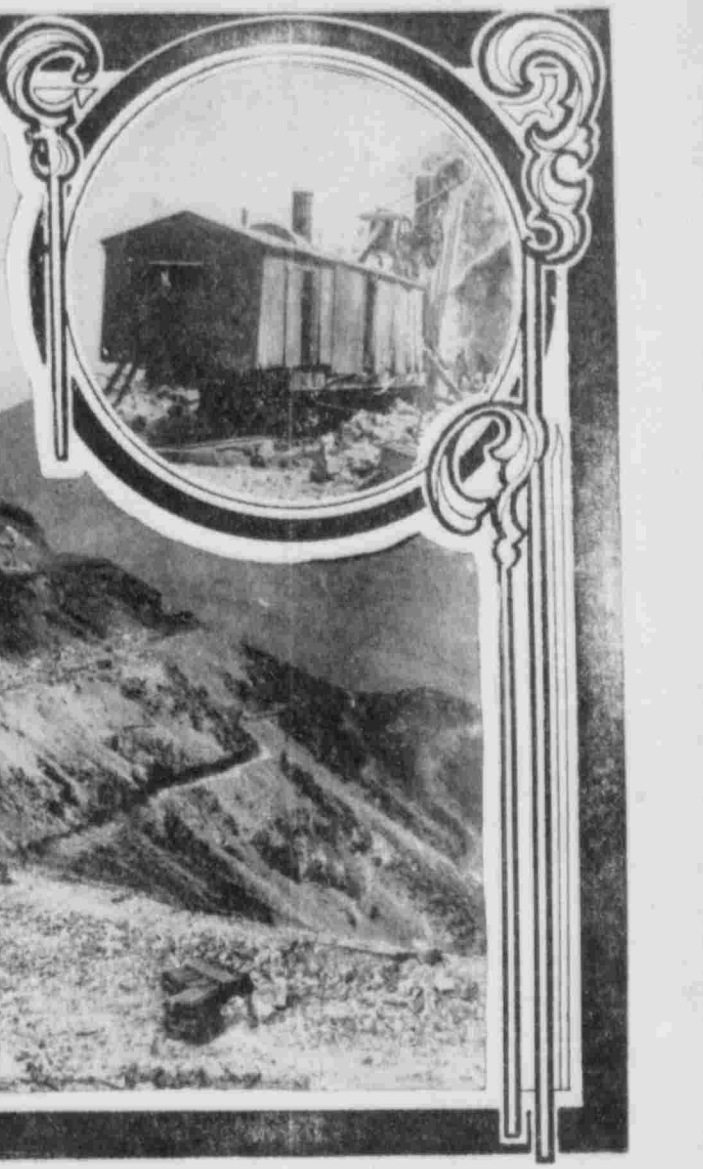
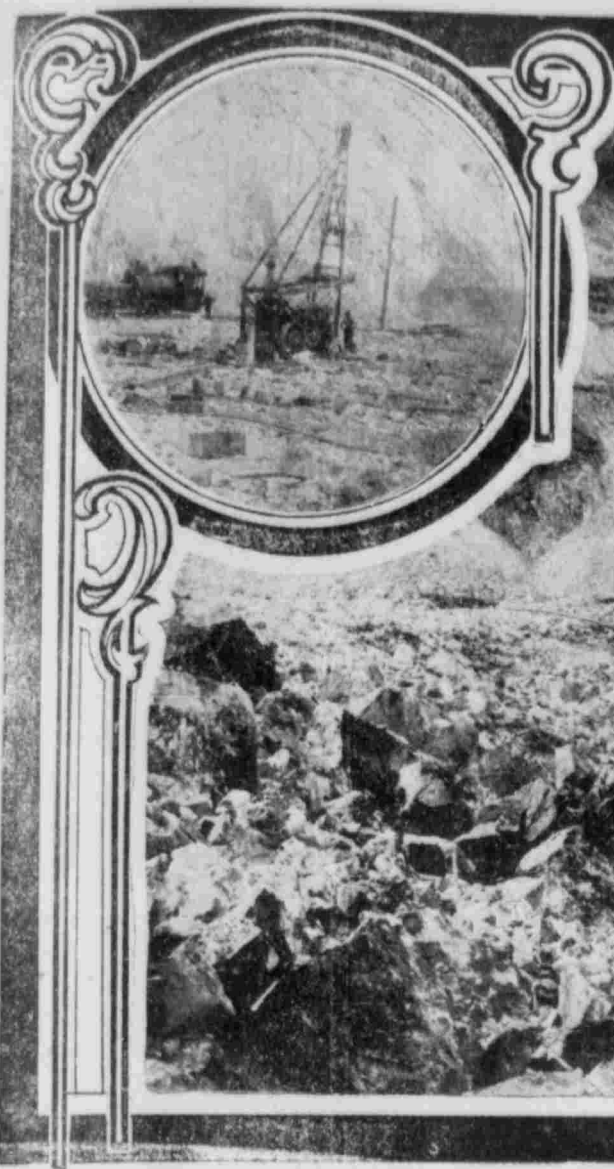


Bingham's Unique Position in the Mining World



BOSTON CONSOLIDATED MINE

What is Being Done to Destroy Nature's Landscape

BINGHAM occupies a most unique position in the mining world. Go where you may, you will find no other mine that resembles it. It is situated about 25 miles from Salt Lake City, in the fourth range of mountains, the summit of which forms the divide between Salt Lake and the Wasatch ranges.

The mineralized area is extensive, spreading as it does over deep canyons and along the highest mountain peaks in the range and gradually sloping down to the foothills at the city's edge.

WORKED THE PLACERS.

A quarter of a century ago the placer miners found it profitable to wash gold from the sands of Bingham creek. Later, the placer miners came along and gathered considerable wealth from the rich carbonate ores at the surface carrying values in gold, silver and lead. But it was left to the twentieth century miner to discover that the camp's greatest treasure lies in the red metal—copper. Then was left the matter of solving the difficult metallurgical problems presented by the development of the large deposits of low grade ores found in this district. For years it was supposed that there was no way of making them commercially profitable. But the metallurgist has triumphed in the endeavor; the success has been sweeping and complete; the lessons learned there have been applied to advantage in other fields—notably at Yerington and Ely, Nev., while the knowledge that the mining engineer and the metallurgist have gained in the investigation of Bingham has rendered the treatment of the low grade ore comparatively easy. Conditions have been overcome that were once believed to be unsurmountable.

BIG THINGS DOING.

Things are done upon a large scale in Bingham—nothing in a small way goes. The importance of this statement can be best appreciated when one takes into consideration that two companies—the Utah Copper and Boston Consolidated—are equipped to handle an output of 3,000 tons a day from their respective mines and which will yield 80,000,000 pounds of copper metal annually. Another one—the Ohio Copper—is also about to play an important part in the camp's production of red metal. Its new mill, now under construction near the town of Lark, will be completed early in the new year and will begin its career of usefulness by the treatment of 2,000 tons of ore daily, and it is the intention of the management to add other units from time to time to approach somewhere near the capacity for the treatment claimed by some of its neighbors. Ohio Copper is a Heinze enterprise. In fact, it is undoubtedly the largest proposition in which the Montanahan is interested in this state, and is a basis of one of the largest mining and smelting enterprises in the West. It is present plans are carried into execution and there is no reason to doubt that they will not be. Not long ago one of the company's engineers made the statement that the new mill at Lark, working at full capacity, will make a net profit of \$125,000 monthly on a 13-cent copper market.

THE PORPHYRY ORES.

The vast deposits of so-called porphyry ore in Bingham have attracted world-wide attention and it is really due to the successful achievements made in the way of making them commercially profitable that has won for the camp so much fame. These deposits are particularly available on the properties of the first two named companies, and, like in the Mesabi range and elsewhere in Minnesota, where steam

shovels are used for mining purposes, these machines are a component part of mining operations of the Bingham district.

People here in Utah, at least a very great majority of them, do not begin to appreciate the vast proportions to which mining activity has grown in this noted district. How often we have read in the literature of the promoter about "a mountain of ore" and which almost invariably turns out to be untrue. But in Bingham this application stands good and it is interesting to note what Walter Reardon Ingalls, editor of the Engineering and Mining Journal, said in this connection after he had paid a visit to Bingham last July.

MOUNTAINS OF IT.

"The mineralized monzonite," he said, "commonly called 'porphyry' of Bingham constitutes literally a mountain of ore and the operations of the Boston Consolidated, Mining company, and the Utah Copper company can be characterized simply as mining a mountain. At some future date the top of the mountain of considerable proportions, even as mountains go, will have been cut off for three or four hundred feet, the adjacent gulches will have been filled with discarded rock and the bulk of the mountain will have been distributed in the form of fine sand and slime over the slopes leading down to the Great Salt Lake near Garfield, 27 miles from the original mountain. No one would venture to predict when this transfer will be completed. Even on the enormous scale of operations for which equipment is now nearly ready—10,000 tons a day—it will be many, many years before the reserves (as reckoned now) are exhausted; and before that time immense quantities of mineralized rock that is not now considered ore may have become so through changes in conditions of exploitation."

TOWN OF BINGHAM.

The town of Bingham is situated in a long narrow gulch which rises steeply. Near the mouth of this gulch is the first concentrating mill of the Utah Copper company. A mile or so further up is the Yampa smelter; still further up the canyon are the lower terminals of the aerial tramways of the Utah Consolidated and United States Mining companies; then the railway station where the Rio Grande Western delivers its passengers and freight; another half mile's climb and the visitor is in the main part of the town. Right there the canyon divides. Carr Fork makes to the west and along its confines are located several of the big mines of the camp and a number of lesser importance. The Shawmut is the first. This property is owned by eastern people, but is not a producer at this time. Going on up the canyon one comes to the compressor plant of the Utah Apex Mining company and near it is the entrance to the deep tunnel—known as the Parsonage—which will eventually be connected with the main ore bodies of the mine. Off to the left one can see, high up on the mountain, the steam shovels of the Boston Consolidated working away clearing off the overburden from the "porphyries," and mining ore for treatment at its Garfield mill. Just below it, the Utah Copper's machines are performing the same service. Occasionally one can see ore trains moving along with their load and back again with empty cars for more loads. Proceeding on up the canyon, one comes to the Yampa mine, the Phoenix, the lower terminal of the Bingham-New Haven Mining company's tramway; a little further, Utah Consolidated is reached. Off to the left is the sulphide mine of the Boston Consolidated; near it is the New England Gold & Copper company's mine, and mill and



Photos by Harry Shipley.

Everyday Scenes in Utah's Greatest Copper District

higher up on the mountain is the Last Chance property of the Nevada Utah Mines & Smelters corporation which is in a state of inactivity at the present time. Above the Utah Consolidated is the Bingham New Haven and not far away is where the Bingham Central-Standard Copper company is carrying on a vigorous campaign of development.

UTAH COPPER WORKS.

In the main Bingham canyon, after leaving the town, one first encounters the mine headquarters of the Utah Copper company and in that vicinity are the Bingham yards of the "Sky Line" branch of the Rio Grande Western railroad. To the left, some distance up on the mountain side, Col. Wall's forces can be observed on the Starless property which, some say, will become one of the big "porphyry" copper mines of the camp—that it will make another Utah Copper. Adjoining the Utah Copper's domains, but at a higher elevation is the territory owned by the Ohio Copper company, already developed into a mine of great magnitude. Above it still are the properties of the United States Mining company. The Commercial mine of the Bingham Consolidated Mining & Smelting company and from which it has been drawing low grade iron sulphide ores, carrying small values in copper, for use as fluxing material at its smelter at Bingham Junction. The Dalton & Lark mine of the Bingham Consolidated is situated in another canyon and is reached by stage or by rail from Revere station on the Bingham branch of the Rio Grande Western railroad. The Fortuna mine, controlled by Simon Bamberger of Salt Lake, is also reached from this point; as well as the Copper Glance and other mines of more or less importance.

WHERE INTEREST IS CENTERED.

But the most interesting part of the mining operations in Bingham at the present time is centered around where the steam shovels are working in the "porphyry" area, and Mr. Ingalls' technical description of these deposits is teeming with interest. He says: "The monzonite dike is more or less mineralized over a large area, but the paying portion as considered at present, is believed to be in a some-

what elliptical area beginning near the scene of the present operations of the Utah Copper company and extending southwesterly. The "porphyry" has a copper-stained capping, or leached zone, which is from 20 to 150 feet thick. The capping is thinnest near the bottom of the gulch, where the erosion has been the greatest. In going up the sides of the mountain the thickness increases. The cap-rock is brownish from oxidation of iron and frequently shows brilliant stains of azurite and malachite in seams. It contains a small per centage of copper and some day itself may be considered as payable ore, but at present it is simply waste. Under the capping is a zone of secondary enrichment, containing the sulphide minerals (chalcopyrite predominating), which is from 100 to 300 feet thick. This is a grayish, non-weathered porphyry, in which the sulphide minerals are very finely disseminated—so finely that crushing to approximately 20 mesh size is necessary to liberate them satisfactorily for concentration. There are portions of the deposit where the mineralization is coarser, some particles being as large as 0.1 inch in diameter, but in general the dissemination is extremely fine, so that to casual inspection the porphyry shows no mineral, looking simply like gray rock. A prospector might walk many times over the occurrence of such material in place without thinking to have it assayed, as indeed was the experience in Bingham. But in the light of present knowledge attention will doubtless be more sharply directed towards similar occurrences. However, it is to be remarked that even if this great mineralization of Bingham had been appreciated 10 years ago, it is doubtful if engineers would have been prepared to handle it on the broad economical lines that they are doing at present.

SECONDARY ENRICHMENT.

"The zone of secondary enrichment conforms generally to the contour of the surface. There are variations in the degree of the mineralization, but over large areas the mineralization is quite uniform. The amount and the grade of ore in this zone are largely matters of the basis of figuring. There are large sections which will go 1

per cent copper and even a little upward. The Utah Copper company estimates that it has actually developed 23,000,000 tons of 'positive' and 'probable' ore that will go 1.5 per cent copper, on the basis of the ore having a minimum assay of 1.25 per cent copper and a probable average of slightly better than 1.5 per cent. It is believed safe to assume 100,000 tons in the 60 acres now partially developed.

BOSTON'S BIG TONNAGE.

"The Boston Consolidated company estimates that it has developed 15,500,000 tons that will assay 1.5 per cent or better in an area of 49 acres, estimating the thickness of the ore at 300 feet. It estimates that it has 156 acres of porphyry (including the 49 acres) that contains 1 per cent copper or more. The best developed block in the Boston Consolidated is estimated to contain 10,626,000 tons averaging 1.92 per cent copper.

"Under the zone of secondary enrichment the porphyry contains 1 per cent of copper or so, and when the estimates of the tonnage are reduced to that basis they become a wild revel of figures. In this main mass of primary ore the predominating sulphide is chalcopyrite.

"It is to be carefully explained that these estimates, extravagant as they may appear, are not mere guesses, but are sound engineering computations. The property of the Utah Copper company has been extraordinarily well developed by drift and raises, and that company possesses not only the results of many samplings both by its own and independent engineers, but also has the result of actually milling more than 250,000 tons of ore taken out in development work which averaged 1.93 per cent copper. The sampling of the same openings by the Guggenheim engineers showed an average of about 2.63 per cent copper. The underground workings in this mine aggregate nearly 17 miles, and it is a remarkable record that so great an amount of driving has been done in less than four years, the work having been begun Sept. 20, 1903.

NOT SO WELL DEVELOPED.

"The Boston Consolidated mine has not been so thoroughly developed. The

Mountains Being Torn Down By Powerful Steam Shovels

drifting the raising, etc., in it amount to only about 31,000 feet, or, say, six miles. Both mines were admirably situated for economical development, their ground being capable of entry by adit levels, while the Utah company was able to go into the mountains on both sides of the gulch and the rise of the mountain is so steep that the adits rapidly gain depth. Besides the copper, the ore contains a little gold and silver, chiefly gold. The precious metal value may be generalized conservatively at 25 cents a ton. If we say 25 cents per ton in gold and silver and 30 pounds in copper, and multiply by the tonnage estimates, we get stupendous figures. Even at the milling rate of 10,000 tons a day, say 3,000,000 tons per annum, the life of these mines will probably exceed that of the men who are now developing them; and they are nearly all young men."

Something about the steam shovels and what they are doing towards changing the landscape of Bingham. This method of mining is new to Utah, but not to Wisconsin and Minnesota, where they are in common use around the iron mines. They became first employed in this state on the property of the Newhouse Mines & Smelters corporation in Beaver county. This was last February but they were operated only a short time—however not unsuccessfully.

HOW IT IS DONE.

As applied to Bingham, the first move is to remove the "capping" or "overburden" overlying the ore deposits. This is called "stripping," and when this is accomplished the ore is exposed and ready for mining in about the same manner that the capping is taken off. The ground is taken down in benches and a very good idea of this method can be gained by the accompanying illustrations. These benches are usually from 30 to 50 feet high. Where hard rock or ground is encountered, it is loosened by sinking holes by means of churn drills, then charging them with giant power and touching them off. Following this procedure, the shovel and the material is moved out of the way. The "overburden" is carried off and dumped into adjoining gulches or outside the porphyry area. Miniature trains are used for this purpose on the property of the Boston Consolidated, while in the case of the Utah Copper company, standard gaged cars are used and in this instance the steam shovels load directly into these cars and the Rio Grande Western hauls it away for use as ballast. There is a good deal of expense attached to the loading and firing of the holes put down to aid the steam shovels in their work of destroying the architecture of nature. In these holes between 1200 and 4700 pounds of dynamite are used in each hole and in Bingham this explosive costs about 11 cents a pound. It is figured that the cost per ton is about 1.5 cents. The Boston Consolidated uses the steam shovel entirely in the operation of its "porphyry" mine, while the Utah Copper is about to employ the caving system in getting out ore in addition to that moved by the shovels. In the mine, that is, that portion of it developed from the main tunnel, air drills are used in the process of loosening the ground.

COST OF MINING.

The cost of steam shovel mining in Bingham is a matter that has not been definitely figured out as the shovels have not been running with regularity since they were started. However, the expenses will be somewhere around 20 cents a ton. Both companies were handicapped up to late in the past summer because of the lack of adequate railroad facilities, scarcity of labor and the difficulty experienced in obtaining deliveries of supplies and equipment. The ore from both the Utah Copper and Boston Consolidated mines is sent to Garfield for treatment, first in the mills of those companies and the product derived therefrom sent on to the smelter of the American Smelting & Refining company on the south end of the Great Salt Lake. The Boston company, however, ships the ore from its sulphide mine direct to the smelter; while the actual movement of the porphyries from its domains will not begin until the mill at Garfield is ready for commission which should be early in the coming year.

The Boston Consolidated's new mill will be ready for operation within a few months.

HEADQUARTERS FOR OHIO.

It is at Lark that the Ohio Copper company is constructing its great concentrating mill and at this writing the Mascot tunnel of the Dalton & Lark mine is being pushed into the mountain at a rapid pace to a connection with the ore bodies of the Ohio mine. This tunnel is to become the avenue through which all the ores of the Ohio mine will be brought for treatment and the cost of transportation, it has been figured, will not exceed 15 cents a ton. The tunnel is electrically equipped and is to form a part of the right of way of the proposed Bingham Railway company, which has an electric line projected between the camp and Salt Lake City and possibly to the site of the proposed "Heinze" smelter west of Garfield.

HEINZE'S GREAT PLANS.

The plans mapped out by F. Augustus Heinze and associates in the matter of the future operation of the Ohio mine are considerably in contrast to those of the Utah Copper and Boston Consolidated. Here, the values are found in the quartzite formation through which they have been found to be quite uniformly disseminated. Some engineers have made the claim that the Ohio ground is the source of the overworld which has so generously enriched the surrounding porphyries; but this contention remains yet to be proved, however, there seems to be good ground for this belief.

When Mr. Heinze took up the Bingham Consolidated, and became an active figure in its management, his attention was called to the Ohio Copper mine and he lost no time in having his engineers examine it. Thomas Weir, who is prominently identified with Utah mining affairs, and who learned some of his first lessons in Bingham, was the first to approach the Montanahan on the subject and it was he who engineered the deal through which Mr. Heinze became a controlling factor in the enterprise.

THEY WERE MISTAKEN.

Notwithstanding that engineers on the staff of the Guggenheim had treated the property down a few months before, Mr. Weir had every confidence that the Ohio Copper mine was a big property and that the men sent there by the Guggenheims had not discovered where "the real mine" was. Mr. Weir's intimate knowledge of the geological conditions of the camp led him to believe that the values were not contained in the porphyries as had proved to be the case in the Utah Copper and Boston Consolidated, but that a little more development would show that the "quartzite" contained the wealth on which the company might depend for its future success. Mr. N. J. Catrow and associates, who were in control of the mine at the time, called Mr. Weir into consultation. He told them what results might be expected if certain lines of development were carried out and the board of directors authorized him to take charge of the property and carry out the line of development which he had proposed. Equipment was ordered for this purpose and within a few weeks' time he was in position to prove that his contention regarding the location of the ore bodies was a correct one. In fact, the results achieved were astonishing to Mr. Weir himself, they having so far exceeded his expectations. It was demonstrated that although the company had made money in mining and in the way of the new grade ore at the surface, the success would be only temporary; that more depth was required to establish the real worth of the property.

ASTONISHING RESULTS.

Since the Heinze engineering staff has been in control of development the results have been so far above expectations that some of them are ready to back up the statement that there are few, if any, mines in the camp that have greater possibilities. The ore is to be taken from the mine to the place where they are to receive mill treatment at Lark, through the Mascot tunnel of the Dalton & Lark mine. The distance will be about four miles, but with the electric haulage system already provided for, no other company in the district will be in position to show lower mining and transportation costs. The mill will begin operations about March 1, with capacity for the treatment of 2,000 tons a day and this will probably be doubled before the close of next year.