

MINING

AFTER many years of experiment, gold mining in Oregon has been given development on a large scale. Until three years ago progress was slow. A number of factors contributed to this condition. It was long contended, even by mining engineers of repute that the ore bodies of Eastern Oregon lacked depth, that if they attained it they carried no profitable values, and that Southern Oregon had no ledges. Investigation by engineers and the development work of the past few years have demonstrated beyond question that in Eastern Oregon are the largest and richest gold fields in the world. It has been proved that the ore bodies go down and that profitable mining can be done at great depths. Values increase not decrease with sinking. In some of the big properties every 100 feet of sinking adds 30 per cent to the value of the rock. The permanency of Southern Oregon's ledges has likewise been proved and deep mining is proceeding at a rate that has put quartz production above that of the placers.

What is deep mining? Two hundred years ago a shaft 100 feet in depth was the object of endeavor. In some of the greatest shafts at which in Great Britain mining operations are carried on has been reached in the Pendleton colliery, near Manchester, where the deepest workings are about 1,000 feet below the surface. This enormous depth has, however, been exceeded in the Lake Superior district in this country, where the Red Jacket shaft of the Calumet and Hecla, which is now being sunk, is to reach a depth of 2,000 feet. Depths such as these show that the limit of depth of 4,000 feet adopted by Professor Hull and the Royal Commission, of Great Britain, in 1870, though ridiculed at the time, was well within the bounds of possibility. Four or five years ago only enthusiasts dreamed of deep mining in Oregon. A year ago the limit was placed at between 2,000 and 3,000 feet. Now comes Professor Lindgren, of the United States Geological Survey, with the statement that values in Eastern Oregon will continue with depth to a point beyond which no modern mechanical appliances can operate mines as a profit. As the Calumet and Hecla is still worked at a profit, having paid \$5,000,000 in dividends in 1900, there is no reason, if Professor Lindgren's position is correct, why gold mining in Oregon should not be carried on at a depth of at least 5,000 feet—nearly a mile. Everywhere in Oregon the importance of deep mining is recognized. This is why the Red Boy, the Columbia, the Bald Mountain and Monmouth and other mines in Eastern Oregon are installing costly machinery; why the Musick Company is tunneling under a high peak in Bohemia; why the Southern Oregon mines are sinking. As deep work is what counts, real mining in Oregon may be said to have only begun. A man need not go east of Oregon if he wants to mine. There is hardly a county in the state which has not some mineral. Time will prove Eastern Oregon to be the world's richest mining district. Bohemia will be greater than Cripple Creek. A few more properties like the Lucky Boy will raise Blue River in the estimation of the world. Men have rushed from Mexico, Canada, Idaho, Nevada and Noron, leaving behind them a formation of blue and green copper carbonate, and copper pyrites intermixed with galena, which offer profit for intelligent working. Good results have been proved in Clackamas County in porphyry and gold-bearing pyrites, and oxidized iron croppings rich in gold values. Crook County shows another formation—a reddish yellow clay, or partly sandstone, very rich at times, and intermixed with porphyry; also quartz and serpentine, near Prineville, sylvanite, antimonial silver, near Frazer City. The miner may grow his garden truck on the ground from which he takes his gold rock. So it is everywhere in Oregon.

A smelter at Portland would do more than anything else to stimulate mining in Oregon. Thousands of tons of ore from Eastern and Western Oregon would be available for the enterprise. At present mining men send their ores to the smelters on Puget Sound or those east of the Rocky Mountains.

Bohemia a Base Camp.
Development work last year proved Bohemia to be essentially a base camp. Enormous bodies of gold, silver, copper and lead in combination are covered by a capping of free-milling gold rock. The principal needs of the district are railroad connection and access to a smelter. The gold output last year was about \$150,000, the greater part of which was contributed by the Helena No. 1. It ran its five-stamp mill the greater part of the year, adding five extra stamps in the Fall. The closing down of the Musick mill threw the production of the district far below what it should have been. Last Fall the company was reorganized and plans were at once perfected for operations on a large scale. The company is now running a long tunnel in Bohemia Mountain, to tap large bodies of ore at a great depth. The Champion Company put a force of men to work in the Fall and resumption of work in the mill is expected in the Spring. Many mineowners are pushing work on their properties and planning to install machinery. The owners of the Grizzly may put in a cyanide plant.

Present machinery equipment in the district consists of 68 stamps, as follows: Noonday, 20; Helena, 10; Musick, 20; Champion, 10; Star, 5; Stocks and Hartlow, 5; Long, 2; Harland, 2; Brooks and Michelson, 2; Hoyt's tremula, 2. Bohemia district is in the Calapoosia

Mountains, 14 miles south of Portland and 11 miles by stage up Row River and Shary Creek. The mineralized belt contains 25 square miles and has enormous bodies of base ore, carrying gold, silver, copper, lead, zinc and galena, covered to a depth of 300 or 400 feet with a capping of free-milling gold. Bohemia and Cripple Creek resemble each other in formation, though Bohemia is many times larger than Cripple Creek. It has been thoroughly prospected for about 15 miles square of its area. Surrounding this square on all sides is mineral-bearing ground. Taking in the Blue River country, which lies 60 miles to the north and east, the mineral belt in the Calapoosia is figured at 60 miles north and



PLACER MINING IN BAKER COUNTY.

Photo by George M. Welster, Portland.

south and 35 miles east and west, an area of 100 square miles.

While the principal work in the district to date has been of a free-milling character, the camp is base. The nominal treasures are base, carrying high values in gold, copper and lead. The coating of iron-stained free-milling ore is of a late formation. Bohemia, all canyons and peaks, is an exceptionally favorable country for deep mining. Everywhere tunneling gives depths varying from 70 to 150 feet. In many of the mines it is an easy matter to strike the line of cleavage between the free-milling and the base ore, and to upraise for the one and sink for the other. Working tunnels can be driven, hand drilling, for \$10 a foot. A 150-foot tunnel on the Noonday would give a depth of 100 feet. On the Henry Clay group in Monto Rico a 200-foot tunnel would give 150 feet of depth. Generally the top rock is honeycomb quartz, mixed with solid quartz, but in the Champion the quartz is almost solid. The quartz hardens, the veins widen, and the values of the free-milling rock increase with depth. When the base rock is opened up it is believed that its values and the veins carrying them will increase with depth.

With very few exceptions, all the rocks of the Bohemia region might be included under the heading of andesites, for the dacite-porphyrates are only porphyritic

veins attain a thickness at times of four feet, but when compound they are as much as 12 feet thick.

The veins follow sets of joint planes, of which there are two—one lying between north 20 degrees west and north 70 degrees west, and the other nearly at right angles to this, a little west of south. The joints of the first set are most abundant, and occur generally in the neighborhood of the veins. Those of the second set are not common.

It is evident from the relations of the joints and veins that the joints determined the position of the veins and aided in affording an opportunity for the circulation of the mineral-bearing solutions by which the ores and gangue were deposited.



BOHEMIA MINING DISTRICT, OREGON.

Photo by George M. Welster, Portland.

The development of the veins, however, cannot be ascribed to the presence of simple joints alone, but to a crushed and porous belt of rock in which there may be many irregular joints. The crushed condition of the rock is well displayed in the faces of some of the drifts. Occasionally the walls or inclosed fragments show well-marked joints or strata of slickensides due to faulting. These appear more abundant about the Noonday mine than anywhere else in the district. The existence of faults of at least small extent cannot be doubted. It is possible that the evidence of faulting was once more general, and that it has been to some extent obscured or obliterated by subsequent deposition of vein matter. The country rocks are wholly volcanic and much alike.

Cottage Grove and Bohemia.
Cottage Grove is 14 miles south of Portland, on the banks of the Coast Fork River, which joins Row River 14 miles north, making the headwaters of the Willamette River. The foothills come to the edge of the town on the east and west sides, making the place the most picturesque of any town in the Willamette Valley.

During the past two years the town and community have had unprecedented prosperity. One hundred and fifty dwellings have been erected. One-half the streets were graded last Summer. Front and Wall streets, which cover 18 blocks, are being macadamized with heavy and light coats of crushed rock. The cost of these improvements is about \$200.

Cottage Grove is surrounded with advantages which promise to make it a town of no little importance. The hills are densely covered with fir timber, and lumbermen are scrambling for every foot of timber land. The Black Butte quicksilver mines, 15 miles south, on the headwaters of the Coast Fork, are coming to the front as one of the principal quicksilver-producers of the Pacific Slope. Other companies are preparing for development of cinnabar deposits.

The Bohemia mining district, 35 miles east, is tributary to Cottage Grove. Many efforts have been made to divert this trade to other channels, but as Cottage Grove is the only direct and natural outlet, it is kept closely allied with the camp. Nine-tenths of the district's business is done at Cottage Grove, and amounts to thousands of dollars annually. The district contains about 1000 localities of various mineral deposits.

The farming land tributary to Cottage Grove is very rich and productive.

Blue River Region.
Development of the Blue River country has been slow, the same as in Bohemia, for the reason that the properties as a rule were in the hands of poor men, and it was difficult to interest outside capital. It took 12 years to get a 10-stamp mill on the Lucky Boy, but when work was begun the rock paid from the grass roots. Last year there was quite a rush of prospectors to the region and a great many locations were made. The most important discovery of the year was the Mineralized Mountain four miles up Blue River. It is about 1300 feet high and ap-



BOHEMIA MINING DISTRICT, OREGON.

Photo by George M. Welster, Portland.

pears to be all quartz. At the top several cliffs of solid quartz project for 100 feet or more above the surface, and there are croppings in all directions. The ore assays from \$5.00 to \$12 per ton.

Considerable work was done in the Summer on the Calapoosia side and many claims showed up well in gold. Blazer's two-stamp mill, on the Sunset started up after the Fall rains set in. Dr. Candian started up his Bryan mill late in October.

Many Copper Deposits.
While the gold fields have practically monopolized attention in Eastern Oregon, there are copper deposits to which capital is giving attention.

In the Fall of 1899 a copper deposit supposed to be 200 feet wide was uncovered 18 miles northeast of Baker City. Work done last year proved the ledge to be from 60 to 600 feet deep. The croppings show for over a mile and there is an unlimited amount of ore that is believed to average 5 per cent copper. At a depth of 60 feet the copper ran 30 per cent and carried gold and silver amounting to \$10 per ton. The copper is in native form and is uniformly distributed throughout the rock.

All the base ores in Bohemia carry

the ledge as shown by a smelter test made at Tacoma is between 7 and 8 per cent copper, and a smelter test of ore from the Elsie Dora claim, owned by the Consolidated Mines Corporation, limited, aggregated \$4, of which \$3 was gold, \$1 copper and \$1 galena.

Copper is found in abundance in claims on Dixie and Strawberry Buttes, in the John Day Valley. Assays from the Copper King claim, near Frazer City, shows from 1 to 20 per cent copper.

Mines in John Day Valley.
Many quartz locations have been made in the John Day Valley in the past two years, and if a fifth part of them amount to anything the Frazer City coun-

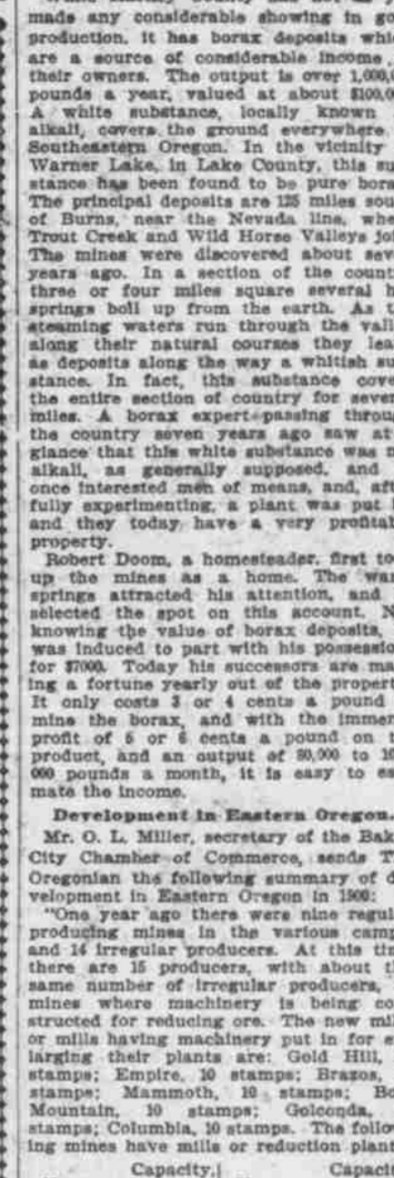


BOHEMIA MINING DISTRICT, OREGON.

Photo by George M. Welster, Portland.

try will be a large producer of gold, copper and cobalt. The mineralized belt, aside from the placer deposits, which are worked along every creek, comprises Dixie Spur of the Blue Mountains, eight miles north of Frazer City, and Strawberry Spur, nine miles south. Dixie Spur is about 35 miles long and skirts the northern side of the John Day Valley. Its highest point is Dixie Butte, which has an elevation of 700 feet. Strawberry Spur is 40 miles long, extending from Canyon Creek, along the southern boundary of the valley, into Malheur County. Its highest point is Strawberry Butte, which has an elevation of 300 feet. The principal development has been on Dixie Spur. Here, along the forks of Dixie Creek, and in Quartzburg district, several properties have been opened. Principal among them are the Standard, the Lone Star, the Keystone, the Sherbondy, the Clayton and the Present Need. The Strawberry country has hardly been touched. The Weaver brothers think they have a 'Treadwell' in the Oregon Wonder. Eight parallel ridges run northwesterly and are said to be 600 feet wide. A shelf of rock rises perpendicularly 80 feet at discovery point, which admits a great depth. A tunnel run in from Snow Creek would

ascend along both sides of the east fork of Dixie Creek. There is cobalt in the rock, but considerable depth will be required to get at the large deposits of this metal. Copper is oxide and carbonates at the surface, but is found in the sulphide state with depth. On the surface the copper is strucky and lumpy, but as depth is attained it solidifies and increases in quantity. Copper values average 10 per cent and the gold from \$50 to \$100 to the ton. Experienced miners now believe that when the ledge is opened up the copper and gold values will run nearly even and that the cobalt will average with the copper.



BOHEMIA MINING DISTRICT, OREGON.

Photo by George M. Welster, Portland.

Harney County Borax.
While Harney County has not as yet made any considerable showing in gold production, it has borax deposits which are a source of considerable income, to their owners. The output is over 1,000,000 pounds a year, valued at about \$100,000.

A white substance, locally known as alkali, underlies the ground everywhere in Southeastern Oregon. In the vicinity of Warner Lake, in Lake County, this substance has been found to be pure borax. The principal deposits are 15 miles south of Burns, near the Nevada border, and Trout Creek and Wild Horse Valleys. The mines were discovered about seven years ago. In a section of the country three or four miles square several hot wells boil up from the earth, and the steaming waters run through the valley along their natural courses they leave as deposits along the way a whitish substance. In fact, this substance covers the entire section of country for several miles. A borax expert passing through the country seven years ago saw at a glance that this white substance was not alkali, as generally supposed, and at once interested men of means, and after fully experimenting, a plant was put in, and they today have a very profitable property.

Robert Doon, a homesteader, first took up the mines as a home. The warm springs attracted his attention, and he selected the spot on this account. Not knowing the value of borax deposits, he was induced to part with his possessions for \$700. Today his successors are making a fortune yearly out of the property. It only costs 3 or 4 cents a pound to mine the borax and with the immense profit of 5 or 6 cents a pound on the product, and an output of 50,000 to 100,000 pounds a month, it is easy to estimate the income.

Development in Eastern Oregon.
Mr. O. L. Miller, secretary of the Baker City Chamber of Commerce, sends the Oregonian the following summary of development in Eastern Oregon in 1900:

"One year ago there were nine regular producing mines in the various camps, and 14 irregular producers. At this time there are 15 producers, with about the same number of irregular producers, or mines where machinery is being constructed for reducing ore. The new mills or mills having machinery put in for enlarging their plants are: Gold Hill, 10 stamps; Empire, 10 stamps; Brazos, 10 stamps; Mammoth, 10 stamps; Bold Mountain, 10 stamps; Golconda, 10 stamps; Columbia, 10 stamps. The following mines have mills or reduction plants:

| Name | Capacity, stamps | Name | Capacity, stamps |
|-----------------|------------------|-------------------------------|------------------|
| Bonanza | 10 | Badger | 10 |
| Columbia | 10 | Gold Hill | 10 |
| Golconda | 10 | Balsley-Eikhorn | 10 |
| Connor Creek | 10 | Flagstaff | 10 |
| Colen Company | 10 | Ohio | 10 |
| Gold Ridge | 10 | May Queen | 10 |
| Robbins-Eikhorn | 10 | Cougar, 100-ton cyanide plant | 10 |
| Gracie Giant | 10 | Gracie Giant | 10 |
| Magnolia | 10 | Bald Mountain | 10 |
| Mammoth | 10 | Starr & Starr | 10 |
| Elmer & Helmer | 10 | Brazos | 10 |
| Empire | 10 | Empire | 10 |
| Red Boy | 10 | Total | 100 |
| North Hill | 10 | | |

"This makes a total of 400 stamps that are supposed to be dropping in the various camps around Baker City. Some of these stamps are temporarily idle for various reasons—mills are being enlarged, new machinery being put in, pending sale, or exploration for deeper work. There are about 100 more stamps in the district that are idle, not mentioned in the above list. These are in mills on old properties that have been worked out, or, if not exhausted, then ruined by bad management and in bad shape.

"There were 50 stamps added to the active workers last year. There are also about the same number in process of construction, and will be ready for next year's work.

"A large amount of holding machinery has been put in place, and considerable deep sinking is going on. The district east of the city has taken a new start, and indications are that the old Virtue district and the country along the Burnt River east of the Virtue district, the Burnt River Creak, Bonanza and the

standstill last year. Mr. Lawler having gone to Nevada to take charge of his interests there, his mill was not in operation. The Albany mill has been closed down for three or four years. No machinery was put up in the district last year. Present equipment consists of the Lawler Gold Mining Company's 20 stamps of 20 tons capacity, and the Albany Gold Mining Company's 10 stamps of 20 tons capacity. Though a number of new locations were made, the principal work was assessment character. California capital has been invested recently. Towards the close of the year a number of locations were made in the vicinity of Detroit. The assays were satisfactory.

The assessor of Harney County and Curry Counties last year than for several years past. The gold output aggregates about \$20,000. No new machinery was set up, and, so far as is known, none is contemplated. The only machinery in the five-stamp mill on the Divilbas mine. It is not in operation on account of litigation.

MINERAL PRODUCTION IN 1900.
Gold, \$3,770,000; Silver, \$15,000,000; Coal, \$270,000; Borax, \$100,000.

According to estimates based upon the most trustworthy information, the mineral output of Oregon in 1900 was \$4,340,000, of which \$3,770,000 was gold, \$15,000,000 silver, \$270,000 borax, and \$100,000 coal. These figures are conservative, and it is believed that if objection is raised to them it will be that they are under, rather than over, the actual output. In 1899 the product of mines was \$3,745,193. The estimate for 1900 follows:

| | |
|--------------------------|-------------|
| Eastern Oregon | \$3,770,000 |
| Josephine County | 600,000 |
| Jackson County | 400,000 |
| Bohemia | 120,000 |
| Remainder of Oregon | 50,000 |
| Total gold | \$3,770,000 |
| Silver | 15,000,000 |
| Borax | 100,000 |
| Coal, 20,000 tons | 270,000 |
| Total mineral production | \$4,340,000 |

Oregon Coal Production.
The coal mines of Oregon in 1899 produced 36,388 short tons of coal, valued at \$200,317. The output for 1900 is estimated at 50,000 tons, valued at \$270,000.

The coal product of Oregon in 1899 was 35,704 short tons, or 49 per cent larger than in 1898, but did not attain the figures reported in 1896 or 1897. It was, however, larger than in any year prior to 1896. The Beaver Hill mines, about which much was promised and which helped to swell the total for 1896 and 1897, did not produce in 1897 and 1898.

Of the 1899 product, 2,500 tons were used in local trade, and 125 tons were used at the mines for steam and heat. The greatest shipment of the state was made in 1897, when 9,221 tons were shipped direct from the mines, although the total output of that year, 191,200 tons, was the greatest yet known, the product of the year preceding, 105,721 tons, brought a higher figure, viz., \$204,654 in 1896, when the output was but 75,585 tons, the largest number of men yet employed in those mines were at work. That year the miners numbered 414, and in 1897 they were but 325, while in 1899 they were reduced to 224, working on an average of 285 days for the year. The apparently large number of men employed in 1896 was due to the large force employed in developing the Beaver Hill mine, which produced coal for shipment during only 30 days of the year. The following table shows the coal product of Oregon from 1896 to 1900 inclusive:

| Year | Short tons | Short tons |
|------|------------|------------|
| 1896 | 105,721 | 105,721 |
| 1897 | 191,200 | 191,200 |
| 1898 | 35,704 | 35,704 |
| 1899 | 36,388 | 36,388 |
| 1900 | 50,000 | 50,000 |

Bohemia Gold Mining Company.
In August, 1899, Mr. George W. Lloyd, of Colorado Springs, visited the Bohemia Mining District, Oregon. He was impressed with its possibilities. He located several claims, and secured a lease on over 250 acres of mineral ground, and with the assistance of M. V. Little, of Fort Wayne, Ind., and A. C. Burnett, of Boston, the Bohemia Gold Mining Company was organized under the laws of the State of Maine. Mr. Little is president, Mr. Burnett is secretary and treasurer, and Mr. Lloyd is general manager. The capitalization is 1,500,000 shares. For value, \$2,000,000 shares are used as treasury stock and are being sold to obtain money for development purposes.

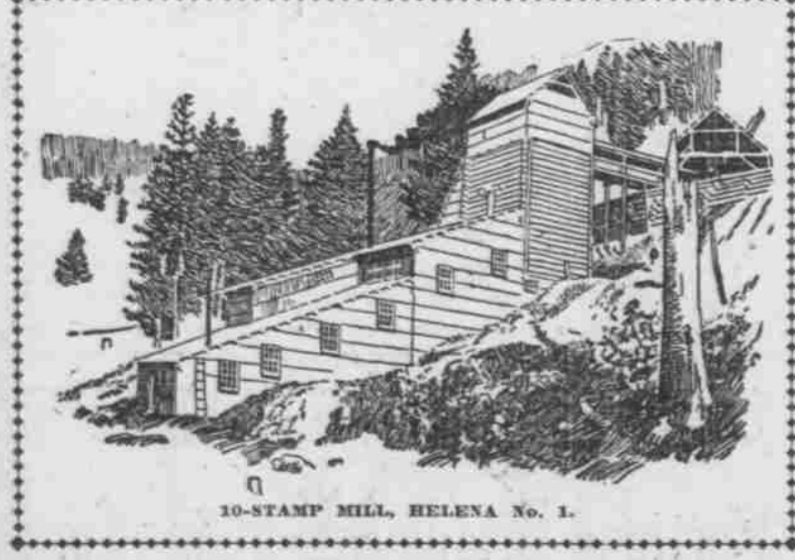
The company owns the Victor, situated on the easterly slope of Jackson Mountain, and the Fort Wayne, Boston, Portland, Pioneer, Black Bear, "L. M.," "F. J." and "G. W.," situated in the southwest part of the district, near the road leading up Hardebeck ridge.

The Victor has a fine quartz ledge, outcropping the entire length of the claim, which averages five feet in width.

The Portland group has several ledges, one of them being in place 60 feet wide, and extends along the length of five claims, a distance of 700 feet. This outcrop assays from \$5 to \$25 per ton in gold.

The company proposes to run a tunnel along this ledge. The surface of the ground is so precipitous that the tunnel driven in along this ledge will be one-half a mile vertically under the surface by the time that the upper end of the property is reached. Mr. Lloyd is now on the ground, superintending the work, and during the present year the tunnel will be driven at the rate of three feet a day. The company has the utmost faith in the district and propose to show their faith by their works.

Oregon-Colorado M. M. & D. Co.
The Oregon-Colorado M. M. & D. Co. Company own seven claims in the Bohemia district, formerly known as the Confidence Copper property of about 140 acres, southeast of the Musick and south of the Helena mines. Having well defined ledges extending the entire length of three claims, being 450 feet. On this ledge a sample for a distance of 300 feet on surface was taken, which showed pay ore in copper gold ore, free from zinc or arsenic; a very desirable ore for treatment. The company has 500 feet of work done. A tunnel is now being run to gain great depth and as soon as surface indications are proven, which will be early spring, a plant for the treating of this ore will be installed at the mine. It is one of the properties that visitors to the camp always want to see.



10-STAMP MILL, HELENA No. 1.

tions on a large scale. The company is now running a long tunnel in Bohemia Mountain, to tap large bodies of ore at a great depth. The Champion Company put a force of men to work in the Fall and resumption of work in the mill is expected in the Spring. Many mineowners are pushing work on their properties and planning to install machinery. The owners of the Grizzly may put in a cyanide plant.

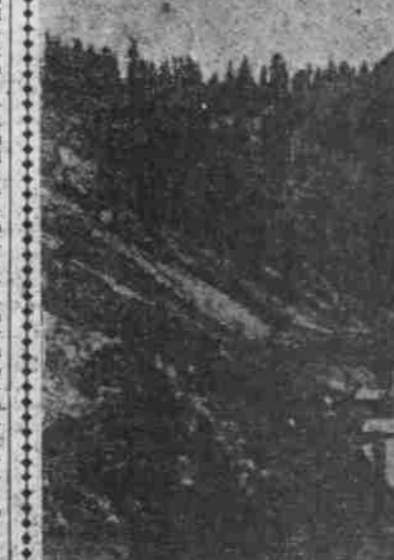
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quartz-bearing andesites. The tufts, too, and most of the basalts are andesite. In several of the andesites hornblende is the only characteristic ferromagnesian silicate. Although widely distributed, the andesites are much altered.

The veins are usually well defined. Generally they are narrow, but irregular mineralized belts, or zones, in which there has been much crushing of rock material. The crushed basalt, as well as the adjacent country rock, sometimes for a distance of 12 feet or more, may be impregnated with pyrite. The veins are irregular and vary from a mere film to sheets 12 feet thick. A vein may be simple or it may be composed of several parallel veins only a few feet apart. When simple, the

Permanent Ledges in Southern Oregon.

Until a few years ago Southern Oregon was popularly supposed to be a placer or hydraulic gold mining country. Even experts said that the ledges were pocketed and carried no depth. This notion no longer obtains and quartz properties are being opened up at a rate which promises large production in a few years. It is now quite generally recognized by mining men that Jackson and Josephine Counties have the same formation as California—barren greenstone, intermixed with serpentine, pyrites and copper carbonate. Josephine County has several mines that are yielding large amounts of gold with vast quantities of rich ore in sight. As in Eastern Oregon, Bohemia and Blue



BOHEMIA MINING DISTRICT, OREGON.

Photo by George M. Welster, Portland.

from 7 to 8 per cent copper, and, as has already been said, such will also be found to be the case in Blue River as depth is reached. Probably the most prominent copper property in Bohemia is the Grizzly group, on the western base of Grizzly at the Junction of Grizzly and Champion Creeks. An assay of rock from one of the claims showed the following values: Gold, \$15.50; copper, \$7.50; silver, \$1.50; lead, \$1.50; total, \$25.50. The average of

tap the ore body 100 feet below the surface. The rock is a sort of ribbon quartz and the contact is porphyry and slate. Thirty assays of surface rock gave returns ranging from \$3.85 to a shade over \$7 in gold and \$21.3 per cent copper to the ton.

Dixie Spur is unquestionably a copper region, though gold predominates in the rock. The copper belt, so far as known, extends four miles north from Johnson's

Granite before the close of the coming season.

A most conservative estimate indicates that before the close of 1901 there will be 10 new dividend-producing mines added to the list of producers in the Eastern Oregon gold fields. The district produced about \$2,500,000 in gold last year. The output of 1901 will approach \$5,000,000.

Santiam district was practically at a



BOHEMIA MINING DISTRICT, OREGON.

Photo by George M. Welster, Portland.

Photo by Lurch, Cottage Grove.