

THE MINES OF LEADVILLE.

VISITING THE FRYER HILL CLAIMS.

THE PRINCIPAL MINES AND THEIR ESTIMATED RICHNESS—THE LITTLE CHIEF, NEW DISCOVERY, CARBONIFEROUS, AND OTHER CLAIMS—HOW THE MINES ARE WORKED.

LEADVILLE, April 23.—A map of the mining localities lying just east and north of this town looks like a drift of planks in a Spring freshet. The outline of a lode mining claim is a parallelogram representing an area of 1,500 by 300 feet. About 150 of these are crowded into a space much too small to hold them, and they lie at every possible angle, elbowing, lapping, and, in some places, overlying one another three and four deep. Where these cover the most valuable deposits, a spirit of compromise has enabled the claimants to reconcile their hostile interests either by purchase or combination, and much destructive litigation has thus been averted. This concentration of interests has resulted in placing the richest part of Fryer Hill in the hands of three combinations of capitalists, and the best "locations" on Carbonate Hill and other centres of mineral deposit have passed, or are passing, into the control of similar companies. A more general system of mining and greater economy are practicable where this prevails, than where individual claims are worked independently, and, as a result, the mines of these combinations are about the only ones that can lay claim to extensive workings, and are the chief sources of the ore smelted here and shipped eastward. The former owners of these mines, generally the discoverers, who had little but their physical labor to expend in developing them, used no system whatever in their work, burrowing after the richest portions of the ore wherever it led them, and rarely even timbering enough to insure their own safety in the drifts. The present owners have therefore, had to do much of the former work over again in correcting lines, timbering, and retimbering, for mere safety. Outside of these groups there are doubtless good mines, but their output has up to the present added little to the wealth of the camp: and there are also many that have good selling "indications," which the discoverers fear to exhaust by vigorous development, so irregular and even fantastic are the freaks that nature has displayed in the distribution of her carbonate favors. The country for miles about has been "staked" by claimants, and the mountain slopes are pitted with their "prospect holes" in the rush to take any chance of "striking mineral," and although discoveries have been made where there was utter defiance of all accepted "indications," it is not probable that this eccentricity in nature has become the normal state, and that every shaft begun, as some pretend, is "sure to strike it" if only sunk low enough. This assumption is based on the extensive deposits found in the principal Fryer Hill mines, where the entire locations seem to be underlain with carbonates.

VISITS TO THE MINES.

Descent into one of the Fryer Hill mines explains much of the fervid writing that has been devoted to Leadville. Accompanied by Mr. Holt, the manager of the Little Chief, the writer passed through the workings of that mine, along passages the walls of which consist mainly of the brown carbonates of lead, with their invisible silver treasure. To the unfamiliar eye, these dark, earthy walls present nothing to excite the imagination, but when the key to their mystery is given, when the observer is told that a few cubic feet of this unpromising-looking material contains any number of ounces, from 50 to 500, of silver, and \$25 or \$30 worth of lead, they at once become translucent, and the narrow dingy passages are transformed in the fancy of the fine writer into widening and interminable vistas in columns of silver, the polished surfaces of which reflect in myriads the flickering and smoky flame of the sperm candle he carries to light him over ore heaps, wheel-barrows, shovels, and picks. The Little Chief was purchased not many months ago by the present owners, John V. Farwell, Wirt Dexter, George H. Holt and some others, all of Chicago, for \$325,000, and consists of one mining location or claim, abridged a trifle, like most other Fryer Hill claims, in the process of compromise made necessary in the crowded state of the hill. It has seven shafts but is worked through three only. Four shafts have shown mineral, and drifts from them have been extended in mineral an aggregate distance of about 600 feet. The ore-bed varies from 3 feet to about 30. In some of the drifts the thickening vein of mineral made necessary three sets of timbers, one above the other, and still the top of the ore was not reached. Some ore recently taken from the mine assayed 9,000 ounces to the ton, but not more than 300 ounces were expected from a mill run of it. The product of a quantity large enough to send to the smelter is the true test of the richness of a mine. The west line of the mine adjoins the east lines of the New Discovery and Carboniferous mines, and, in some places, the workings are separated by a line of timbering only, and notice of the discharge of a blast has to be given from one side to the other. "Stopping," or removing ore beyond what is excavated from the drifts, has not been done to any great extent in the Little Chief, and the mine is said, therefore, to be only preparing to put out its ore. The steam machinery that is to displace the California horse whim hitherto used in hoisting, is about in operation now. The owners of the Little Chief propose to build smelting works on their mine to smelt their own ores and those of any other Fryer Hill mines that desire it.

A visit to the New Discovery, one of the mines of the Little Pittsburg Consolidated Mining Company, who own also the Little Pittsburg, Winnemuck, and Dives, discloses much the same character of workings and mineral as in the Little Chief. Several levels are run lengthwise of the claim, and are to be connected by cross-cuts, which will leave the ore-bed standing in blocks of 50 feet square. The value of the ore ranges, as in the Little Chief, from a few dollars to \$22,000 by assay, and in quantities about \$100 to \$300, with a recently opened seam that produces from \$800 to \$1,100 ore. This mine yielded about half the ore extracted the last half of last year from the mines of the combination. Ex-Senator Chaffee and Lieut.-Gov. Tabor, of this State, are prominent members of the company. The Little Pittsburg Mine was not open to visitors, Gen. Bearce, the Superintendent of the mines of the company, stating that some active timbering operation was in progress there. A small donkey engine is used in hoisting from the New Discovery, and the power will be increased soon.

Another mining combination on Fryer Hill—Borden, Tabor & Co.—own the Carboniferous, Vulture, Chrysolite, Little Eva, Kit Carson, Fairview, and some others. The Carboniferous and Vulture are some advanced in development, but, for some unexplained reason, no visitors are permitted to enter the mines. Their output, however, indicates the same character of mines as those previously described. Besides, the lines of the Carboniferous, Vulture, and Chrysolite are in contact on one side with those of the New Discovery, and the Little Chief lies between the Carboniferous and New Discovery on one side, and the Little Pittsburg on the other.

Proceeding up Stray Horse Gulch, which separates Fryer Hill from Carbonate Hill and the mines of a higher belt, some workings of a different kind were found. The Argentine mining property, consisting of the Young America, Keystone, Charleston, Camp Bird, and Pine locations, is owned by the St. Louis Smelting and Refining Company, which has a smelting branch in Leadville, known as the Harrison Reduction Works. The mine property was purchased a year ago for \$225,000. Here the system of mining is by a tunnel connecting the mines, which are on a slope above its mouth. The tunnel runs into the hill, horizontally, 800 feet, and will be continued to 2,000 feet. Much of the vein lies above the tunnel, and the ore is brought from the levels in the vein to shafts at various distances along the tunnel, and dumped into chutes that conduct it into cars on a tramway in the tunnel. About 500 feet of drifts have been opened in the Pine, Camp Bird, and Charleston. The mines are not worked to their full capacity, as the owners, like other mining companies, are waiting for railroad facilities, which will greatly reduce freight charges, not only on ores shipped, but on all the materials used in smelting here. The high-grade ores from the Argentine are sent to the works in St. Louis, and the low grades are smelted in Leadville. The usual position of the silver-bearing ore is under a layer of porphyry rock and above a layer of limestone, but in the Argentine some silver-bearing iron has been found under the limestone, yielding 56 ounces of the precious metal to the ton.

Crossing the ridge from Stray Horse toward California Gulch, what is known as the Iron Mine is reached. This property belongs to

Stevens & Leiter and is the first of a line of claims running end to end along the outcrop of a horizontal vein which extends southward through the Bull's Eye, Lime, Stone, and Rock Mines, and is cut through in the Stone claim by California Gulch. Running along beside these claims, and just above them on the hill-side, is a similar chain of claims, two of which, the Silver Wave and the Dome, are owned by Stevens & Leiter. The vein that crops out in the Iron property dips into the hill under the claims above it, and their only source of mineral is this vein after it passes beyond the Stevens boundary and into their lines. Stevens & Leiter claim the right to follow the vein beyond their side lines into the hill and under the claims above them. Hence the litigation in which Judge Hallett recently rendered the decision favorable to Stevens & Leiter, and which has yet to come before the United States Supreme Court. The struggle with the claimants of the upper mines, whose shaft opened into the Iron Mine tunnel, of which they held possession for nine days, was exciting, though not bloody, and ended in a permanent guard of 24 men, with breech-loading rifles, being maintained in the Iron Mine to prevent surprise. One of the leaders in the opposition to Stevens & Leiter was a man named Lavery, who was afterward shot dead while attempting to "jump" the Chrysolite Mine on Fryer Hill. The system of working the Iron Mine is by an incline of 15 degrees along the dip of the vein into the hill. From this incline drifts run along the strike of the vein northward and southward, and these again are connected by cross-cuts leaving the vein in columns 100 feet square. The incline has already extended 750 feet into the hill, and three levels have been run from each side to distances of 370 to 400 feet. The width of the vein is said to be from 6 to 70 feet, and assays from 52 to 12,000 ounces to the ton have been obtained. The output is limited to the ore removed in the course of opening the levels, which pays expenses and leaves a surplus on the dump. A horse whim is used to haul the ore up the tramway in the incline, but steam machinery will be put in as soon as the embarrassing litigation is shaken off. The development of the mine has been carried forward to some extent with a view to demonstrating the continuity of the vein with that struck by the claimants above it, and some eccentric passages have been run so as to come under shafts coming down from new points above. Workings have thus been established into which the law forbids the contestants to enter.

This outline of the workings of the principal mines may convey some idea of the state of development of mining property here. There are, besides the above combinations, others whose mines are more or less advanced in development, such as the Leadville Mining Company, of which Mr. Chaffee is also a member, who own the Carbonate and Shamrock Mines, on Carbonate Hill, and are "waging" a lawsuit for the possession of the Little Giant Mine, claiming it as a "break" from their vein or a continuation of it. This looks like the "side-line" principle, for which Stevens & Leiter are contending, and may presage legal warfare that will convulse mining interests here as violently as the volcanic throes of the remote past did the deposits on which those interests are based. A company in which Ex-Gov. Rout is a partner own the Morning Star and Waterloo, on Carbonate Hill, and the Crescent and Aetna, on the same hill, are owned by the Myer Mining Company. Near the Argentine property, in Stray Horse Gulch, are the mines of the Adelaide Consolidated Silver Mining and Smelting Company, consisting of the Adelaide and Terrible. There are besides these the Small Hopes Mining Pool, a New-York company, who own the Gone Abroad, Robert Emmet, Rancho, Result, and Forest City; the Philadelphia purchasers of the Prince Mines; the Chicago company that recently bought the Dyer Mine, and a few others, showing that although the camp is young the attractive force of capital is drawing the mines that are worth anything into groups for more systematic working. The Long and Derry group of mines is about six miles from Leadville, and higher up the mountains than any of the others.

PRODUCTIVENESS OF THE MINES.

There is a great deal of loose talk about a mining camp, which should be treated as the ores are, by a process of reduction, and the men who best understand this talk and its value are the men who are engaged in treating the ores—the smelters. The establishment of smelting works in Leadville has furnished a market for the low grade ores that could not stand the heavy freight rates through the mountains and by rail to the Eastern reduction works, in the weighty and bulky form of ore. By smelting they are reduced to base bullion, silver and lead, which is shipped East for separation as far as Newark, N. J., and was at one time even to Wales. The smelters buy ores from the mines, and either smelt or ship the ores as they find most profitable. There are also samplers who deal in ores, buying from the mines and selling to the smelters in Leadville, or sacking such as are high grade and shipping them East. Some of the loose talk about Leadville may be shown by a few figures from a recent statement in the Chicago Times. The correspondent, giving the product of the mines for 1878, gives the total amounts of the business of the samplers and smelters and adds all together, overlooking the fact that half or two-thirds the ore purchased by the samplers from the miners is sold again by them to the Leadville smelters, and thus counting a large proportion of the ore product twice. He thus makes the total mineral product of Leadville alone more than \$1,000,000 greater than the official figures represent the whole of Lake County, in which Leadville is situated, to have produced in the same period. The following facts are the substance of conversations with the leading smelters on the productiveness of the mines:

The Grant Smelting Company have three furnaces in operation, and a fourth going up, which will increase the capacity of the works to 75 tons in 24 hours. They buy ore, work it up, and ship the base bullion, which usually contains 400 ounces of silver to the ton. They do not propose to extend their works beyond the improvements now in progress, as they judge, from the number of smelters in operation and in contemplation, that the competition will be unprofitable. The deposits now discovered and disclosed by the mining operations of the large companies, if not reinforced by fresh discoveries, could be exhausted by the smelters in operation and going up in 12 months. The producing mines are the Iron, Carbonate, Crescent, Little Pittsburg, New Discovery, Carboniferous, Chrysolite, Eaton, Winnemuck, Vulture, Little Chief, Adelaide, Camp Bird, Charleston, Keystone, Pine, Agassiz, Wolfe Tone, Robert Emmet, and Gone Abroad, besides a number of mines that produce spasmodically, and a dozen others that contain a low grade of ore that it will not pay to work until railroad facilities have reduced the cost of everything here by reducing freights. The permanent veins, such as the Iron Mine, are taken out very little ore, partly because of lack of facilities, and partly because they are waiting for some one of the three or four railroads expected here to reduce freights. There are only four or five mines the smelters can depend on for a steady supply of ore for their works. The Georgetown (Clear Creek County) ores average higher grades than any others in Colorado, and the Colorado ores are richer than those of Nevada. Mr. Grant thought little of the San Juan mines. Their product last year was but \$400,000, while the Leadville region produced nearly \$3,000,000. If mines were worth anything miners would work them, and not, as in San Juan, confine themselves to simply digging the depth required by law in order to hold them. He would put no money in mines unless they were well developed. He would buy mining property when he saw its product in the mill, and knew what it would yield. People were crazier about mining property than any other, and bought anything in the shape of a hole. It was worse than gambling. A gambler would sometimes give his victim a chance, but in mining and prospecting "indications" the chances of a return were fewer than in faro. Very little of what one heard about a mining camp was to be believed.

The smelting works of Bardell, Witherell & Co. contain two furnaces, capable of smelting 35 tons each in 24 hours. A third is to be added. The company buy all their ores. The competition among the smelters has already raised prices of ore very high, and the prospect, in view of the introduction of new works and extension of the old, is appalling to those now in the business. They dare not think of it. Very little ore is shipped, a check having been given to production by the mines by the great surplus of production in December and January, when the smelters refused to take more, and also by the near prospect of railroad facilities. The producing mines number about 30. Others are in condition to produce, but the owners are holding back for various reasons.

The Harrison Reduction Works, a branch of the St. Louis Smelting and Refining Works, consists of two furnaces, with a capacity of 40 tons a day, and two others are to be built which will double this. This was the first smelter built in Leadville. Mr. Edmund Harrison, President of the St. Louis Company, came here two years ago, on the representations of Mr. Stevens, then of Stevens & Wood, but now of Stevens & Leiter, to see what there was in the carbonates of lead then discovered in California Gulch. He found Stevens & Wood in trouble with 300 young men whom the former had induced to

leave Detroit for Colorado to work in California Gulch; there was no Leadville then, the site being covered with forest trees. The deep snow prevented mining operations, and there was no work for the men, who were driven to desperation. They seized Stevens and Wood, put ropes about their necks to compel them to pay them something for coming up here. At that critical moment Mr. Harrison arrived and gave his check for \$4,000 to the men, and they released the mine owners, who would probably have had a short shrift, as the men were led to believe that they had been brought out here to break down the wages of miners. Mr. Harrison concluded to put up a smelter and applied for a patent for 30 acres of land, as the law allows. The smelter was established, and the foundation of Leadville begun in March, 1877, a market being thus established for the ores. The company buy ores and also smelt the ores from their own mines. The high grades are sent to the St. Louis works, and the low are treated in Leadville. About 40 tons a day are usually sent to St. Louis, containing about 80 ounces of silver and 30 per cent of lead. Speaking of the permanency of the mineral resources of the Leadville district, Vice-President Maud, of this company, thought the discoveries were only in their infancy. Whether the discoveries were pockets, deposits, beds, or veins was hard to determine, for even scientific men held opposite views on this point. In any event they gave no sign of decreasing.

The sampling establishment of August R. Myer & Co. last year received over one-third of the ore product of the camp. A representative of the company gives the following as the producing mines: The J. D. Dana, Faint Hope, Iron, the Argentine Mines, the Adelaide Mines, the Carbonate, Shamrock, Little Giant, Yankee Doodle, Crescent, Henrietta, Wolfe Tone, Rancho, Gone Abroad, Agassiz, Little Pittsburg, Winnemuck, Dives, New Discovery, Little Chief, Carboniferous, Chrysolite, Little Eva, Vulture, Nevada, Little Ella. The Ready Cash, Hoosier Girl, and Dyer produce at other seasons, and about 25 or 30 others produce at intervals from pockets. Still others, again, produce low grade ores, too poor to ship or smelt. They carry little silver, and have been heavily affected by the fall in lead since the beginning of the year. Myer & Co. purchased 1,433 tons of ore in January, and 2,160 tons in February of this year, the average value of which was \$100 a ton. The highest month's purchases last year did not exceed 1,600 tons. The output of the mines in March, April, and May falls off materially on account of the weather, the breaking up of the roads, and water in the mines, the heaviest snows of the Winter falling in March and April. The five smelting works in operation, and the seven or eight new ones in progress and in contemplation, will require new discoveries to keep them employed.

The Lake County Sampling Works and Building Company is a branch of a Georgetown establishment. Their business is sampling, but having the power to spare, they have added sawing machinery to their works. Their capacity to treat ores is about 30 tons in 24 hours, which will be extended to 40 tons soon. They buy ores from the miners, and find it most profitable to sell to the Leadville smelters, who pay them more than Eastern smelters. Mr. Franklin Ballou, of this company, gave substantially the following views of the camp: At present there are 30 producing mines, and the number will be increased when railroad facilities are introduced or more smelters are established. The daily product of the camp is about 180 tons. The Little Chief, Little Pittsburg, New Discovery, on Fryer Hill, and the iron mine alone could produce 400 tons a day with improved facilities. The smelting capacity of the camp at present is nine furnaces in blast, and others are in contemplation that will increase this to 25, when it will be equal to the reduction of 500 tons of ore daily. Two advantages are possessed by carbonate-producing mines over others, such as the great Comstock lode, for instance, in the cheapness of mining and the large percentage of metal recovered. Of the silver contained in the Comstock ore, only 65 per cent is recovered by the most successful process, while of that contained in the Fryer Hill carbonate ores, 90 per cent is recovered. As to the permanency of the mines, a good deal depends on the character of the formation, and here the geological theories enter into consideration. One (Mr. Ballou's) is that the ore vein is sedimentary, and has "faulted," or been disturbed, so as to break its continuity, producing the terraced position of the Leadville mines. The Fryer Hill mines, on the lower terrace, are "out of place," and, therefore, likely to be exhausted some time. In Carbonate Hill, the next terrace, the formation is more regular, and it would be easier to recover the vein if it should be lost. In the Fryer Hill mines the ore is from 10 to 30 feet in thickness, while in the Carbonate Mine on Carbonate Hill it is from three to six feet thick. The growth and permanency of the town is, of course, intimately connected with the extent and duration of the ore production. Taking the smelting furnaces as a basis, those in operation and in contemplation will employ about 1,200 men immediately connected with them. To supply the ore for these, 3,600 miners will be required. With those employed in other branches of business, particularly in building, it would be safe to say that a permanent population of 20,000 can be maintained here. "Then, again, I have no doubt that deposits will be found all through the Arkansas Valley. The Silver Cliff deposits are not 'in place'; they are wash from this upper region. There are also fair prospects for further discoveries about here. The trees are disappearing, but material for making bricks is abundant, and there is excellent limestone (dolomite) for building and for lime. Coal is not a geological impossibility; in fact, there are statements of coal having been found within a short distance of this, but the deep snow prevents the fact being determined." Of course, the discovery of coal would be almost as fortunate a circumstance as that of silver.

Eddy & James, samplers, treat on an average daily about 50 tons of ore, the average value of which is \$170. For some time past they have shipped very little, being engaged in an effort to secure lower freights.

THE CELEBRATED "CARBONATES."

The ore found here is carbonate of lead carrying silver. The chemical formula would be Pb. O.-CO. The only form in which the silver is recognizable is that of chloride of silver, which is sometimes seen as a thin layer of yellow wax-like substance on the surface of the hard carbonate ore. Generally the silver is so intimately associated with the lead that it is impossible to determine its form. In the furnace equal parts of charcoal and coke are used for fuel, and iron ore and limestone, and sometimes the slag from the smelter, are used for flux. At the smelting heat the oxide of lead, which is an extremely unstable compound, surrenders its atom of oxygen, which unites with the carbonic oxide, and forms carbonic acid, setting the lead free. The chemical process with the silver is not known, except when it is in the form of a chloride, in which case the chlorine is volatilized. The silver and lead, being heavier than the substances held by the flux, then sink into a well at the bottom of the furnace, from which they are ladled into molds that hold about 100 pounds of the base bullion, while the slag floating on top is drawn off through a higher channel into heavy conical coolers, and emptied in sugar-loaf cones on the dump. The chemical action in the furnace, therefore, would be represented, so far as discoverable, by the formula Pb. O.-CO=Pb.-CO₂. The carbonates are hard and soft, the hard varying in color from that of gray limestone to dark slate, and the soft from a deep cream to a rich dark brown. The hard is a dense, firm rock of great hardness, requiring powder to remove it; the soft is sometimes of the consistency of chalk, that can be crushed with the fingers, or in the form of a coarse sand, and can be mined with pick and shovel. The presence of masses of galena in the vein is not infrequent, and in such relation to the carbonates as to lead to the belief with some that the carbonates are the result of a change from sulphurets to carbonates by the action of water or air.