

partly vitrified, which might happen with impure vein-stone; while according to others, the gain in product did not suffice to pay the cost of the process, which is but partially effectual in decomposing the sulphurets present in the ore. Prof. Sullivan, in his report on the Tangier district, estimates the cost of calcining the quartz with wood at \$4 the cord, to be not less than \$1 the ton.

"The mineral in Nova Scotia is thus taken from the mine directly to the mill, where it is sorted, the barren portions rejected, and the material reduced to fragments of a proper size. Two plans have there been employed for pulverizing the quartz; the Chilian mill and the stamp mill. The former consists of edge wheels or cylinders of granite or cast iron, running in iron pans, but its use in Nova Scotia has been very limited, and is now almost entirely abandoned. Although well suited for assays, and for the treatment of rich ores and residues, the Chilian mill is not adapted to the working of large amounts of quartz containing only a moderate proportion of gold. For this purpose stamps are more generally had recourse to."

"There are two systems of stamps in use in Nova Scotia, those with square heads and those with round and rotating heads, but in both cases the stamp mill consists of one or more batteries, each consisting of a series of vertical rods, carrying at their lower ends the stamp heads, which are of cast iron, or in some cases, shod with steel, and destined to pulverize the mineral in a rectangular box or mortar. This box is generally of a single piece of cast iron, and when of wood (which is preferable if, as is here the case, mercury is used in the batteries,) requires for its bottom a heavy plate of iron. These stamps are raised by means of a horizontal shaft furnished with cams, which act upon collars fixed to the rods, causing these to rise vertically, and then, the cams ceasing to act, to fall by their own weight from a height of ten or twelve inches upon the mineral, which is introduced to the box by means of an opening placed behind the battery. Plates or dies of cast iron or steel, round or square, according to the shape of the stamp heads, are fixed in the battery, beneath each stamp. During the operation a quantity of water sufficient to aid the pulverization and amalgamation, and to carry out the pulverized mineral, is supplied to each stamp, by means of tubes furnished with stop-cocks. In the front of each battery there is a rectangular opening, which is closed by means of a frame or moveable sash, covered with a fine screen or grating. Through this grating, the liquid mud formed by the pulverization of the mineral under water, and projected from the boxes by the blows of the stamps, passes out and flows over a series of fixed or oscillating tables slightly inclined, and placed the one before the other, at different levels, before being conveyed as waste or refuse to a place of deposit without. The metallic gratings in front of the batteries have generally from 160 to 200 holes to the square inch. The finer the grating the less the amount of material stamped in a given time, but the more complete the treatment. I am inclined to believe that many of the mill workers, not taking into account the smallness of the particles of gold, often invisible, do not pulverize to a sufficient degree of fineness. One of the exceptions to this, however, is found in the battery of the Provincial Company at Wine Harbor, which yields a material of great fineness, while it reduced with eight stamps only six tons in twenty-four hours."

"The stamp mill of the Ophir Company, in the Renfrew district, recently constructed by Mr. Peter Monteith, is particularly worthy of mention. The stamps, which are round, rotating, and shod with steel, present many advantages over square non-rotating cast iron stamps. It is maintained that the effect of a round stamp, which preserves in falling the rotatory motion communicated to it during its upward movement, is much greater than that of a square stamp falling without that motion. Experience has shown that with the former a greater amount of rock is pulverized in a given time, and with less wearing of the stamp heads. The mill of the Ophir Co. has twenty-four stamps, arranged in six batteries of four,

placed side by side. The weight of each stamp with the rod, is six hundred pounds, the fall ten inches, and the number of blows from sixty-five to seventy in a minute. The liquid mud from the pulverization, passing from the battery through the grating, flows over four fixed tables, placed one below the other. The first, or uppermost table, is the shortest, and is trapezoidal in form; the dimensions of the two parallel sides being three and a half and two and a half feet. The three succeeding tables are rectangular, and have respectively the lengths of seven, eight and six feet; their breadths being twenty-four, fourteen and twelve inches. In many stamps there are used besides fixed tables, others having an oscillating movement, which is in some cases lateral, in others backward and forwards. Thus each battery of the De Wolf Company at Waverly has the first table fixed, while the three others below it are shaking tables, with a lateral movement."

"Steam power is employed for the greater number of the stamp mills of Nova Scotia. These of eight stamps I found to be worked by engines nominally of eight, twelve and twenty horse power, and reducing from six to twelve tons of quartz in twenty-four hours. The mill of the New Haven and Renfrew Company has an engine of thirty, and that of the De Wolf Company one of fifty horse power, the most powerful in the mining region, and capable of being employed not only to move the stamp mill, but to raise the mineral and water from the neighboring shafts."

"The two largest mills of Nova Scotia, that of Mr. Burkner at Waverly, and that of the Ophir Company at Renfrew, are moved by water power. The first, which has during a long time, treated thirty-six tons of mineral in twenty-four hours, has probably done more work, and certainly furnished a greater amount of gold than any other in Nova Scotia. The water-wheel of the Ophir mill has a diameter of sixteen feet and a breadth of eight feet, divided into two series of buckets. The force of the fall is estimated to equal fifty horse power. This mill, with twenty-four stamps, reduces from twenty-four to twenty-eight tons of quartz in twenty-four hours, works with great regularity, and is conducted with great skill by Mr. H. M. Huff. Besides the water power this mill is furnished with a portable steam engine of seven horse power, which heats the water for the batteries, turns a circular saw for cutting wood and could be made, in case of need, to work two of the batteries."

The system of amalgamation in the batteries, generally adopted in Nova Scotia, is in many regions replaced by other methods, in which the whole or a large part of the gold is extracted from the pulverized quartz by washing. In the plan generally adopted, and for a long time practised in South America, the rock is crushed beneath stamps, with addition of water, but without mercury, and the material escaping from the batteries is made to flow over inclined tables, covered with coarse woollen blankets, or with bullock skins dressed with the hair on. These skins or cloths are removed from time to time, and the heavy material, rich in gold, is removed from them by beating and washing in vats arranged for its collection. At the Morro Velho mine, in Brazil, according to Philipps, 67 per cent. of the gold in the quartz is at once extracted by this process. Of the remainder a portion is lost in the slimes but the greater part is obtained by grinding the concentrated tailings in arrastres, and washing again as before. From the rich material which collects on the cloths or skins the gold is extracted by amalgamation.

It is impossible to determine with precision the total amount of gold obtained from the mines of Nova Scotia since their discovery. The Department of Mines was not organized until 1862, and it was not until the following year that complete returns were obtained. From this it results that no accurate estimate can be given of the amounts of gold obtained in 1860, 1861 and 1862, though they are supposed to have been not inconsiderable. The official returns for the last six years, based on the gold for which the royalty of three per cent. has been paid, are as follows:

1862	7,275	ounces.
1863	14,001	"
1864	20,023	"
1865	25,454	"
1866	25,204	"
1867	27,583	"

Total..... 119,541 ounces.

The value of the above amount of gold, at the Government price of \$18.50 the ounce, is \$2,211,508; but at \$20, which is about the worth of the Nova Scotia gold, it amounts to \$2,390,081. If to this we add the unreported gold obtained in the first two or three years, we may conclude that the whole product has been equal in round numbers to about two and a half millions of dollars. This amount is doubtless small when compared with the productions of regions like California and Australia, where the yield of some single mines surpasses the whole annual production of Nova Scotia. As we have seen in a note to page 18, the quartz mines of Victoria employed, in 1866, 14,878 miners, and yielded 521,000 ounces of gold. The mean yield to the ton of quartz was, however, only 10 dwt. 16 gr., and the produce for each miner £117.5s.7d. or \$570.71, while for Nova Scotia these amounts were respectively 17 dwt. 23 gr. and \$765. In Victoria the whole amount of quartz crushed up to the close of 1866 was nearly 4,000,000 of tons, with an average yield of a 11 dwt. 23 gr., while in Nova Scotia it has equalled not quite 100,000, with an average yield of over 20 dwt. of gold to the ton. It is to be remarked that with improved systems of mining and working, both in Victoria and Nova Scotia, poor materials may be wrought with profit, so that while the average product of gold per ton diminishes, the return for each miner increases. We have but to consult the table given below to see that the produce for each miner is proportionate not so much to the richness of the quartz as to the skill and economy of the management, which, within the last year has raised the production in Renfrew and Sherbrooke to such high figures. It may however be affirmed that the average yield of gold to the ton of rock, and also to each miner, is greater in Nova Scotia than in any other auriferous region known.

THE GRAND TRUNK.—Rumour is busy with the concerns of this Company. The last report in circulation in England is, that the railway is to be sold to the Canadian Government, and "that some low terms are to be given somewhat in excess of the present market value of the several stocks and securities of the Company." Without admitting the existence of any desire on the part of the Government to add to the number of elephants already on their hands, we very much question whether the state of the Dominion finances would warrant another large outlay. The Government will, some day perhaps, have a railway sufficiently long and troublesome to satisfy the most insatiable advocates of Government administration without swallowing the Grand Trunk. The Province of Ontario is likely to have a surplus, and Mr. Sandfield McDonald might, perhaps, be induced to entertain seriously the notion of investing in a few hundred miles of railway. If the Company is eager to sell out, it might be well to try him.

"THROUGH CANADA TO THE PACIFIC."—The near approach to completion of our inter-oceanic railway, begins to startle our British brethren. They begin to regret that they know so little of their proper relations to their Canadian kindred. Indeed, as our tunnel blasts amid the Rocky Mountains knock the scales from their eyes, they are troubled with visions of a line of communication "through Canada to the Pacific." Through that country, they argue, lies the most direct route to China and Japan. Let them declaim, "there is a certain work that must be done." Let Lord Milton "sum up" in the British Parliament, as concisely as he can, when he argues for the development of British Columbia, there is no help. Before English rails can cross the Canadas and Columbia, there will be a trio of lines belting the continent. The control of commerce with China and Japan is to be in our hands.—*American Journal of Mining.*