken place. It is this system of faulting and mineralization which constitutes the veins and ore bodies of the district. The westerly section of the district yields primarily gold ores, while in the easterly section, as at Tip Top, silver ores predominate.

The most important veins in the immediate district are the Tip Top and the El Dorado. These veins are sharply defined fissures, varying from a few inches to two or more feet in width where they form minable ore bodies. The veins are very persistent in length and may be traced for several miles. The gangue is essentially quartz, with some barite and the ore minerals are wolframite, arsenopyrite, sphalerite, and galena, with which the high silver values occur. Ruby silver and horn silver form the high-grade silver minerals.

The Tip Top mine has been filled with water, seepage and surface waters, up to the 200-foot level, which is an adit level connecting with the 800-foot inclined shaft. The vein strikes northeast and southwest and dips about 65 degrees to the northwest. The ore shoot, about 600 feet in length, has a rake in the vein of about 60 degrees to the northeast, which is typical of most of the ore shoots in the district. The inclined shaft entered the ore shoot at a depth of about 250 feet and passed through it at about the 800-foot level. Drifting on the 800-foot level and winzes sunk show the ore to persist in depth.



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TIP TOP MINE
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Down to the 500-foot level, the part of the ore has been stoped. Several pillars, however, have been left standing. From the 500 to the 800-foot level small chloriding stopes have been worked. The ore was broken and roughly sorted at the mine, the waste being used as backfill. As a result the stopes carry sufficient ore to make them profitable. There are several thousand tons of mill-grade ore on the various dumps.

The operating plans of the present company are to continue to mill the best grade sections of the dump, pull the stopes, and break down the various pillars which remain in the stopes. This ore will be milled and the water in the mine used for milling. As the mine is unwatered, it will be put in shape in the lower levels for continued mining.

The mine is equipped with a full gravity flow 50-ton flotation mill. Ore passes from a 14-foot diameter by 16-foot high circular coarse ore bin, with 7-inch grizzly on top and a quadrant ore feeder, to a one-inch grizzly, at the bottom of which is a four-foot by five-foot sorting table. From 15 to 20 per cent of waste rock is hand sorted and trammed to the dump. The balance of the ore is fed to a Fraser-Chalmer gyratory crushing to one-inch size.

The fines (through the one-inch grizzly) and the crushed ore land on a 30-foot by 14-inch conveyor belt and are carried to the fine ore bin, which is the same size and type as the coarse ore bin. The crushed ore is fed from the fine ore bin by a Challenge ore feeder to a 45-inch by 45-inch Darbyshire-Harvie ball mill, equipped with a combination center and scoop feed. The ball mill is in closed circuit with a 54-inch by 16-foot Dorr-Duplex classifier and grinding is to about 60 mesh.

The overflow from the classifier goes to a five-foot by five-foot conditioner tank where the reagents are fed; the pulp goes to a six-cell Weinig flotation machine. Two of the six cells are used as finishing cells and four as roughing cells, the roughed flotation concentrates going to the two finishing cells to be cleaned. The finished concentrates go to an eight-foot V cone thickener and then to a four-foot, three-leaf American filter, and are spread and dried.

The tailings from the flotation machine go to two Deister tables and the concentrates from the tables, carrying a tungsten content, are stacked and stored for future treatment. The tailings from the table go to a homemade screw classifier for de-sanding and discharging with a low water content. The overflow from the classifier then goes to an 18-foot diameter by eight-foot high Dorr thickener. The overflow water from the thickener is pumped back to the return water tank and the thickened slimes go to waste.

The mill is powered by a 120-horsepower Atlas Imperial Diesel engine with a V-belt drive, 100 kw. General Electric generator. The various units in the mill have individual motor drives, using V belt drive in most instances. The power for mining and pumping of water is supplied by a 308-cubic foot Chicago Pneumatic hot head compressor which also supplies air for Sullivan drill sharpener.

The ore is a hard quartz and is crushed to about 60 mesh, and a recovery of from 80 to 85 per cent of the silver values is made. The ratio of concentration is about 80 to one. The flotation reagents, butyl Xanthate, Aerofloat, and sodium sulphide are used.

The property is owned by the Tip Top Mines, Inc., and is operated under contract and lease by La Bajada Exploration, Engineering and Equipment Corporation. The officers of the Tip Top Mines, Inc., are J. Cloughly, president, and Henry J. Webster, secretary, who are also directors along with Henry Gason, A. J. Fuchs, Wm. Findly, E. O. Dorsch and John Burns, all of St. Louis, Missouri.

La Bajada Exploration, Engineering and Equipment Corporation (an Arizona Corporation) has for president and treasurer, A. Hatfield, and for secretary, F. C. McDonald, both of St. Louis, Missouri. The operations of La Bajada Exploration, Engineering and Equipment Corporation are being carried on under the direction of S. Coupal, mining engineer.

CONTROL OF CALLAHAN ZINC GOES TO FRANK EICHELBERGER

Controlling interest in the Callahan Zinc-lead Company, D. A. Callahan of Wallace, Idaho, president, is reported to have been purchased by Frank Eichelberger of Kellogg, who recently resigned from the Sunshine Mining Company and became interested in Sunshine Consolidated Mining Company, adjoining. Negotiations, which were concluded through Harry B. Kingsbury, mining broker of Wallace, have been carried on during the past six months or so and involved a reported consideration of \$672,518, of which \$370,000 is to be paid in cash not later than July 31.

While full details have not been announced, previous failures of refinancing plans made this move advisable. The company holds the Interstate-Callahan group of 81 patented and two unpatented claims in the Beaver district near Interstate, equipped with modern mining machinery and 600-ton concentrator, including a flotation mill.

The Galena mine includes the Chicago-Boston, Killbuck, Vulcan, Argentine, Wallace, and Silver Range groups covering 31 patented and 76 unpatented claims in the Placer Center district near Wallace. This property is also fully equipped and has a 150-ton flotation plant. Engineers have advised that the properties offer sufficient ore reserves to justify continuance of development.

PRODUCTION AND EARNINGS FIGURES FOR MAGMA COPPER

Magma Copper Company, Superior, Arizona, has issued its report on operations and earnings for the six months ended June 30, 1936, showing a total production of 17,245,646 pounds of copper. The average production cost is given as 5.095 cents a pound, with the average selling price as 9.072 cents.

Total net income for the six months amounted to \$755,226.88 after all expenses and depreciation, but before federal income taxes and mine depletion. This figure compares with \$407,088 for the first half of 1935. For the entire year ended June 30, 1936, net earnings before federal taxes amounted to \$1,052,151.89.

During recent months production at Magma has been running about 24,000 tons of copper ore monthly, with 497 men on the regular payroll. Production in the current quarter will show a marked reduction, however, as the usual summer close-down period started July 1, and will continue about a month. During this period major repairs are being made at the smelter and mine.

Wm. Koerner is general manager, and Darrell Gardner, mine superintendent.

JOHN W. FINCH* describes the

New Electrometallurgical Experiment Station

The United States Bureau of Mines is to establish a new electrometallurgical experiment station at Boulder City, Nevada, to study a wide variety of problems on a pilot plant scale.

Recognizing the opportunity for increased service to the mining and metallurgical industries offered by the creation of experimental facilities at the seat of future sources of low-cost power, the last Congress directed that an experiment station of the United States Bureau of Mines be established at Boulder City, Nevada.

The station will be devoted to electrometallurgical investigations and will be so equipped that a wide variety of problems can be studied on a pilot plant scale. Methods evolved for the treatment of domestic ores occurring in the vicinity of government power projects can thus be tested on a sufficiently large scale to be of real service in estimating treatment costs and to provide a basis for exploitation of the methods by industry. Large scale testing is required in many cases to determine whether a proposed method is commercially feasible; some operations may be conducted on a large scale that would not work successfully on a small laboratory scale. The work also will be of value to the government through the development of methods that could be used for the production of strategic minerals in the event that foreign sources of supply are cut off or are held at exorbitant prices.

With money available on July first of this year, a building has been purchased and so far as finances permit is being equipped with machinery of a nature that will enable the prosecution of widely diversified projects. Such equipment as crushing, grinding and conveying machines, electric furnaces of several types, electrolytic equipment, fabricating machines, transformers and voltage regulators, and special types of equipment determined by the specific problem under investigation will be required.

The work will be under the general supervision of Dr. R. S. Dean, chief engineer of the metallurgical division, and will be directed by Dr. J. Koster, supervising engineer of the electrometallurgical section. R. G. Knickerbocker will be in charge at the Boulder City plant. This staff will be augmented by metallurgists, furnace operators, mechanics, and laborers who will be engaged in the experimental work which is expected to get underway in the early fall.

Problems that will receive early attention at the Boulder City experiment station have been studied during the past year in the laboratory at Reno, Nevada. These include investigations on the treatment of domestic manganese ores, domestic chrome ores, and alunite ores from Utah.

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The new method for the production of high purity metallic manganese by electrolysis from solutions obtained by leaching low-grade ores has been developed through the laboratory stage. This promises to make many of the low-grade domestic manganese deposits worthy of being exploited on a large scale and thus tend toward the eventual independence of the United States from foreign supplies of manganese ores.

Studies on a small scale of various methods for the treatment of domestic chrome ores by electrometallurgical methods have demonstrated the possibility of producing ordinary ferrochromium from some of the low-grade ores of this country and have shown that a higher grade alloy may be produced by the electric smelting of chromite in the presence of sulphides of iron and copper.

A comprehensive investigation of electrothermal methods for the recovery of alumina and potash from alunite has been started. One of the developments which shows promise is the volatilization of silica from alunite in an electric furnace, leaving a high alumina residue that should be amenable to ordinary aluminum processes. The potash escapes with the silica fume and can be leached from it. The results of the preliminary investigations are to be published shortly. These methods appear to have a chance for economic application as the data which the larger scale work at the new station is expected to provide will, on a large measure, determine this.

Other problems that will receive attention as equipment and other facilities permit involve investigations to determine the possibility of producing alloys from other ores and minerals which occur in the vicinity of those dam sites where low cost power may become available. This group of ores includes those containing molybdenum, tungsten, cobalt, nickel, chromium, manganese, iron, magnesium, and aluminum.

BUCKHORN MINE IN NEVADA HAS OWN OPERATING COMPANY

M. G. Baragwanath, president of the Pardners Mines Corporation, 405 Lexington Avenue, New York, has announced that the Pardners company has disposed of its interest in the Buckhorn mine, Euro county, Nevada, to the Buckhorn Mining Company, a recently organized Delaware corporation, in which it has a substantial equity. Pardners Mines Corporation will direct the Buckhorn management. Charles Mayotte, Buckhorn, via Palisade, is superintendent.

ANACONDA COPPER EMPLOYEES HAVE GROUP INSURANCE

The Anaconda Copper Mining Company, W. B. Daly of Butte, Montana, general manager, is reported to have arranged group insurance for the 28,000 employees of the company and its subsidiaries in the United States and Canada. The insurance was taken with the Prudential Life Insurance Company and will be financed by joint contributions by the company and the insured employees. Initial cost to employees is stated to be 60 cents a month per \$1,000.