

Birth of Garfield, Utah's New Smelter City.

HERE is where a city shall be built. Words to that effect were spoken in the summer of 1905, when, one afternoon, a distinguished party of mining and smelting men drove their automobiles over the ground upon which the new town of Garfield in the western part of Salt Lake county has been brought into existence. The party referred to consisted of Daniel Guggenheim, president of the American Smelting & Refining company, Charles W. Whitley, general manager of the Utah branch of that great corporation's enterprises, Lafayette Hanchett, general manager of the Boston Consolidated Mining company, D. C. Jackling, general manager of the Utah Copper company, and others.

The occasion was significant for the reason that one which is destined to become one of the most populous and prosperous commercial centers of this great commonwealth. It will be the home of thousands of wage earners and their families; it will have advantages of schools and churches; it will have electric cars for the accommodation of the citizens, which will become a part of the street railway system of Salt Lake City, and during the next year facilities for rapid interurban traffic will be provided, in addition to the steam service of the San Pedro, Los Angeles & Salt Lake and Western Pacific railroads, for rapid interurban traffic.

But what is to make Garfield? Or why is it to become so important? has been asked. Only three words are needed in the answer—the copper mines. The wonderful development and startling results obtained in Bingham are the real cause of the bringing into existence of this new town which is to become suburban to Utah's capital city. So great had become the pressure upon the American Smelting & Refining company to provide greater facilities for the treatment of copper ores that the once barren waste between the famous old Garfield bathing resort was selected as the site for the new copper smelter of the Garfield Smelter company (an auxiliary organization) which was completed with the present year at a cost of about \$3,000,000.

The Utah Copper company needed a place for the reduction of the vast masses of low grade copper ores of the Bingham mine to concentrate and it chose the site where its new plant is being erected. In looking around for a place to send the ores of the Boston Consolidated for the same purpose, Samuel Newhouse, the president of that corporation, was persuaded to join the company, although he had selected ground in Utah county for a mill of large capacity. The last two named companies will probably spend \$1,000,000 in the mill enterprises and it is claimed, the railroads have expended or will expend as much again, in the construction of new roads and equipping them to meet the demands of the mining companies when they begin milling operations at Garfield next year.

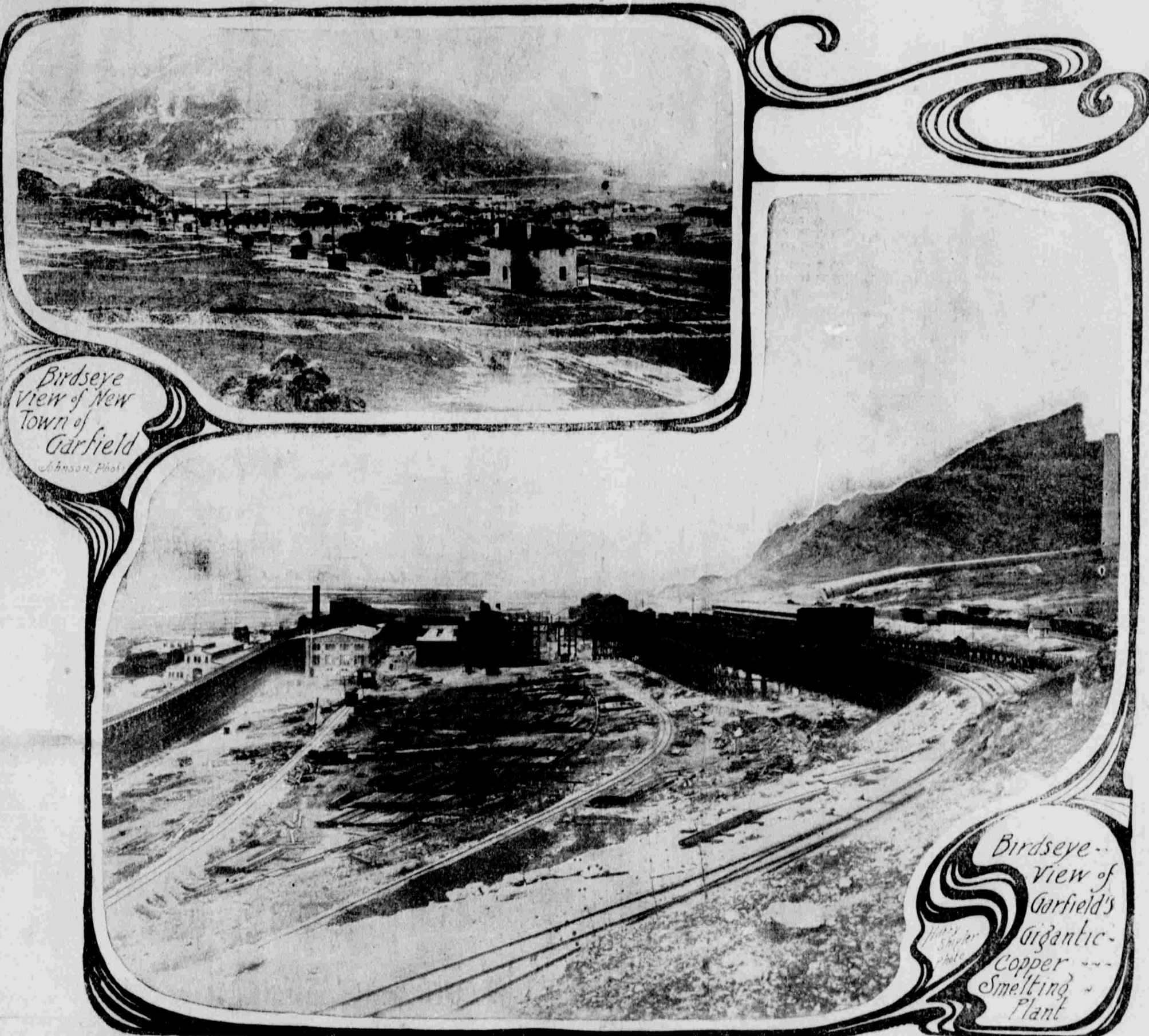
The facts enumerated in the foregoing have made Garfield a possible town and it is not unlikely that other smelters and mills will be built somewhere near this town and cause it to become all greater. All three of the companies named are equally interested in the water and water companies and they are striving to make it one of the best places in the state. During the past half year many substantial buildings have been erected. Wooden structures are not allowed, Garfield, within a very short time, should have a population of 10,000 souls.

NEW GARFIELD SMELTER.

The Garfield smelter, located at the south end of the Great Salt Lake, and about 12 miles west of Salt Lake City, is operated by the Garfield Smelting company, an auxiliary corporation to the American Smelting and Refining company. Ground was broken for it in Aug. 17, 1905, and the production of copper bullion commenced during the last autumn. It was built expressly for the treatment of copper ores, the lead ores going to the Murray plant of the A. S. & R.

The Garfield Smelting company operates a railroad system within its own domain. Tracks having been laid for 12 miles. This mileage consists of 10 tracks, switches and spurs of standard gauge. Of the trackage situated, 10,000 feet is built on wooden trestles, and 1,100 feet on steel trestles. The yards at present are connected with the tracks of the Rio Grande Western and San Pedro, Los Angeles & Salt Lake; the former comes in to the smelter grounds from the east, and the latter from the west. The Rio Grande has also built about 15 miles of road from its Bingham branch line; while the San Pedro found an easy grade to the ore bins above the smelter from about two miles out. The maximum curvature of either of these roads does not exceed 10 degrees, while the maximum grade is not over 3 per cent. The smelter yards will accommodate about 100 railroad cars.

The general management of all the American Smelting and Refining company's properties in Utah is under the direction of Charles W. Whitley, who has won his way up to a high position in the smelting world.



Structural Steel Furnished and Erected by Minneapolis Steel & Machinery Company.

The plant has bin capacity for 25,000 tons of ore.

OPERATION OF PLANT.

After being dumped into these bins from the railroad cars in which it comes from the mines or mills, the ore is conveyed, by a Robbins belt, to the sampling mill where it goes through the usual process. From the sampling mill, some of the ore goes to the blast-furnace bin where it is bedded, while the fines are moved on to the McDougall roasters in the main building about 140 feet away from the sampling mills, and so on through every process of smelting.

The slag is taken away from the furnaces in 10-ton slag pots drawn by electric motors.

The huge stack, which carries off the smoke and fumes, is 300 feet in height above its base. From the top of the stack to the converter floor, the difference in elevation is about 500 feet. The inside measurement of the stack is 30 feet. Three flues, of 10-inch construction, (each 2,300 feet long, from reverberatory furnaces to stack) stand to a height of 24 feet above the foundation. The shape is oval; the width at the base is 24 feet. The thickness of the walls is 13 inches. The flues are provided with numerous openings and with hopper bottoms to facilitate cleaning and are arranged with mechanical feeders; and a 14-foot forehearth.

Just to the north of the reverberatory furnaces are four converter stands, each 35x138 feet. A Huntington & Heberlein converter plant, with 20 pots, has also been installed. Two 60-ton Shaw electric cranes also a 19-ton auxiliary, with a 40-foot span, operates the full length of the main building. In the power house, another electric crane has been set to operate over an 80-foot span. In the machine shop is still another, while in the blacksmith shop are various other devices for the lifting and moving of heavy things.

The main building is constructed entirely of steel. The carpenter shop, a

wooden structure, is 28.8x80 feet, it is equipped with a 15 horsepower electric motor, which supplies power for the various wood-working machines. The warehouse, another steel structure, completing the group, is 44 feet wide and 110 feet long.

The smelter has been built with the view of future expansion. The initial unit of 1,500 tons is being brought into commission.

The plant is treating now about 1,000 tons of ore per day. Eventually it is the purpose to bring the capacity up to 5,000 tons of ore per day.

LABOR SAVING DEVICES.

The blacksmith shop occupies a space 45x75 ft., and is equipped with every necessary modern labor-saving device; the machine shop is 80x195 ft., in dimensions; power house, 130x256 ft.; the latter building contains all the steam and electrical power equipment required for the operation of the plant. The power house is equipped with seven overhead coal-bins with capacity for 70 tons each. This trio of buildings is of brick and steel construction.

The McDougall-roaster building is 60x222 ft., and contains 16 18-ft. furnaces. Two sampling mills have been provided, each 23x32 ft. The main building of the lot (which holds the reverberatory, blast furnace, converter and bullion department) rests on concrete foundations within the area of 390x395 ft. Two reverberatory furnaces have been installed, and preparations for the third are under way. The dimensions of these furnaces are: Length of hearth, 142.5 ft.; width of hearth, 19 ft.; length of grate, 7 ft.; width of grate, 16 ft. Besides, there are two blast furnaces, which measure 42x240 in. at the tuyeres. Then followed the working out of plans to build a smelting plant large enough to handle the tonnage contracted for. So, in due time, the site was selected, and in a portion of Salt Lake county far removed from the farming districts where the danger of destruction to vegetation by fumes is remote, indeed.

The Garfield plant covers an area of about 30 acres, and is 33 per cent larger

than originally planned. The plant is reached by all the railroads centering at Salt Lake; being on the main lines of the San Pedro, Los Angeles & Salt Lake, and Western Pacific railroads. The Rio Grande Western comes in over a branch line; while the Oregon Short Line has traffic arrangements with the San Pedro, Los Angeles & Salt Lake which gives it access to the smelting works.

Aside from the general offices, assay and chemical laboratory, mess house and officers' residences, which are built on the old Spanish design, there are numerous other buildings designed with the view of permanency.

The rapidity in which mine development has progressed in the west during the past few years (particularly in the districts of Utah and Nevada) which are tributary to Salt Lake City) mine owners were confronted with the rather unusual spectacle of inadequate facilities for the treatment of their ores, which, in many instances, were a drag on the market. Numerous cases were noted where producers were unable to sell the product of their mines because of the congestion existing around the custom-smelting plants; and there were other cases on record where smelter managers requested their regular customers to curtail ore extraction until such time as the situation could be relieved.

The startling developments made in the big copper mines of Bingham, and the execution by managers of plans to operate their properties on an enormous scale, necessitated prompt action on the part of the American Smelting interests to forestall any effort toward the erection of independent plants.

The structural and corrugated steel in all of these buildings was furnished and erected by the Minneapolis Steel & Machinery company of Minneapolis, G. W. Pope, contracting engineer, with offices in the Dooly block, who put up over 5,000 tons in the plant.

A METALLURGICAL CONTROL.

A demonstration, the outcome of which will be watched closely by

metallurgists the world over, will take place in the near future near the town of Garfield. Two great concentrating mills, in which identical Bingham ores will be treated, are being built there, yet the processes through which these ores are to be reduced to concentrate will be entirely different. One of the plants is being erected by the Boston Consolidated Mining company; the other, by the Utah Copper company.

Here is an instance where eminent metallurgists have failed to agree and, for that reason, the result of the operation of these mills will be viewed from far and near with intense interest and concern.

The demonstration will be in the nature of a contest; with the stamp on one side and the crushing roll on the other, whereby is to be determined which savors most of economy in the treatment of low grade copper bearing porphyries characteristic of Utah's greatest copper camp.

The Boston Consolidated will employ the stamp to crush its ores and Samuel Newhouse, the president of that great company, along with his mill manager and chief metallurgist—Alfred J. Bettles, is a staunch adherent of the method.

On the other hand, officials of the Utah Copper company, among them being General Manager D. C. Jackling, General Supt. R. C. Gemmel and Consulting Engineer George O. Bradley, are just as sanguine of obtaining as satisfactory results with rolls and Chilian mills. So here has been brought about a most interesting situation. The lessons to be learned will become invaluable to the student of metallurgy.

Not being trained in the science of metallurgy it would be out of place for the writer to attempt to make a prediction as to what will be the outcome of this friendly rivalry between the engineers of the two big companies mentioned in the foregoing. Nevertheless, it is consistent to say that the construction and equipment of the Boston Consolidated plant will be less expensive than the one expected to make future dividends for Utah Copper shareholders. But in every respect the Boston company will have a thoroughly up to date plant and its composition and process of operation is not lacking in interest. The "New" is indebted to Mill Manager Bettles for this information concerning the Boston Con.

BOSTON CON. PLANT.

The entire plant will consist of several structures principal among them being the main mill building, which is to stand on foundations (recently completed) 600 feet wide by 550 feet in length; the crushing plant will be 50 feet wide by 70 feet long; the crude ore bin 300 feet long, 35 feet wide and 40 feet high; the crushed ore bin, 550 feet long, 22 feet wide and 37 feet high; while the blacksmith shop, shear shop and machine shop, will be contained in one building 45 feet wide by 175 feet in length, each having its own separate department.

A striking feature about the mechanism of the Boston mill is the absence of elevators. The big building is constructed on the terrace plan and after leaving the crude ore bin and crushers at the top of the plan the product is carried practically all the way down to the finish by gravity. Thus, it will be observed, the designers always had economy in view; which is a very important factor particularly when the success of treating large bodies of low grade ores such as the Bingham porphyries, are depends upon it. The ore to be treated will be brought from Bingham by the Rio Grande Western Railroad company and delivered on two tracks over the crude ore bin, where the ore will be unloaded. This bin is to be equipped at the bottom with 16 patent gates, through which the ore is fed automatically onto two belt conveyors, each 30 inches wide, which are designed to carry it to two No. 3 style K. gyratory crushers, where on being crushed, passes on through two large revolving screens and through a

one and a half inch opening. All the ore passing through this screen falls on to two other belt conveyors, while the rejected ore passes into two No. 5 Shorthead gyratory crushers where it is finished so that the largest particles will pass through a 1 1/2-inch ring. This in turn, falls on to the two belt conveyors mentioned and all the product is then carried to the top of the crushed ore bin, where it is again taken by belt conveyors, operating each way from the center, and distributed the full length of the bin. The capacity of this bin, as well as the crude ore bin above, is for 12,000 tons of ore. From the crushed ore bin the product is fed automatically into stamps for fine crushing. The company has selected the Nissen style, and there are 312 of them, each dropping at 1,500 pounds. In the series of tests made as much as 10 1/2 tons of ore, per stamp, has been crushed per 24 hours, so it will readily be seen that the initial capacity of the plant when placed in full operation will be in excess of 3,000 tons. Mr. Bettles says, from 2,700 to 3,000 tons.

The stamps will reduce the ore down to 28 mesh, a No. 35 wire being used for this purpose. The product is then classified into four different sizes. These four sizes will then be run over the Wilfley tables—of which there are 236 in number—the first two, or coarse sizes, to be finished on the Wilfleys, and the last two, or finer sizes, after passing the Wilfleys, go into a set of Callow cone-setting tanks where the product is settled and pulped. After being pulped it is passed over a system of Johnston concentrators—the plant to have 254 of them.

The finished concentrate from each of the machines, according to the arrangement of the plant, will be delivered automatically to 104 chutes and shared through them to large settling bins from which the product will be removed by machinery into railroad cars and shipped to the smelter of the American Smelting & Refining company at Garfield. The tailings from the mill will run down to the valley and confined by dams.

It was ascertained in the tests conducted by Mill Manager Bettles and his assistants during the year that an extraction of from 85 to 91 per cent can be made over the Wilfley tables alone; but by retreating the finer concentrate on the Johnston machines the extraction can be brought up to 91 to 93 per cent. The basis of concentration will be from 16 to 20 tons of crude ore into one ton of concentrate.

The water supplied to the Boston Consolidated by the Garfield Water company, is delivered to Spencer spring, at which the company has a pumping station located, and in a lift of 500 feet is delivered to a large reservoir above the mill which is capable of holding a reserve supply of 1,000,000 gallons.

The company will not need to build a power house for at least five years, as the plant will be supplied by the Turbine Power company under a favorable contract. The management has decided to put in a laundry department and will equip it so that it will never be necessary to go outside of its own premises to have laundry work done. The building will be built of structural steel, as will the main mill and all other principal buildings. Altogether, it is estimated, 3,000 tons of structural steel material will be used.

In designing and constructing the mill and other improvements, Mill Manager Bettles was ably assisted by a strong force of lieutenants and speaks in a most complimentary manner of the work accomplished by R. E. Moore, mechanical engineer, and L. H. Wheeler, superintendent of construction.

Contract was let about May 1st to the Minneapolis Steel & Machinery company of Minneapolis, Minnesota, G. W. Pope, consulting engineer, with offices in the Dooly block, for the steel plans and buildings for this entire plant. This contract calls for furnishing and erecting over 3,500 tons of structural steel and corrugated steel. About 100 cars of this material are now on the way here and as soon as these cars of this material are now on the way here and as soon as they arrive a large force of engineers will be set to work putting this material in place.

UTAH COPPER GARFIELD PLANT.

The plant of the Utah Copper company is designed for a capacity of 6,000 tons of ore per day. The general dimensions of the main mill building are 600 feet by 508 feet. This dimension including what is known as two sections of 3,000 tons capacity each, 1/3 of which sections are exactly similar.

To serve the two sections, there is one receiving bin, in which ore from the mine will be dumped; having a capacity of 4,000 tons, and one bin for crushed ore, having a capacity of 14,000 tons; a total of 50,000 tons storage.

The mill, in itself, is divided generally into three departments; coarse crushing, fine crushing, and concentrating. Each section has its own separate crushing department, each department containing two No. 7 1/2 gyratory crushers having a capacity of 100 tons an hour for each crusher, or 400 tons an hour total. In each department there are two 34x20 inch crushing rolls. In these coarse crushing departments the ore is crushed dry to three-fourths-inch size. General dimensions of these two coarse crushing departments is 60 feet square.

The fine crushing department for the entire mill will contain 35 6-ft. Chilian mills and 20 sets of 18x36-inch crushing

(Continued on page twenty-four.)



Structural Steel Furnished and Erected By Minneapolis Steel and Machinery Co.

Boston Con. Mill Now Building at Garfield.

Utah Copper Co's, New Garfield Mill.

Photo By Harry Soper

Photo By Rex Mingley