GOLD MINING IN GEORGIA.

BY WILBER COLVIN, PROFESSOR IN THE NORTH GEORGIA AGRICULTURAL COLLEGE.

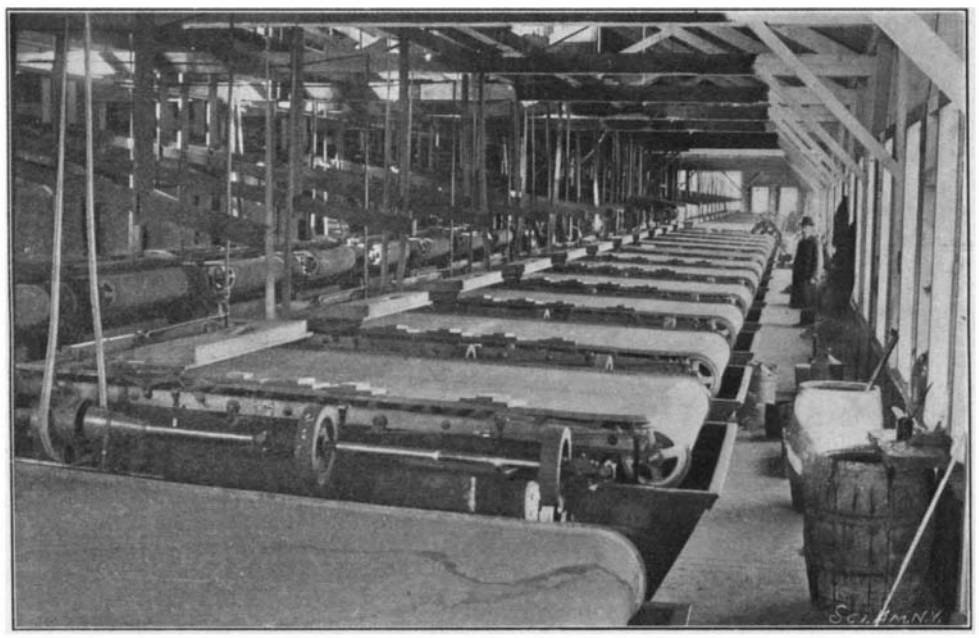
Sixty years ago the Dahlonega gold belt was a familiar name. From about 1835 to 1849, Dahlonega, Georgia, was the principal gold mining center of the United States. So great was the importance of this field that, in 1838, the government established at Dahlonega the first branch United States mint. And from 1838 to the date of its closing in 1861, because of the war, 1,381,784 pieces of gold money, with total value of $6,115,569, were coined at this mint. And this sum is less than one-half of the estimated output of the field during that period, a time when the methods of extracting the gold were very crude and wasteful. Probably from 50 to 90 per cent of the gold in the ore escaped over the old style mercury plates. White's statistics of Georgia, published in 1849, declare that from 1829 to 1849, twenty years, Lumpkin County, of which Dahlonega is the county seat, itself produced 20,000,000 dwts. of gold.

After the war the Federal government gave the mint and grounds to the trustees of the North Georgia Agricultural College. The mint building was used as a college for a number of years, until it was destroyed by fire; but soon afterward, upon the same massive foundations, was erected the present fine main building of this flourishing institution. Fifty years ago the interest and excitement over the discovery of the famous California gold fields overshadowed the Dahlonega gold belt; and the war closed the mint and so changed things generally that the very existence of this belt passed out of general public attention. Moreover, the local financial and other conditions have not been favorable to a strong revival of the gold mining here until the present time.

The earliest discoveries in this belt, in about 1829, were of free gold; and placer mining, the washing and panning of the disintegrated rock waste that had accumulated in the valleys and beds of streams, was the first stage of the gold mining. The next stage was washing down and crushing the oxidized and partly disintegrated auriferous rock, called "saprolite," washing the sand, thus formed, over mercury-covered plates and amalgamating and catching the gold set free. Some free gold also was caught in the sluice basins.

But it was found that beyond about one hundred feet from the surface of the ground the gold-bearing rocks were so little oxidized that the gold could not be extracted in this manner. A large part of the gold is in quartz rock, but mixed with compounds of sulphur and iron, forming "sulphurets," in which the gold is protected from amalgamation with mercury.

To successfully unlock the royal metal from this secure embrace has long been the hope of those acquainted with the situation. No ordinary processes would do it. Science, machinery and plants expensive and complicated are needed to do this work. And just now this new era in gold mining here is beginning to dawn. Within eighteen months six great mining companies have been organized in the immediate vicinity, with a total capital of $20,000,000, to bring into use the latest and best scientific means of extracting the gold in a large way.



FRUE VANNER CONCENTRATING MACHINES.

The gold is present in practically unlimited quantities, in formations that have long been pronounced by eminent geologists and mineralogists to be "true fissure veins of injection." The ore is very rich. It is easy of access. Conditions of climate and seasons are almost ideal, being far enough south to avoid winter's blasts, and sufficiently elevated to temper summer's heat. All that is necessary to develop the precious metal in abundant quantities is modern machinery and judicious management.

The Dahlonega Consolidated Gold Mining Company, the pioneer of these new mining companies, has made the most progress at this time in the work of erecting its plant and developing the gold. And as its mill is the largest east of the Rocky Mountains, and is one of the largest in the United States, and as the plant as a whole has been pronounced by competent judges to be the peer in completeness and modern, up-to-date, scientific efficiency of any in the world, a description of it will be of special interest. Nothing that thought or money could supply has been spared to make it in every way complete for its purpose.

This company was organized in November, 1898, and is composed principally of Ohio capitalists. The erection of the mill was begun in June, 1899, and it is expected that it will be substantially completed and formally started about June 20, 1900.

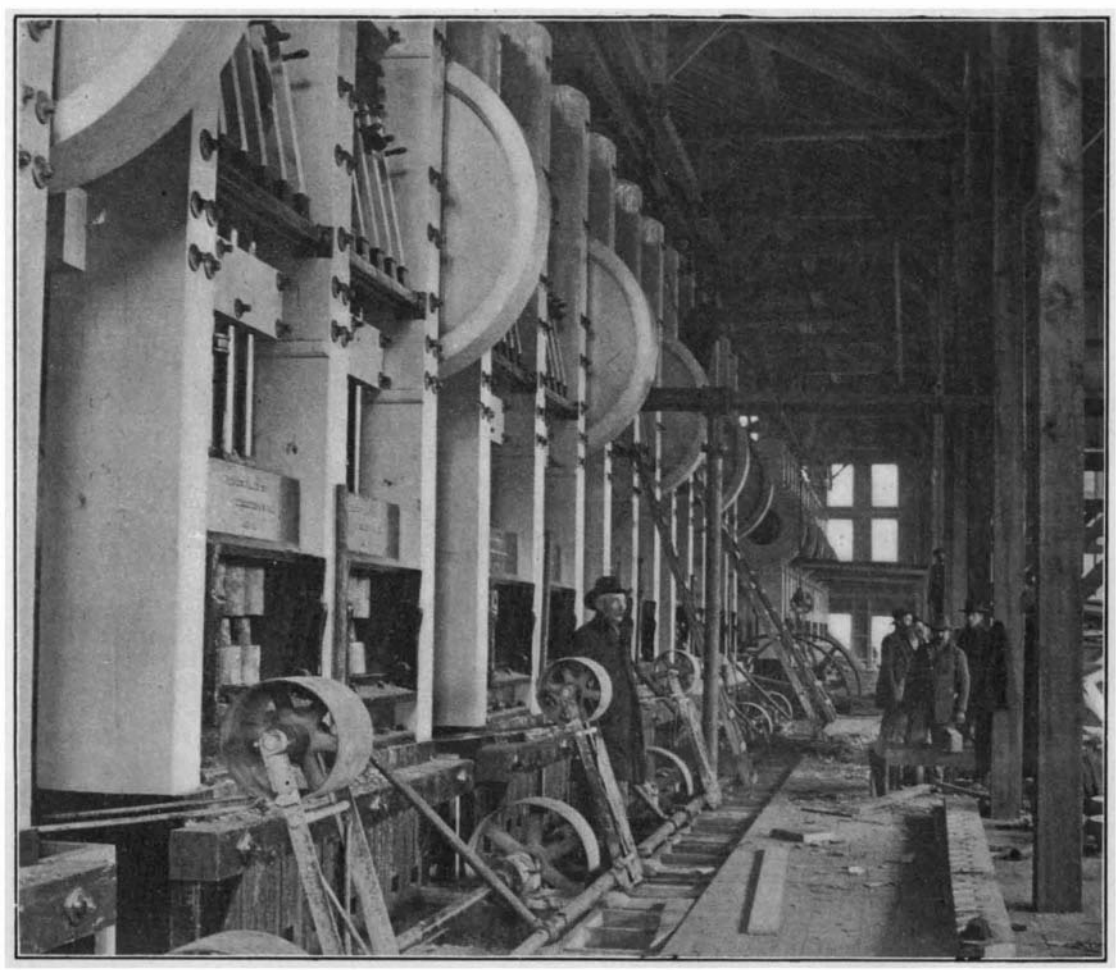
The plant is located on the banks of the Yahoola River, within the corporate limits of the city of Dahlonega, within a mile of the public square. It is in the very midst of a perfect network of rich gold veins, the hills all around being largely composed of auriferous rock, the outcroppings of veins striking into the earth to unmeasured depths. It is proper to add that this company owns about 7,000 acres of gold ore and fine magnetic iron ore land, all within five miles of Dahlonega. And all of the other mining companies have large holdings nearly or quite as rich in gold.

This plant consists of a stamp and concentrating mill, 300 by 100 feet, and four stories high; a chlorination plant, 128 by 128 feet and four stories high; two shaft houses, each 120 by 40 feet; a blacksmith and machine shop, 84 by 36 feet; a carpenter shop and storehouse, 84 by 36 feet. All these buildings are most substantially constructed and are covered, sides and roof, with No. 24 corrugated iron plates.

The stamp mill has 120 stamps, each of 850 pounds weight, arranged in batteries of ten each. The stamps fall a distance of about 9 inches at the rate of 90 strokes per minute, and have capacity of crushing to powder 600 tons of ore per day, running day and night. The entire plant will be run both day and night. This mill is also equipped with 48 Frue Vanner concentrating machines.

Adjacent to the mill building is a great ore bin or pit, 300 by 60 by 22 feet, with a capacity of 27,000 tons of ore. The ore is carried from the mines on tram cars propelled by electricity to this bin and automatically dumped. From the bin the ore passes to the large crusher, a No. 6 Gates. This reduces the ore to pieces about the size of hickory nuts. A No. 2 Gates crusher adjacent to the larger one will reduce any lumps that fail to pass the screen. An endless bucket hoist carries the crushed ore up to the belt on the fourth floor that distributes it to the stamps on the third floor. By them it is reduced to a pulp, water being admitted here. This pulp is washed over mercury-covered plates on the second floor, that amalgamate and catch the free gold. The remainder is carried by wooden conduits to the Frue Vanner concentrating machines on the first floor. These each have a table 6 by 13 feet, formed of an endless belt of rubber with "egg-shell" surface, that, as it slowly rotates, receives a lateral motion of about 200 vibrations per minute. The gold concentrates thus extracted are thence sent to the chlorination plant for treatment.

The remaining pulp or sand, after the gold has been

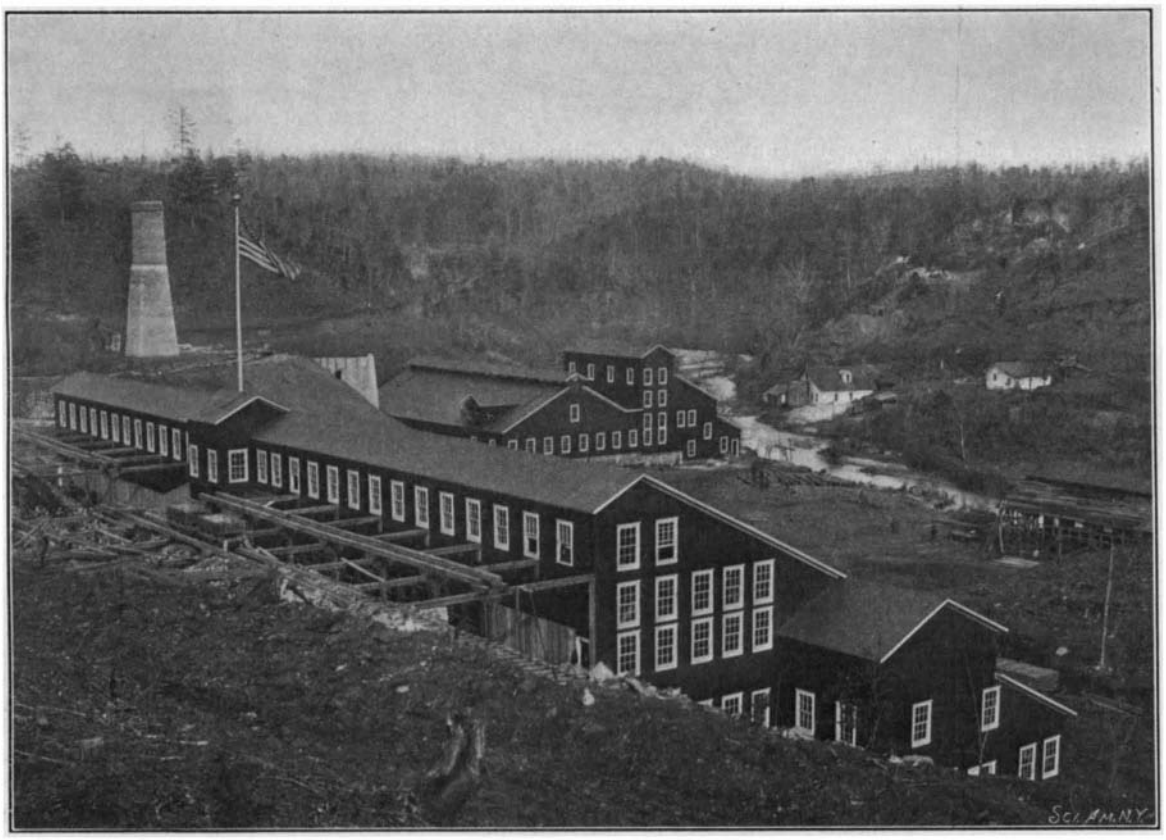


STAMP BATTERY WHERE THE ORE IS CRUSHED READY FOR THE AMALGAMATING BATTERY.

REPAIRING 44-INCH WOODEN PIPE IN THE HAND DITCH.

thus extracted, passes down to the basement, and through underground conduits is washed into the Yahoola River.

The stamp mill is run by water power. The hand ditch conveys the water from the Yahoola River to a reservoir, on a hill near the mill, and under a head of 235 vertical feet, the water is admitted through a 44-inch wooden tube, at a pressure of about 100 pounds per square inch, upon the Pelton water wheels, each of 500 horse power and each capable of running the mill. The water escaping through two nozzles of 2 and 2½ inches diameter at each wheel is forced against cups on the periphery of the wheels, and under full power uses about 2,900 cubic feet of water per minute. The smaller 40-horse power wheels operate the Frue Vanner concentrating tables. The drills in the mines are operated by a 200 horse power air compressor. Two dynamos are driven by the water power; one for operating electric lights for the mill, mines, plant and premises; and a power dynamo for propelling the ore tram cars, as heretofore noted.



GENERAL VIEW OF THE DAHLONEGA GOLD MINING PLANT.

The hand ditch is itself a remarkable piece of engineering skill. It brings water from a point in the Yahoola River about seven miles from Dahlonega. But on account of the many ridges around which it must travel, its course is very sinuous, and it is nearly 20 miles long. It was begun in 1859, but was not completed until after the war. Its construction cost over $300,000, and required the excavation of over 5,000,000 cubic feet of earth, and the blasting of thousands of tons of rock. The open part of the ditch is 6 feet wide at the bottom; 10 feet wide at the top; vertical depth, 4 feet. But in eight places it is carried across deep ravines through great inverted siphons, and across streams in iron tubes from 38 to 48 inches in diameter, and in spans from 200 to 3,840 feet in length. The total length of this tubing is 10,526 feet. Flowing at full capacity this ditch will discharge at the mill 4,000 cubic feet of water per minute.

From the stamp mill the concentrate ore is carried on tram cars to the chlorination plant and dumped through a hopper into the roasting furnace. This is 100 feet long and 14 feet wide, and about 9 feet high, and is on the ground floor. About two and one-half hours are required for the ore to traverse this; as it is slowly carried along it is constantly stirred by revolving robbles. This furnace is heated by four fireboxes, using wood fuel. The iron flue chamber, 6 feet in diameter and 90 feet long, leads to a chute of masonry 45 feet long, and it to the brick stack, 66 feet high. The capacity of this furnace is twenty-five tons of concentrates every twenty-four hours. This process expels the sulphur.

Beneath this furnace, and of the same length and width, is the cooling hearth on which the roasted ore is slowly carried back, being stirred and cooled, to the hopper end. Here a screw conveyer moves the ore about 30 feet to the elevator that carries it to the storage bin on the fourth floor. From here it passes by gravity to the charge hopper and scales, on the third floor, where it is weighed for charging the chlorination barrels, on the second floor. These are charged with ore, water, sulphuric acid, and calcium chloride. There are two of these barrels, each of five tons capacity. They are of steel, lined with ½-inch lead, cylindrical, 5 by 8 feet inside measurement, and are swung horizontally. When charged and sealed they are rotated at about six revolutions per minute for three to five hours. The solution is then washed out of the barrels, hose attachments being provided; but within the barrels are filters that retain most of the tailings. This filtrate solution containing the gold passes into settling tanks on the first floor, where it remains about twenty-four hours. It is then conveyed by a Montjose air pressure tank into the two precipitate tanks, each 8 feet cube, on the second floor, where jets of hydrogen sulphide from a generator are introduced under pressure at the bottom, and this gas passing up through the solution precipitates the gold chloride. This precipitate is then by air pressure forced through the filter in the basement story. The gold chloride is here caught on the filter paper and canvas. It is then roasted, fluxed, smelted, and cast into bars—the precious metal. The entire process, for a given mass of ore, requires about 36 hours.

The power for this plant is furnished by a 20 horse power electric motor using current from the stamp mill dynamo.

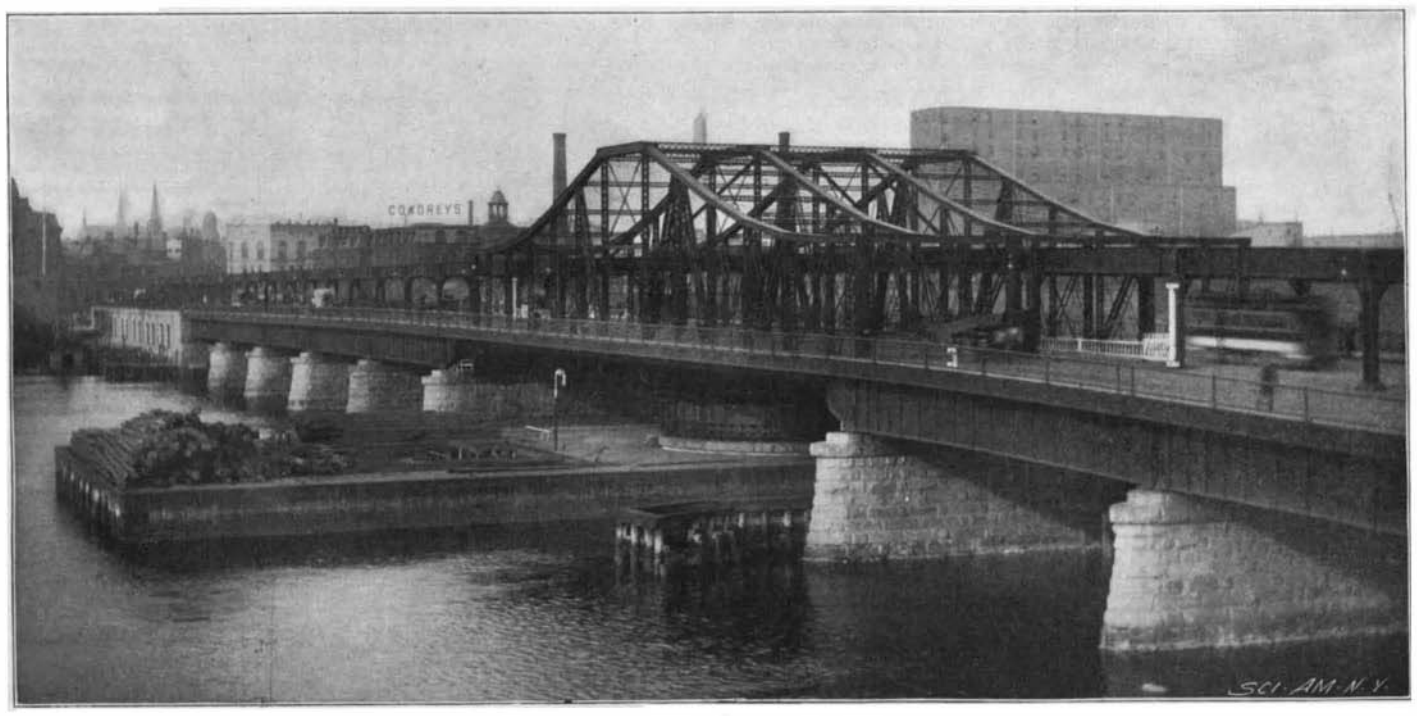
The Consolidated Gold Mining Company has now in its employ about 600 men, and in full operation it will regularly employ about this number. It has already mined and ready for the mill over 50,000 tons of gold ore.

The Standard Gold Mining Company has begun the erection of another 120-stamp mill just across the river from the plant above described. Another roasting furnace, for which there is place, will be added to the chlorination plant, which will make it double throughout, and it will then serve both mills. This company's first order for lumber for the construction of the new mill provided for 1,000,000 feet.

The Crown Mountain Gold Mining Company has begun the erection of a 60-stamp mill, and will likely treat its concentrates by the cyanide of potassium process.

The Dahlonega Gold Mining Company and the Chicago New South Gold Mining Company, both recently organized, expect to build large mills, beginning this summer.

These are all near Dahlonega. But in several of the adjoining counties there is great activity in gold, copper, and iron mining, and North Georgia bids fair to soon become relatively more prominent as a mineral and gold mining center than it was two generations ago.



Span, 240 feet; width, 100 feet; weight, 1,200 tons.

NEW ELEVATED RAILWAY DRAWBRIDGE, BOSTON.

THE ELEVATED RAILWAY DRAWBRIDGE, BOSTON.

The large drawbridge herewith illustrated forms an important link both in the elevated railway and street car systems and in vehicle and pedestrian traffic across the Charles River, Boston. The elevated railway accommodates the through traffic from Dudley Street, Roxbury, to Sullivan Square, Charlestown, a distance of about 4½ miles. At the point of crossing, there is also concentrated a large amount of street railway traffic, in addition to a considerable volume of surface travel, for which the new bridge will form the natural point of crossing.

The total length of the bridge with its approaches is 1,920 feet, of which about 1,000 feet is built across the water. The fixed spans of the approaches, which are of plate-girder construction, are each 85 feet in length, while the draw-span has a total length over all of 240 feet. The total width of the bridge is 100 feet, the space being occupied by two 10-foot sidewalks, two 29-foot roadways, and a space at the center 22 feet wide for the accommodation of the street railways. The draw-span, which weighs 1,200 tons, has several features of interest, among which may be mentioned the fact that it consists of four parallel trusses, this being, we believe, the only instance in which this number has been used in a bridge of this kind. It rotates on a circular track which is 54 feet in diameter. The load is carried upon seventy solid, cast steel wheels, which are 26 inches in diameter. The motive power and machinery for operating the draw are located in a room beneath the floor of the bridge and in the center of the turntable. The draw is opened and closed by means of two 28 horse power railway motors. They are placed outside the power house, one on each side of the turntable, with which they are connected by the usual shafting and gears.

The draw-span is provided with eight hydraulic jacks, four at each end, which are utilized to lift the ends of the draw when it is closed. The rams are located vertically beneath the end posts of the trusses, those beneath the two outer trusses having a capacity of 100 tons each, and those beneath the two inner trusses having a capacity of 200 tons each. When the draw is closed, the ends are raised 3½ inches, and a