THE LE ROI SMELTER

A Description of the Plant and Process.

ECONOMICAL ORE TREATMENT

The Passage of Ore From the Product of the Mine to High Grade Matte--The Present Stages of Treatment--Alterations Now in Progress--Outlook for the Year.

The manner in which during the past year the Rossland mines have been developed has placed beyond the shadow of a doubt the immense output of which the mines of this camp are capable of yielding. There are large quantities of ore stored in the various mines which have been exposed and proved by systematic development, not alone on one, but on many properties. Feeling satisfied with this the next question that comes before the citizens of Rossland is the treatment of this tremendous output, a sample of which has been given during the past year, but which output, large increase as it was on the previous records, will be completely thrown in the shadow by the shipments which will be recorded from year to year in the future. There is a smelter at Trail and another at Northport, on which reduction works the mines of this city are chiefly dependent for treatment of their ores. That of Trail is being enlarged and a similar increase is being taken in hand at Northport. The latter, while a custom smelter, inasmuch as it purchases various ores, principally for fluxing purposes, is designed for the accommodation, primarily, of the product of the Le Roi mine, and, secondly, for the handling of the output of some of the subsidiary mines of that parent company.

As these at the present moment are the mines on which the camp is largely dependent, more so than any others, for the output a description of the smelter as at present completed will tend to show that as far as that end of the smelter accommodation for the camp is concerned there need be no fear of the capacity of the smelter, in this year to come, falling behind the capacity of the mines, as was the case during the past summer and fall when the whole of the scheme of the working and reducing of the ores of these properties had not been completed.

Within a few weeks the Northport smelter will have a gross capacity of over 1,500 tons per diem, while, allowing for temporary shutdowns of particular furnaces, for furnaces, like boilers, want occasional overhauling, there will be a daily capacity for 1,200 tons and more.

This means that in the course of the year there will be dealt with, in round numbers, upwards of 400,000 tons. Now this amount is practically double the output of the whole camp, including all the shipments to Trail for the last year of the nineteenth century, and a good record is being started upon for the first year of the twentieth. Thus the output being secure, it is also apparent that the smelter accommodation is no less indubitable.

The method in which the Rossland ores are dealt with at the smelter is based upon quick handling and economical methods, highly necessary in a plant which deals with low grade ores. Indeed, economy is imperative. A large railway yard has been built, lying between the railway station and the smelter, which is about 400 yards further up the bank of the Columbia river. Many sidings have been constructed to accommodate the vast amount of cars which are necessary for the handling of the ore and its fluxes which, together, come not far short of 1,800 tons a day. One switch, designed for the accommodation solely of Le Roi ore, passes around the front of the smelter grounds and, after backing along the hill, comes to the back of the furnaces, separated from them by the roasting yard. There the ore is discharged into receiving bins, and is thence taken and piled into heaps, each containing about 5,000 tons, which are thereupon roasted. This process, which is undertaken for the purpose of getting rid of the superfluous sulphur, takes some six weeks for the actual incineration, and about another two for the process of cooling down. As this is done the sulphur is reduced to about 2 per cent. Now as the charge of ore going into the furnaces will admit of the presence of nearly twice as high a percentage of sulphur, it follows that as the ordinary ore runs 7 to 8 per cent. in sulphur that about one-third of green ore can be used in the charges. This green ore is that which has not undergone the oxidizing or roasting process. This being the case there is a direct saving accruing through the omittal of the double handling necessitated by roasting the ore.

After leaving the roasting heaps the ore goes to the furnaces, the charge being made up constantly according to a certain formula given to the man in charge of each furnace; so much ore, so much lime, so much coke. Of the two latter there are used daily from 200 to 300 tons. There are at present three furnaces, and two additional are in the course of construction, which will bring the capacity of the smelter, when all are blown in, to about 1,500 tons a day. As some of these are always being cleaned out and looked over, the average daily caapcrty, day in day out, throughout the year is brought to between 1,200 and 1,300 tons a day. These furnaces are constantly kept going with the exception named ,shutting down from time to time to admit of the performance of the necessary overhauling. To prevent the furnaces from burning out a constant stream of water fills a water jacket around each. To create a sufficient draught each furnace is connected with a cycloidal blower which supplies compressed air under a pressure of 32 inches, which is believed to be one of the strongest pressures used in smelters in this country, or in the west of the United States. These blowers, of which there are five, are driven by a couple of engines, one of which is already in operation and the other is in course of assembly. The engines in turn are supplied with power by three Heine water tube boilers of an aggregate horse power of 800, the steam being created at present with wood fuel, a constant force of woodcutters being kept at work by the smelter company.

Below the furnaces a constant stream of molten slag and metal pours out of the bottom of the furnace. This drops onto a huge receiver. The metal part of the molten stream drops to the bottom of the receiver, the upper part of which is nearly all slag or refuse. This overflow is in turn dropped into a second and movable receiver which overflows in a constant stream into a "laundry" or conduit of water. Instantly the stream is granulated or converted into powder, which is hurried down to the river where it is strewn along the bottom for miles down the stream.

There is a by-product connected with this slag which is the making of a sort of large brick which is really a deeply colored glass. This is about three times the size of the ordinary brick and is used for the paving of the smelter yards and the building of the various structures wanted around the reduction works. It is durable, fireproof and cheap, costing the company about 1 cent each. The manufacture is simple, merely consisting of the emptying of the slag into moulds instead of allowing it to drop into the flowing stream. This stream itself is a discharge from the water jackets where the first coolness of the water is utilized, and which afterwards, by its contact with the molten slag, gets heated to very nearly the boiling point and is not much lower at the time of its discharge into the river.

Returning to the metal which, it has been explained, dropped to the bottom of the first receiver after leaving the discharge from the furnace, this is drawn off by means of an aperture stopped with fire clay at the lower part of the receptacle. This is re-stopped after a sufficient amount of molten metal has been drawn off to fill the huge conical wheelbarrow under the aperture, with a fresh plug of fire clay, which in its turn will be broken through when the next barrow is brought along for more metal. The molten metal, sputtering a thousand sparks as it falls into the barrows, is then cast into a stream of rapidly flowing water and granulated by the contact with the fluid and drawn up into bins. At this stage the product is called calcines. After granulating the metal the stream flowing off is conducted into settling tanks, of which it makes the circuit, all the matte held in suspension falling to the bottom of the tanks and the circulating water finally falls, cleared of all its valuable matte, into the "laundry" and then passes away into the Columbia river. The siltings of the tanks are from time to time gathered up and made into briquettes, to be dealt with later.

Another source of waste is the flue dust. This is blown up the chimney by the tremendous draught created by the blowers. The chimney connects with a huge chamber of 100 square feet of inside area, and which is several hundred feet long, forming one side of the building, and eventually leading to the huge stack, two hundred feet high, recently constructed. It is calculated, and the calculation is borne out by experience, that the smoke during its long horizontal passage through the chamber will drop all the metals held in suspension as the air cools. Within 300 feet of the point of ingress into this chamber all the metallic contents blown off the charges in the furnaces will have dropped. Beyond this first the sulphur and finally the arsenic drops, and by the time the smoke and fumes have reached the stack all the precious contents have been deposited. All along this chamber are placed traps at constant intervals so that the flue dust can be taken from time to time from point to point without necessitating the shutting down of the furnaces which are thus allowed to be continually in operation. This flue dust is very valuable, the clearing out of the chamber resulting in the recovery of from a quarter to half a million dollars annually.

Returning again to the calcined matte, the first product of the smelting furnaces, this is gathered up with its metallic contents existing as sulphides and is taken to the mechanical roaster. There are at present two of these, but two more are about to be added. Each is 100 feet long, and after the starting of the process the ores, supplied by the sulphides, contain their own fuel. Several ploughs pass through the long roaster turning over the calcines so that each particle gets exposed to the heat and the extra sulphur passes off in fumes. The calcines are automatically fed into the roaster, the passing plough raking in just so much at each revolution and raking out at the other end just so much more, keeping the amount in the roasters the same all the time. The product is now taken to the briquetting machine and is made into cylindrical briquettes. Certain proportions of matte flue dust, slimes, concentrates and lime are cast into a pugging mill and the mixture is forced out below as briquettes. There is only one briquetting machine at present at work, but a second is to be added. The briquettes are made so as to prevent a second escape up the chimney which would infallibly be the case were the matte resmelted in powder form.

These briquettes are now passed through the furnaces and the result is a matte up to the requirements in gold and which contains about 50 per cent. of metals present.

The matte is then passed through a matte sampling mill and assayed in order to see what are its values and just how much it varies, if at all, from the standard contracted for by the refineries.

Returning to the beginning of the process: No mention has been made of the sampling mill for the assay of the ore as received green. As the ore dealt with has been Le Roi ore, and as that mine has its own sampling mill and assay office at the collar of the shaft, there is no need to deal with the ore at Northport. It thus passes directly from the ore cars to the roast heaps. With regard to custom ores the process described is varied by the passage of the ore through the sampling mill at the smelter, and from thence goes to the roast heaps or to the green ore pile, as the exigencies of the charges require. One of the drawbacks or limitations of the smelter heretofore has been the smallness of the sampling mill. This has not been enlarged for the reason that another sampling mill was being erected in Rossland, which will be finished during the next few days, thus setting free the sampling plant at Northport to deal with custom ores merely.

Reference has been made to a certain contract standard wanted by the refineries. Under the present market conditions, there being a great demand for copper and a consequently active competition for it, there is little profit resulting in the refining of this metal. Much the same is true for silver, though not for the same reason. It follows that the refineries look to the gold contents of the matte in order to recoup the expenses of refinement. Hence all contracts call for a certain percentage of gold in the matte. If the ores treated by the smelter are poor in gold values the matte resulting from these ores alone would fall below the specified percentage of gold. Hence an ore is wanted which will contain a larger percentage of that precious metal. It is for reasons such as these that the smelter is glad to pay a cut rate of even $4.50 a ton for treatment if the ore dealt with will make up the deficiency, such as is the case with the I.X.L. So much is this matter of importance that smelters at the present time are glad to pay even a higher rate for gold in concentrates than could be obtained for the metal in its metallic state. This is not the case with the Northport smelter, but it is true of other smelters, especially in regions where the copper ore is poor in gold.

It will also follow from the facts stated above that any ore which will supply certain substances which are required for the fluxes, such, for instance, as lime, a lesser quantity of which would then have to be quarried and cast into the furnaces to make up the charge, would also obtain more favorable rates than a mean rate which could be termed a standard. On the other hand other ores containing substances such as silica or magnesia would require additional fluxes and could not, therefore, command even that arbitrary mean rate just supposed. Hence, although $4.50 would be a paying rate for the smelter with some ores, with others even twice that sum would hardly be remunerative.

The building of the chamber and stack involved the use of over a million of bricks. This was the chief part of the smelter operations and alterations to be undertaken. The remainder, the putting in of a couple of additional furnaces, the installation of another engine and the addition of another roaster and briquetting machine are matters which will not consume very much time nor involve the expenditure of much more money. Fifteen thousand dollars should finish the whole thing and the smelter be in full blast by the end of next month at the very latest. This does not mean that the Le Roi will be curtailed in its shipments, as the smelter wants from 80,000 to 100,000 tons of ore stored in the yard, which has been enlarged and in which there are at present not more than 50,000 or 60,000 tons.

All the coke used by the smelter comes from the East, and a trainload is required daily. Similarly with the lime, of which from 250 to 300 tons are quarried at a point about three miles below the smelter down the river. This means another train load. Thus the need for yard room and for an abundance of cars. There is limestone directly behind the smelter which, however, contains constituents which materially take away from its value as a flux, and in consequence were this taken more rock would have to be quarried in order to overcome this disadvantage. This and other things which will be apparent renders it more economical to take the lime from a more distant point and pay freight.

The water power is cheap and abundant, about 750 gallons being used per minute. This is procured by means of a flume from Deep creek, not far above Northport. The smelter also supplies the town with water.

It is by reason of the possession of these facilities that this smelter is enabled to grant economical rates for the treatment of ores.

There have been a few changes in the smelter management of late. Mr. William Thompson, of the B.A.C., has been appointed business manager, and Mr. Bela Kadish, of Baker City, Ore., having been made smelter manager, and whose business it is to look after the metallurgical end. Mr. Bela Kadish is a man of some experience, and has come to the smelter from the management of the Baker City sampling works.

The management intend making some changes in the detail of the work, but there is no material addition contemplated to the smelter. The only fear is that the little road between the smelter and Rossland and Spokane will not have sufficient facilities for dealing with the output and with the supplies.

THE CANADIANS IN LONDON

Continued From Page One.

grown so familiar of late. Then they got into carriages and drove all round the the town amid a scene of unbounded enthusiasm. All the places of public resort were thrown open. The Canadians went to the Weest Pier, where there was a short concert and speech-making, to the new Marine Palace pier, to the Aquarium, and so to the historic Royal Pavilion, where they were entertained to lunch. A hundred guests were invited to meet the men, who did not sit together, but were scattered about among their entertainers. Sir Joseph Ewart, Col. Sir George Pocock, and the Vivar of Brighton were present.

More Oratory and a Drive.

The mayor of Brighton made another speech after lunch. He said when the Dominion of Canada wanted the help of the mother country plenty of Sussex volunteers would come forward (Brighton is in Sussex). Major Rogers replied that their reception had been an inspiration. Tney were proud of being Britishers and it was a source of great gratification to them to be associated in South Africa with some of the finest regiments in the British army. After the lunch the Canadians were presented with a book each, containing a history of the Royal Pavilion, and in the grand corridor as they walked out there were assembled a number of students who accorded them ringing cheers. Major Rogers was compelled to speak here also, and talked to the crowd on the responsibility of empire, to their evident appreciation. The mayor and the corporation bid the Canadians good bye in the vestibule, and then they went for a drive along the seaport and then to the station, where Sir George Pocock saw them off by an afternoon special.

In the evening the officers were entertained by the First Life Guards at Windsor Cavalry Barracks, the Duke of Teck being present, and afterwards they went to a ball at Clewer park, where Lady Gooch was the hostess.

The Nation's Arsenal.

Yesterday was taken up with a visit to the National Arsenal at Woolwich, to-wit: the Canadians went under command of Mayor Buchan. Though their special was timed to arrive as early as half-past nine in the morning there was an immense crowd in the streets to see the march from Woolwich station to the Arsenal, and the military authorities were on the railroad platform. The Canadians showed a keen interest in all the departments, and particularly in the forty-ton hammer which was worked for their special benefit. Mayor Fisher took the officers round and explained the workings of the latest patterns of guns to them at length. They lunched with the officers of the Royal artillery and the Royal Horse artillery, Sir J. F. Maurice doing the laudatory speech-making which the gallant colonials have won for them wherever they have appeared in England. At three o'clock the return journey was commenced, the bands of the Tenth Lancers and Royal Horse artillery marching in front. No more enthusiastic and overflowing ovation has been accorded to the men in their rambles about old England than they experienced as they marched back through the somewhat sordid streets of Woolwich. At the station the band played "Auld Lang Syne," as the contingent steamed slowly out of sight amid deafening cheers. Eighty-six Canadians made the journey.

More Hospitality.

Last night the mayor and corporation of Kensington, one of the London districts which has just been incorporated under the act of Parliament by which London is cut up into boroughs, entertained the men, whose barracks were within the limits of the borough. Over the wine and walnuts there were some very generous compliments bandied about, and afterwards there was a smoking concert.

Today the men have an insight into English notions of sport. They have been asked to attend a football match at the famous Queen's park enclosure which is close to their barracks. The opposing sides are the Corinthians, our leading combination of university and public school amateurs, who play a wonderful game and can hold their own in any company, and Notts county, a professional combination of first rate ability, who have for many years taken a leading part in making the history of the pastime. The miserable weather which has persistently pursued the Canadians and compelled them to see sights in drizzle and slush still attends them, and many will accept the co-temperaneous alternative of an entertainment by Lord Strathcona at the Imperial Institute.

FROM THE PROVINCIAL GAZETTE

COMPANIES GRANTED ARTICLES OF INCORPORATION, ETC.

A Number of Railway Schemes on the Carpet—Assayers Who Passed the Recent Examination.

The last issue of the British Columbia Gazette contains the following announcements:

Sittings of the Supreme court for the trial of civil causes will be held at Nelson commencing on Monday, the 4th day of February.

A license has been issued to the Cariboo Trading company to carry on business in this province. The head office is in London, while the office in this province is at 150-Mile House. The capital stock of the company is £42,000, divided into £1 shares. The company proposes carrying on a general trading business at 150-Mile House.

A certificate of incorporation has been issued for the Avon Mining & Milling company, limited. The capital is $500,000, divded into 2,000,000 shares of 25 cents each. The object is to operate certain claims in the Burnt Basin section and to generally engage in the mining business.

A certificate of incorporation has been issued to the Commonwealth Mines, limited, non-personal liability. The capital stock is $1,500,000, divided into $1 shares. The object is to acquire the Commonwealth, Republican and Sultan claims and the Republic fraction and the Sultan fraction, on Hooker creek, in the Ainsworth mining division of East Kootenay, and to carry on a general mining business.

A certificate of incorporation has been issued to the White Warrior Gold Mining company, limited, non-personal liability. The capital is $150,000, divided into 1,500,000 shares of 10 cents each. The objects of the incorporation is to carry on a general mining business.

As a result of the recent examination of assayers at Nelson Hon. Richard McBride has issued certificates to the following assayers: Under Section 2, sub-section (1)—Walter Bishop, Vancouver, B.C.; Geo. B. Church, Nelson; Colin Campbell, Nelson; J. B. Farquhar, Vancouver, B.C.; Francis Hawkins, Nelson; Richard Marsh, Rossland; Walter Segsworth, Nelson; Robert E. Tally, Trail; Frank Vans-Agnew, Nelson; Roland T. Wales, Trail; J. Cuthbert Welch, Trail; W. A. Williams, Grand Forks; C. M. Wilson, Sandon. Under Section 2, sub-section (2)—Selwyn G. Blaylock, Fernie; Geo. A. Clothier, Moyie; Geo. A. Guess, Greenwood; G. M. Hiliary, Phoenix; Alex. Kaye, Atlin; John McLellan, Rossland; John McVicar, Ymir; S. Shannon, Ferguson; Howard West, New Denver. Under Section 2, sub-section (3)—Henry Harris, Nelson; Alexander McKillop, Nelson.

Notice is given that application will be made to the Legislative Assembly of the province of British Columbia, at its next session, for an act to incorporate a company for the purpose of the transmission, supply and sale of power, light and heat, and of construction and operation of telephone lines for the transmission of messages for hire, within the electoral districts of Esquimalt, Victoria City, North and South Victoria, together with the power of expropriation and appropriation of any lands or waters convenient therefor, and such other powers, rights and privileges as may be necessary, incidental or conductive to the attainment of the above objects.

Notice is given that application will be made to the Legislative Assembly of the province of Bdivid(Nina 7893.. 8903...., province at its next session, for an act to incorporate a company with power to construct, equip, maintain and operate a single or double line of railway, from a point on Burrard inlet, at or near the city of Vancouver; thence via the city of New Westminster in an easterly direction along the south side of the valley of the Fraser river to some point on the said Fraser river between the junction of the Chilliwack river with the said Fraser river and the town of Yale; thence in an easterly direction along the valleys of the Chilliwack, Coquihalla, Tulameen and Similkameen and Osoyoos lakes; thence to a point on the Kettle river at or near Rock creek; ween rivers, or some of them, or the tributaries thereof, or some of them, by the most feasible route, to a point between Penticton and the International Boundary on the watercourse connecting Okanogan thence to a point at or near Midway; thence to a point at or near the city of Grand Forks; with power to construct, equip, maintain and operate, from any point on the said railway, branches and extensions of the same of not more than 30 miles in length.

Notice is given that application will be made to the Legislative Assembly at its next session for an act to incorporate the "Kootenay Central Railway Company," with power to construct, equip, operate and maintain a line of railway, of standard or any other gauge, to be operated by steam, electricity or any other power, for the carrying of freight and passengers:—

First.—From Fort Steele to Elko or some other convenient point on the Crow's Nest railway between Elko and Wardner; thence on either the east or west side of Wigwam river, or by the most convenient route to the International Boundary line.

Second.—From Fort Steele to Windermere by either the east or west side of the Kootenay river; thence to the Town of Golden on the main line of the Canadian Pacific railway, and to build and operate tramways in connection therewith, with power to construct, operate and maintain branch lines, and to build, acquire and maintain steam and other vessels and boats, and to operate the same on the Kootenay river from the International Boundary as far north as the said river may be, or may be made, navigable.

Notice is given that application will be made to the Legislature at its next session for an act to incorporate an association to be known as "The British Columbia Mining association," the said association being founded for the following purposes, namely: First, to promote the arts and sciences connected with the economical production of valuable minerals and metals by means of meetings for the reading and discussion of technical papers and the subsequent distribution of such information as may be gained through the medium of publication. Second, the establishment of a central reference library and a headquarters for the purpose of this organization. Third, to take concerted action upon such matters as affect the mining and metallurgical industries of the province of British Columbia, and to encourage and promote these industries by all lawful and honorable means.

Notice is given that application will be made to the Legislative Assembly at its next session for an act to incorporate a company with power to construct, equip, operate and maintain a railway, standard or narrow gauge, for the conveying of passengers and freight from some point on the line of the Canadian Pacific railway at or near the outlet of Kamloops lake; thence by the most direct and feasible route to the plateau of the Bonaparte river; thence to a point on the Cariboo wagon road near the 100-Mile House; thence to some point near the headwaters of the Beaver river; thence following generally the direction of the Beaver to the confluence of the Quesnelle with the Fraser rivers; with power also to build a branch from the above described line to some point in the vicinity of Williams or Antler creek, in the Cariboo district.

British Columbia London Agency.

Among other important questions which will have shortly to occupy the attention of the Vancouver Board of Trade is that of the representation of British Columbia in London, says a Canadian contemporary. Our great mining interests are yearly increasing in such magnitude that we cannot afford any longer to be shut up in a corner of the Temple Gardens as though we were a community of lawyers. We need the assistance, it is true, of our contemporaries in Fleet street, but we need at present convenient premises in the city. Our enormous deposits of copper need the co-operation of those who control the gold of the world. Mining experts of undoubted integrity should be at the instant call of city financiers, so that they could give reasonable advice regarding any "prospects" submitted in London. Many good mines are lying dormant in this country for the simple reason that the owners have not the money to pay fees to investigate their claims, and London promoters will not send out engineers to report only in exceptional cases, and even then only when they allocate a large share of the capital to themselves. Looking at the matter in this way, it is in the interests of the province that adequate representation should be arranged. The interests of each true individual miner in British Columbia is the interest of the province. We are units of one great whole; therefore it is the bounden duty of every voter to ask his representative to help forward suitable representation in London. There is a good time coming, and we need to be ready.—The Empire.

Canadians Honorably Mentioned.

Ottawa, Dec. 6.—Lieut.-Colonel Lessard, commanding the Royal Canadian Dragoons, mentions the names of Lieut. H. E. W. Turner, Lieut. H. Z. C. Cockburn, acting Sergeant Hollatt, Lieut. Morrison, Pte. N. J. Builders and Pte. Kinsley for conspicuous gallantry at engagements near Belfast on November 6th and 7th. Colonel Lessard says the Canadian guns were near being captured, the enemy at one time being only about 50 yards from them, but the gallantry of the above mentioned troopers saved them.

Mr. William Thompson, of the Northport smelter, is passing Christmas in this city.