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# The Mining Record.

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## BRITISH COLUMBIA MINING RECORD

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P.O. Drawer 645, Victoria, B.C.

### PUBLISHER'S NOTICE.

ERE this, each of our subscribers in good standing will have received a copy of our special Christmas Supplement.

Those whose subscriptions are in arrears can secure without further cost a copy of this handsome special number by remitting the amount due on or before the 1st of January, 1901.

### THE MONTH.

IN the *Engineering Magazine* for November a series of articles on "The General Principles of Successful Mine Management," by Mr. A. G. Charleton has been begun of which it may be said that if the succeeding articles come up to the standard of the first, the series will be of great value to everyone interested in the practical management of mines. Mr. Charleton in the first place knows what a mine manager is, or should be, a very rare piece of knowledge. According to Mr. Charleton a mine manager should be a man who can exercise the highest amount of judgment:

1. In the selection of the most suitable machinery and materials to effect various specific purposes.
2. In the choice of men selected to perform any requisite piece of work and in the way in which they are handled.
3. In the employment of men and machinery col-

lectively, in the execution of different jobs, so as to secure the best possible results at the least possible cost.

"Above all, it is essential that he should possess that combination of practical scientific and business knowledge necessary for a mining engineer to take full advantage of any improvements in technical practice, which will save labour, improve extraction, enlarge output or otherwise cheapen production."

The measure of the mine manager's success is the profit and loss account of the company operating the mine, and it is his business to combine the success of the engineer, the accuracy of the assayer and of the surveyor, the care of the sampler, the oversight of the shift boss, and the energy of the workman, and to organize a system of breaking, hoisting, shipping and treating the ore in such a way that the highest percentage of profit is obtained. But he does not require to combine all these qualities in his own person any more than he requires to carry the ore from the mine on his own back.

In Mr. Charleton's own words: "What is wanted for efficient mine management is the happy combination of general experience, engineering knowledge and business capacity, regulated by administrative ability. A man may be, in fact, a first-rate engineer but a second-rate administrator, or the converse, and fail in either case where other managers with less ability in some one of these departments succeed."

The art of selecting machinery cannot be learned from makers' catalogues: "It is only to be learned by experience, involving, as it does, a more or less thorough acquaintance with the relative merits, capacity, durability, price and applicability of mechanical appliances of all kinds employed in mining operations. The chief point to be determined is whether quality and design shall be sacrificed to price, or whether it is cheaper to pay a higher price for a better article, the choice depending partly on the time any particular piece of machinery is likely to be required to last, partly upon its comparative suitability for the purpose for which it is to be employed."

With regard to the choice of men the matter is summed up as follows: "So called 'cheap men' like cheap materials, often prove the most expensive in the long run." In fact, it is practically certain that if you want to get the best possible value out of men, the way to do so is to pay them well and treat them impartially."

Mr. Charleton emphasizes the fact that "mutual confidence between employer and employed, loyalty, *esprit de corps* and discipline are factors of great importance in running a mine successfully.

He further remarks that, "In the organization of the work under his charge, the manager should endeavour to trust as much as he can, without trusting too much, to the various heads of departments act-

ing under him—stimulating them to use their brains and exercise independent judgment when occasion calls for it, and to look to him for advice only when in doubt or difficulties," with due deference to the principle, however, "that one responsible head is an essential for the proper conduct of business of any description."

Next to labour comes economy in the use of stores, particularly explosives and timber. It may be pointed out, although the fact is not drawn attention to by Mr. Charleton in the present article, that economy in the use of timber is not measured by the amount of timber used. That is one factor, certainly, but to minimise the timber used in a mine to what cannot be done without in the meantime frequently results in the complete ruination of the mine.

In addition, a manager "requires to see that developments are pushed ahead on systematic and proper lines," that a proper system of tallying ore broken and hoisted is in use, that the stopes are properly and regularly measured, and that a proper assay plan is constructed and kept up to date, that stock is taken of stores, that boilers are tested and cleaned when necessary, and their consumption of fuel and water recorded, that renewals and repairs are properly looked after and charged up and more especially that winding ropes and signalling and safety appliances are regularly and thoroughly inspected, and that a record is kept of the life of the different wearing parts of the machinery."

It is not remarkable that good mine managers command high salaries.

The silver market presents features of great encouragement to the silver mine owner in British Columbia. Not only is the price higher, but the tendency is towards progressive improvement. During the year drawing to a close a great demand has sprung up for silver in the East. The Indian government has bought large quantities, as it has been discovered there, that whatever the standard may be, the currency in use among the people must be made of the white metal. Japan has also entered the market for the first time since it adopted a gold standard; the object of Japan's purchases has probably been to pay the expenses of the Japanese forces in China. Russia has been a heavy buyer for the same reason. The demand from China itself has been the most marked of all. Chinese merchants are no longer importing foreign goods in exchange for their exports, but taking payments in silver, which in troublous times like the present is more easily conveyed and also more easily concealed. None of the conditions which have led to this extra demand on the silver producing resources of the world are at all likely to disappear for a long time to come; and the production of silver cannot be largely increased without a greater advance in price than has hitherto taken place. Therefore, the silver market is likely to discover a decided shortage in the supply of that metal sometime in the not very remote future. The immediate effect of this would be to cause a rapid advance in the price of the metal to 75 or 80 cents, or even higher, which advance, however, could not be expected to continue. When the boom was over silver would settle down to a normal price on a higher level than its present market value. Such a boom would be of the greatest possible service to British Columbia. It would stimulate mining in the

Province to a hitherto undreamt of degree and bring new districts rapidly to the front. It would not be at all surprising if the next mining excitement in British Columbia were a silver mining excitement and the next great inrush of capital attracted by the Province's silver resources. The movement of silver to the Orient shows a great change as the following table shows:

	1899.	1900.	Changes.
London to British East Indies .....	£4,162,007	£4,968,476	1. £ 806,469
London to Japan .....	.....	89,800	1. 89,800
London to China .....	1,276,375	1,949,376	1. 673,201
Totals .....	£5,438,382	£7,007,852	1. £1,569,470
San Francisco to China .....	971,080	2,346,859	1. 1,375,779
San Francisco to Japan .....	.....	13,047	1. 13,047
Totals .....	£6,409,462	£9,367,768	1. £2,958,306

It will be seen that while London remains the shipping point for the British East Indies, China and Japan are buying very largely from San Francisco. British Columbia is quite as well situated, in fact better situated than San Francisco to export silver to the Oriental market. Why does British Columbia not open up this trade. Sooner or later it will be done, of course. But progress consists in realising such opportunities and setting to work to carry out such ideas in a practical way. Here is a profitable opportunity for the investment of capital in British Columbia. During the present year the silver output of British Columbia must have been very nearly doubled, and is increasing very rapidly. There must be a profit in refining the metal in British Columbia and shipping it direct to the Orient instead of allowing it to be transmitted through a dozen different hands in the United States and Great Britain before it reaches its ultimate destination.

We are in receipt of a letter from Mr. S. Thornton Langley, of Rossland, which is published with a certain amount of diffidence. We are compelled to excise one paragraph in which Mr. Langley makes statements about the directors of the company which we have no desire to be invited by a court of law to sustain. The letter reads as follows:

Rossland, B. C. Nov. 12, 1900.

The Editor B. C. Mining Record, Victoria, B. C.:

Dear Sir,—I have seen your paragraph in this month's issue, referring to my connection with the Okanagan Gold Mines, Limited, in very unfavourable terms. You are entirely in error in your conclusions in this matter, as I was in no way responsible for the failure of the company. In the ordinary course of business I was engaged as a broker to sell the shares of the company, which I did to the entire satisfaction of the directors and shareholders, and in July, 1899, I received a vote of thanks from them for the able and efficient manner in which I had conducted the sale of shares entrusted to me by the company.

At no time was I a manager or had anything whatever to do with the active management of the company. I was a director for three months, from August to October, 1899, during which time I was absent from Rossland, but during this period the company was in a prosperous condition. After I left the directorate and all of the treasury shares of the company had been disposed of, I sold part of my shares, as I had a perfect right to do. At that period the company had a most favorable future before it, which would have been amply realized had it even been fairly managed.

I am now a large holder of the company's shares, for which I paid the highest market price. These being the true facts of the matter, I fail to see anything scandalous in my connection with the company. It is true I have loaned the company large sums of money when they were in urgent need of it, as I wished to protect my friends and shareholders, which I consider a very laudable and honourable proceeding on my part, after I had left the directorate of the company.

Now that I have placed the facts before you, which are well known to your correspondent here, Mr. H. F. Evans, and which were set out in my circular, a copy of which he sent to you, I expect a complete and adequate withdrawal of your libellous statements.

From time to time, I have noticed that you publish in your columns news of a derogatory character and assume them to be facts, which are not so. It is quite evident to me that the Okanogan article, as well as those relating to this section, have been inspired by some one unfriendly to this community.

Yours truly,

S. THORNTON LANGLEY.

It will be observed that we merely said that if Mr. Langley had acted in a certain way his conduct would have been scandalous. He says he did not act in the way described. We are unaffectedly delighted to hear it. Mr. Langley states that he was engaged in the ordinary course of business as a broker to sell the shares of the company and sat on the board of directors for three months. This and loaning money to the company covered his connection with it. The conclusion of Mr. Langley's letter is painful to us, although what he says is sometimes unfortunately true. It is impossible always to protect our columns from matter which is untrue, derogatory and inspired by enemies of the community. An instance of something which seems like this in the light of Mr. Langley's letter occurs to our mind now. In the MINING RECORD of last April there was an article in which the following passage appeared: "In March, 1895, Mr. Langley came to Rossland, since which time he has been actively engaged in promoting mining enterprises, one of his most recent undertakings being the Okanogan Free Gold Mines, which paid a dividend of five per cent. on the capital stock in October last." To connect this company with Mr. Langley's name as one of his undertakings and to connect him with this dividend as if it had been one of the fruits of his enterprise was obviously in the light of his letter, erroneous and derogatory. So desirous have we been to do full justice and make ample reparation to Mr. Langley that we have endeavoured to trace the source of this communication, but have not been able to follow our correspondent beyond the front door of Mr. Langley's own office, and presume that he must have borrowed the use of Mr. Langley's typewriter to indite it, which was piling Ossa upon Pelion, heaping insult upon injury. When this article appeared, our books show that Mr. Langley bought up every available surplus copy of the RECORD to be had and we appreciate the delicacy with which he endeavoured to limit the circulation of this injurious statement without informing us of his intention.

The report on operations at the Whitewater mine from 1st March, 1900 to 31st August, 1900, by Mr. S. S. Fowler, is a somewhat perplexing but by no

means encouraging document. It appears that 2277 tons of concentrates have been shipped, on which the net smelter returns were \$68,133.71 or \$29.92 per ton. The amount of ore milled during this period is not given. But over the whole period since the mill was started the amount mined and milled (exclusive of the tonnage treated from the old dumps) has been 32,345 tons, resulting in 3,589.6 tons of concentrates or as nearly as possible 9 tons of crude ore to one of concentrates. The average cost of mining and milling per ton is not given either. The chairman of the company, however, stated that this had been reduced from \$2.31 in April to \$1.64 in August. If \$1.75 be taken as a reasonable average, and it must be said that if ore is being mined and trammed and milled at the Whitewater for \$1.75 a ton it is being done very cheaply indeed, then the cost per ton of concentrates would be \$15.75, leaving a profit of \$14.17 per ton of concentrates over the bare cost of mining. This gives something like \$32,000 surplus for the period or say \$60,000 a year, out of which would have to come development and maintenance expenses before anything was available for dividend. This is not by any means brilliant. But when it is considered that during the year 1899, when 1,913.8 tons of concentrates were provided, on which the returns were \$104,965.38, or \$36,831.67 more than was received from 2,277 tons this year, the total net profit of the company was under \$20,000, we confess that Mr. Fowler's report discloses a condition of affairs of a somewhat dismal character. And if anything were needed to accentuate the doubtful position of the mine it would be his statement that there was only six months' ore in sight.

Some comfort may be derived from the fact that the mine is looking better at present than it has for some time and that there seems to be every likelihood that the value of the concentrates produced may be restored to its former level. Under the able management of the Whitewater mine all that can be accomplished by care and economy will be done, and it is certainly to be hoped that more encouraging results will be forthcoming in the future.

A good many enquiries are now being instituted with regard to the occurrence of petroleum in British Columbia. Indications of the presence of oil are most favourable in South East Kootenay and also, we understand, in Queen Charlotte Islands, and in the former field no less than eleven leases have been applied for this month. In a report to the Geological Survey of Canada Dr. Selwyn, who visited the East Kootenay oil fields in 1891, thus describes the Cameron Falls locality:

"After following up the stream about a mile and a half on the left bank, I noticed a powerful odour of petroleum. Descending to the edge of the water and stirring the stones and gravel in the bed of the stream, considerable quantity of oil at once rose to the surface and floated away. Crossing to the right bank, some inches above the then level of the stream, here, skimmed off the surface of a shallow pool, a wine bottle full was soon collected. This can now be seen in the Geological Survey Museum. Sixty or seventy yards below where the oil was seen, a rocky reef of grey silicious dolomite crosses the creek and rises into a steep bluff on the left bank; on the right bank, seven or eight feet above the creek, a broad, thickly timbered flat extends for 150 yards to the

base of the bordering mountains, which culminate six miles to the south-west at the boundary monument, 6,000 feet above sea level. No work whatever has been done to test the nature of the oil sources. A comparatively small outlay for some shallow sinking or boring on the flat above described would do this.

"On the 24th, we proceeded down the valley, and about four miles north of the 49th parallel the trail came down to the level of the brook, on the edge of a beaver dam pool, there were ledges of dark blue shale dipping E. 30°, N. 12°. Lifting layers of this at and below the water, a quantity of dark green circular patches of oil rose to the surface, and a precisely similar result followed by stirring up the mud in the bottom of the pool. This place is about 15 miles in a direct line west, 10 degrees south, from the occurrence on Cameron Falls Creek, the main watershed of the Rocky Mountains and Mounts Kirby, Spence and Yarrell intervening, oil is said, by the Indians (the Stoneys) who frequent this region, to occur at other points, in the Akamina Brook Valley, both above and below that recorded. The Akamina joins the Flathead River in Montana, about four miles south of the international boundary. The beaver dam oil is of a dark greenish-black, and does not apparently differ much from that of Cameron Falls Creek. Preliminary tests might be made here by sinking a shallow shaft in the shales at the beaver dam pool, and by boring on the sandy and gravelly flat country about two miles and a half north of the boundary line.

"At about a mile and a half higher up, the creek leaves the high mountains, which border its upper course in a north-easterly direction up to the main watershed some twelve miles distant, and here, at the edge of the water, on the left bank, I found hard, dark flinty shales like those at the beaver dam pool on the Akamina, dipping S. 25 degrees, 30 degrees, W. 25 degrees. Directly the layers of this rock are raised, the oil rises and spreads over the surface of the water in such abundance that a short time suffices, with the aid of a tin cup, to collect a bottle full. Here, also a considerable quantity of gas escapes from the cracks and joints in the rocks, and ignites freely on the application of a match.

"Less than half a mile higher up, on the right bank and on the opposite side of the valley, oil was again found issuing from the base of the bank or drift, which has here filled the valley and causes the stream to make a sharp bend eastward to the base of the opposite mountain. No rock was exposed here, but every stone in the bed of the creek, especially on being broken or rubbed, gave out a strong odor of petroleum. The oil collected here, a sample of which can be seen in the Museum, differs entirely in appearance from those of the Cameron Falls Creek and Akamina or Kish-e-ne-nah Creek. Some of it was of a light lemon-yellow, but most of it nearly the colour of pale brandy and with a powerful petroleum odor."

The last annual report of Sir Horace Seymour, comptroller of the Royal Mint contains separate reports by the Deputy-Masters of the branches established in Australia at Sydney, Melbourne and Perth. The three colonial mints coin gold only, while the London mint supplies silver and other coinages required by the Empire.

The Sydney and Melbourne mints, although estab-

lished for many years, have only just ceased to be a source of annual loss. In 1899 the figures are given as follows:

	Revenue.	Ex- penditure.	Profit of Revenue
Sydney . . . . .	£15,610	£14,488	£1,122
Melbourne . . . . .	25,145	17,001	8,144

The Perth branch has only recently been established. It seems from the report of Sir Horace Seymour that all the gold produced does not find its way to these colonial mints. In 1896 the mints received about 80 per cent. of the total Australasian production, but the proportions for the last three years are as follows:

	1897 Ozs.	1898 Ozs.	1899 Ozs.
Total estimated Australasian production of gold . . . .	2,929,959	3,547,079	4,462,500
Total sent into the colonial mints . . . . .	2,127,098	2,233,525	2,670,796
Proportion of production . . . . .	72½%	63%	60%

The decrease in the proportion is said to have been occasioned chiefly by the considerable quantity of the large West Australian yield shipped in the form of bullion. The Perth mint is, however, attracting the gold, and doubtless the proportion of the total output coined in the colonies will soon show some recovery.

From these reports it is abundantly clear that what we have already pointed out with regard to the proposed Canadian mint is correct. It is not necessary merely to have a mint, but also to have one that will attract the gold produced in the country. The place where the mint is located and the price it offers for gold are the two most vital considerations. Unless the Canadian mint is located on the Pacific Coast, it will certainly not attract the gold produced in the Klondyke and British Columbia. All the difference between making the Canadian mint a success and a ridiculous fiasco is involved in the choice between the East and West for its location. Furthermore, unless the mint is prepared to offer the same price for gold as is offered by the United States mint at Seattle, it will not attract the gold either. And it must not be forgotten that the United States mint assumes a proportion of the cost of refining the gold, and all the cost of transporting it to San Francisco or Philadelphia, where actual minting operations are carried on.

In a popular novel recently published in Great Britain the hero, who is a duke just come into his inheritance, wishes to bury two degenerate scions of his race in some remote part of the earth. He takes the advice of his most intimate friend, who tells him: "There are great reports about British Columbia just now. They've found wonderful new gold-fields and they are a fearful distance from anywhere. It takes months to get to them, so I'm told." How long it takes to get to a place entirely depends on where one starts from. It takes five days to get from the centre of the British Columbia gold-fields to New York and seven days on the average to go from New York to London. The average time for letters from London to the centre of the British Columbia gold-fields is fifteen days. The travelling is luxurious. One carries a dining room, a reading room, a bar, a barber shop and a bathroom on the train. The

centre of British Columbia goldfields is more accessible to London than such places as San Francisco, Capetown, (not to mention Johannesburg), Calcutta, Bombay and Madras. The real test of distance, however, is the comparative facility of communication. Does one wish to do business by telegraph with London from the centre of British Columbia gold-fields? It is more accessible than Glasgow. When one's office closes at night the telegraph message is handed in. The reply is received before the office is opened in the morning and the correspondent in London has had a full working day to consider its contents or procure information asked for. It is possible to sit in one's office in the centre of the British Columbia gold-fields and converse with people in Spokane, San Francisco, Los Angeles, Butte and Helena. As a matter of fact it is not done because there is not business enough with these places to maintain a service. But it is possible. Theoretically it is possible to do the same thing between Lombard and Queen Victoria streets. Practically it is not. The meaning of an adequate telephone circuit has not yet dawned upon the transpantine intelligence. The conditions of life are not materially different in the centre of the British Columbia gold-fields than they are anywhere else. There is possibly more room for the activities of young men of energy and principle. Of course people may send degenerates there and maintain them after they are there just as they may anywhere else. It is fairly cheap, too. Because these unfortunates fall at once and outwardly, where they really belong, to the lowest strata of society. Some find their metier in handling a pick and shovel. Others, the worst, prey upon society by incurring debts they cannot and do not intend to pay. A few become a direct burden on the community by finding their way into the prisons and lunatic asylums. The idea of this duke and his adviser expressed in the course of the same dialogue that in shipping such material to the colonies they are helping to build up the Empire with a big capital E may be a pious but certainly is a ghastly fiction.

The absorption of the Dominion Copper Company, owning the Brooklyn and Stenwinder mines at Phoenix, by a New York syndicate with James Breen at its head, is the most convincing demonstration yet offered to outsiders that the low grade of Boundary ores will pay. It is frequently said, and it is true, that the problem in the Boundary is a smelting and not a mining problem. James Breen is the one man in the Northwest, if not in all America, to give a fully trustworthy opinion whether that problem has been or can be solved. He has given that opinion in the most convincing and emphatic way possible by purchasing the Brooklyn and Stenwinder. He was F. A. Heinze's right hand man in the construction and operation of his Butte smelters, by which the Montana smelting ring was smashed, and treatment of ore very much reduced. He constructed the smelter at Trail to treat the Le Roi ore and learned what could be done with that kind of ore at a freight and treatment rate of \$11.00 a ton. He left Heinze to build the Northport smelter for the Le Roi company, who were glad to bonus his knowledge and that of his partner in the enterprise, Mr. Bellinger, with an interest of one-quarter in the plant on a contract with the mine for an \$8 treatment rate. When the B. A. C. purchased the Le Roi mine they

purchased three-fourths only of the smelter, and were bound to account to Messrs. Breen & Bellinger at an \$8 rate. In two years these gentlemen had realised large private fortunes, which were augmented by the price at which the Le Roi company were glad to purchase their interest. Since that time Mr. Breen has been unattached, having made up his mind to operate for himself. That he has found the best available opportunity offered by the copper industry of a continent in the purchase of low grade mines in the Boundary district of British Columbia is fairly conclusive evidence as to the value of such mines and the future in store for the district.

The Crow's Nest Coal Company is now the largest producing coal mine in the Province, having a daily output of 1,200 tons. Besides which it keeps 281 beehive coke ovens engaged in the subsidiary manufacture of coke. It requires one hundred freight cars daily to handle the output. From one-third to one-half of the output is exported, the Great Northern Railway buying 400 tons a day for use on its railway system. It is curious to reflect that when first opened the coal of the Crow's Nest field was not considered a good coal for use on locomotives on account of its liability to make the fire box of the engine into a miniature coke oven. This, however, was easily overcome as soon as the firemen became accustomed to its use, and now it ranks as steam fuel second to none. The greater part of the coal produced, however, is absorbed by the mining and smelting industries of British Columbia itself, which is the most satisfactory feature of the success attendant on this great enterprise. That active mining for the precious metals was never in such a buoyant and progressive condition as at present is amply proved if proof were necessary by the continuous and increasing demand for coal and coke. The coal mining industry in the Crow's Nest Pass cannot flourish unless mining for the precious metals is flourishing. The prosperity of the one is derived from the prosperity of the other.

The Centre Star reappears as a dividend paying mine after the best of a year devoted to organization and development. The dividend which is payable on the 1st of January is at the rate of one per cent., the total sum distributed being \$35,000. It is expected that from that date on a regular monthly dividend of one per cent. will be paid. Centre Star shares stand at 50 per cent. premium, and at that price, provided the anticipations of the management are fulfilled, will yield 8 per cent. per annum. The present price of Centre Star shares is the price at which they were first issued. The mine carries a capital valuation of \$5,250,000. Eight per cent. per annum does not allow much for resumption of capital and interest on a mining investment. Even regular monthly dividends at this rate would not justify any advance in the shares, except in anticipation of increased output and profits.

The shares of the Nimrod Syndicate are being heavily boomed on the English market on the strength of a consolidation of interests purchased on McKee Creek, in Atlin district. The capital of the Nimrod Syndicate is £25,250 in £1 shares and the shares stand on the market at £6½. The Nimrod Syndicate has bought out McKee, the locator of the creek,

who has worked it successfully for two seasons. Mr. McKee is an old and experienced placer miner and has evidently formed a pretty definite opinion as to the extent of the pay left before he sold out. Relatively to the expectations of profit raised in the minds of shareholders and prospective shareholders in the Nimrod Syndicate, by the reports published, McKee sold out for a song. According to the best information we can secure, the prospects of getting good profits by consolidating the claims on this creek and bringing hydraulic power to bear is a good one, provided the valuation set on the claims by the sellers plus the capital necessary to put in hydraulic appliances, is not exceeded. But we have the strongest reasons for believing that a reasonable valuation of the property is being grossly exceeded. The fault lies not in Atlin, but in London.

The shares of the British Columbia Copper Company now stand at \$20 on the Boston mining market, giving the property of the company, the Mother Lode, in Deadwood Camp, a market value of \$4,000,000. This company has been steadily opening up its property since 1896 and is the pioneer representative of Eastern American capital among the copper mines of British Columbia. 1901 will be the company's first productive year, but the success of the enterprise is already a foregone conclusion. The great appreciation in the value of the shares has already done much to awaken interest in Boston in British Columbia mines. Introduced by a conservative and successful corporation like the British Columbia Copper Company the Province should be able to attract a great deal of capital from mining centres in the Eastern United States.

We are in receipt of the preliminary prospectus of "The Chamber of Mines of Southern British Columbia (Kootenay and Yale)." The object of this association is to "direct the attention of the financial world to our great mineral resources and to seek to induce capital to investigate and invest in every mining camp in the district." The means by which it proposes to carry out this object are the collection and distribution of accurate information about the progress and resources of mining in the territory it covers. The object is laudable, and the means chosen are good. We hope the Chamber of Mines will be successfully inaugurated, comprehensive in its constitution and scope, and an active agency in accomplishing the good work it proposes to attempt.

Through the death of Marcus Daly, Montana loses one of its best known public men and Western America a long familiar and picturesque figure. Besides being a successful mining man Marcus Daly took a keen interest in politics and racehorses. For long he was paramount in Montana state politics, but with the transfer of his mining interests to a large corporation of which he was not in control, he lost his political prestige and influence. Marcus Daly made his fortune, which is computed at \$20,000,000, but is probably under that sum, by his persistent faith in the Butte mines when they were condemned by experts and believed in by nobody except himself and one or two more.

A coal mining undertaking is reported from the Arctic Islands of Northern Europe, as a result of

German expeditions. A Norwegian company has, following up the German explorers, actually opened productive mines in the Ice Fjord, Spitzbergen, and these will be worked next year. It is stated that the coal strata are above sea level, three of them lying from six to nine feet deep. Furnace coal is found in the same locality and the supply is said to be rich enough to supply the whole demand of Northern Norway for a period practically unlimited. Compared with the local conditions of these Arctic coal fields, those of the deposits in the Yukon—the practical value of which has yet to be tested—seem easy indeed.

The St. Eugene mine at Moyie has entered the list of dividend paying mines with a distribution of \$105,000, or 3% on its capital of three and a half millions. This dividend is for the quarter ending 31st December, and is payable on the 1st of January. It is at the rate of 12% a year. The Canadian Goldfields Syndicate has also, out of the proceeds of the St. Eugene, declared a dividend on its capital stock of \$1,000,000 of 3%. The Byron N. White Company, owning and operating the Slocan Star, has also declared a dividend of \$25,000, being at the rate of 5%. These are all satisfactory indications of renewed activity in silver lead mining.

During October and November the lode mines of British Columbia declared dividends amounting to \$368,750. Of that sum \$25,000 went to England and \$25,000 to the United States. The balance, \$318,750, was distributed to Canadian shareholders.

With the completion of the Crawford Bay wagon road, and of the Molly Gibson tramway, two events of the month of November, two very important additions are made to the list of actively productive mines. The ore of the Molly Gibson and of the properties of the London Consolidated is high grade and both expect to export a considerable tonnage this season. Very greatly increased shipments may be expected from now on from the Slocan and also from the Lardeau where abundant snow has provided the necessary facilities for rawhiding ore.

Particular attention should be paid by those looking for a district in which to invest money or to sell mining machinery and supplies, or to establish business, to the summary of progress in the Boundary country from our own correspondent, published this month. It is a statement of cold and unromantic facts, yet it is as wonderful and fascinating as any romance ever written. No district in the Province has suffered more than the Boundary from adverse criticism; none is vindicating itself more splendidly.

#### THE YEAR IN BOUNDARY.

(By Our Own Correspondent.)

ON the whole the mining industry of the district is making distinct and gratifying progress. Boom correspondents continue to occasionally supply to newspapers that will publish their glittering generalities with inflated statements that will not bear close examination and yet stand. For instance, there is the oft-repeated assertion that early in the New Year there will be twenty shipping mines—or words to that effect—in the Boundary. Of course it all de-

pends upon what construction is placed upon the designation "shipping mine." If claims that send out an occasional carload of ore, probably taken from a very limited supply, are to be regarded as "shipping mines," then the Boundary district should soon possess not only one score, but two or three score of such uncertain aids to its progress. Again, if there are to be included properties that have practically no sufficient development ahead of their producing capacity to admit of their maintaining an appreciably large production during any reasonable period of suspension of development work—properties that send out anywhere from two or three hundred to two or three thousand tons of ore and then find themselves at the end of their ore supply—then there may be added half a dozen or may be half a score more to the "shipping mines" of the district. But if a "shipping mine" is to be regarded from a point of view that rejects all properties whose production of ore cannot for some time to come be made continuous in a degree that will ensure a regular supply to the several reduction works now looking to the district for sufficient ore to keep their furnaces going right along, then the statement that there will be twenty—or even ten "shipping mines" in the Boundary district is plainly and unequivocally not a true one. The writer has but one end in view in frequently reiterating that there is much inflation and mis-statement in some of the reports published in newspapers giving space to mining news from this district, and that is to write of matters pertaining to the mining industry as favorably as he can consistently with a careful and conservative regard to the actual facts of the position. And in maintaining this attitude he has the approval and support of some of the competent and responsible mine managers who are not in sympathy with the cry popular with many people: "Whoop her up! Get men to come in and we'll take chances of some of them putting their money into the district. We'll benefit to some extent anyhow."

That there may be no misunderstanding as to the position taken by the writer, it may be well for him to once again direct attention to what may be fairly and honestly claimed as actual and substantial progress in connection with the mining industry in the Boundary. Up to June last, or possibly a few weeks earlier, there had been practically no ore sent to the smelters from the Boundary district. For the sake of literalness it will be conceded that there may have possibly been anywhere from 500 to 5,000 tons sent out earlier for reduction, but the quantity in comparison with the total to be shipped to the present date was very small. Nor was there last May or June a smelter in operation in the district. In contrast to this take the position on say November 30. The aggregate of ore shipments to October 31 was approximately 55,000 tons, made up as follows:

Old Ironsides and Knob Hill Group	32,000
B. C.	14,000
City of Paris	3,500
Golden Crown	1,900
Winnipeg	1,200
Athelstan	500
Unenumerated	900

Approximate total to Oct. 31st . . . . . 54,000

To satisfy possible critics it will be admitted that the detailed quantities here given in round numbers—

some mines should possibly be given credit for a little more and others a little less. November shipments aggregated about 26,000 tons in the following proportions.

Old Ironsides and Knob Hill Groups	18,500
B. C.	3,000
Mother Lode	3,000
Unenumerated	1,500
Total	26,000

The exact figures for November are at the time of writing not obtainable, so the estimated total may possibly prove to be from 500 to 1,500 tons in excess of the actual shipments, but with this qualification, it will serve to illustrate the substantial results achieved during November, not, be it noted, by "twenty shipping mines," but, to all intents and purposes, by three. Where then is there any necessity or even excuse for flagrant exaggeration? Is it not enough to make the statement—one that cannot be disproved that the Boundary district, which is as yet in its infancy as regards production, in November sent, say, 25,000 tons of ore to the smelters? Place upon that ore an average of \$10 per ton gross (which is within the mark) and it represents a quarter of a million dollars worth of ore taken out of only three mines. Surely this is a record that a mining district only just entered upon the period of production may take a pardonable pride in. And it is quite permissible to point out that three months hence or as much sooner as it shall be possible to get into working order the larger air compressor and hoist with which the Mother Lode Mine is now being equipped, the big ore reserves of that mine will easily yield 10,000 to 15,000 tons per month, whilst the Old Ironsides group can increase its monthly output by 10,000 tons whenever a third furnace shall have been added to the Granby Company's smelter to treat the additional quantity of ore. Then, too, there is a prospective increase from the B. C. mine, leaving altogether out of consideration the probability that during the first half of the year 1901 the Brooklyn and Stemwinder, Snowshoe, Gold Drop, Golden Crown, Winnipeg, Athelstan, City of Paris, Morrison, Jewel, Oro Denoro, R. Bell and several others may have become small producers, though not during that period "shipping mines."

From the foregoing it should be evident that though the Boundary district may not yet truthfully claim to have "twenty shipping mines" in the sense usually accepted where mining operations are of substantial importance it is amply warranted in claiming that it already has what is even better—three producing mines—mines that are demonstrating by the unanswerable argument of their regular output of a profit earning-product that the district offers a very promising field for the investment of capital. And since production of itself is insufficient to ensure success, regard must be had to the fact that not only are the Trail and Grand Forks smelters available for the treatment of the ore output of the district mines, but that early in the new year the smelters of both the British Columbia Copper Company and the Standard Pyritic Smelting Company will also be in operation, and, further, will be prepared to increase their treatment capacity as production shall require them to do so.



## THE CANADIAN MINERAL EXHIBIT AT PARIS.

ITS SUCCESSES AND HOW THEY WERE ATTAINED.

(By Angus K. Stuart.)

Of the many millions of people who have now seen the great exhibition here a very large percentage have visited the Canadian pavilion and the various sections where Canadian products are displayed and, now that the awards have all been made and the enormous fair is drawing to a close, it is quite possible to form an idea as to whether the Canadian exhibition has, or has not been a success.

Perhaps, however, it would be hardly fair to judge the success of the exhibition or any part of it solely by the numbers which have visited it; in any case it would be more reasonable to try to find out whether it has been productive of satisfactory results—*i.e.*, the advertising of Canada as a rich and prosperous country, and whether the opportunity afforded here to accomplish this end has been utilized to the best advantage.

On these matters any one can form an equally good judgment as myself—all I can do is to confine myself to what I have had time to see and learn since my stay here, hoping that any experience gained may eventually, through the medium of your valuable publication, be of some use to the province from which I hail. Doubtless from the daily press you will have been notified of many of the successes gained by Canada here. You will also perhaps have read criticisms as to the management of certain details connected with the arrangement and display of our exhibits. All this it is not my business nor office to comment on. What I hope to convey is an accurate idea of the Canadian mineral exhibit as it is, the successes it has quite undoubtedly obtained, the cause of these successes and what practical benefits to the Canadian mining industry may be expected to result from all the trouble, time, money and skill employed in getting this collection in place for the inspection of the public of all nations.

Perhaps before going any further it would be well to explain the origin (if such a term may be used) of the exhibit. This would be scarcely necessary if some misunderstanding did not seem to exist as to some things connected therewith—but as such appears to prevail a few words of explanation can scarcely be much out of place. The exhibit as a whole was like any other section of the Canadian exhibit here, arranged for, collected, transported and placed here under the management of the Canadian Commission. One of the commissioners, Dr. G. M. Dawson, C.M.G., director of the Geological Survey of Ottawa, very naturally had the control of this. To the very thorough way in which this work was carried on,—to the scientific manner in which the whole collection was handled—may undoubtedly be attributed the name it has acquired here of being the most attractive and at the same time the most elaboratively scientific display of mineral products to be seen in the exhibition grounds. The Canadian Geological Survey Department is perhaps not quite appreciated as it should be in Canada and especially out West, being an institution which, like Bobs, "does not advertise," but its work seems to be thoroughly well known to scientific and technical people on the Continent, and if possible its reputation has been still more enhanced by the way this mineral

exhibit has been got together, by the able representatives it has sent here in Messrs. E. R. Faribault and A. P. Low, and the publications of both a theoretical and practical kind which it got out specially for distribution here. Great credit is also due to the mining bureaus of the various provinces, especially those of British Columbia, Ontario, Quebec and Nova Scotia and to the many private individuals who assisted in collecting the exhibits. As such a very large number of the latter come from British Columbia and as the British Columbia exhibit is specially representative too much credit cannot possibly be given to Mr. W. F. Robertson, your provincial mineralogist, who took such enormous pains to ensure the province being thoroughly represented. He will doubtless be glad to know that it is due very largely to his individual efforts that Canada has had so many successes.

To return to the exhibit. The whole exhibit is a collective one of the economical minerals of Canada, no attempt being made to advertise any of the provinces separately. The work of handling it after it left Ottawa, *i. e.*, the placing and arranging here was entrusted to Mr. E. R. Faribault of the Geological Survey, and Mr. W. C. Willimott, assistant curator of the same department. Mr. Faribault being not only a scientist but also equally proficient in French and English, his linguistic capabilities were of the greatest assistance, practically invaluable in fact, especially in aiding the work of the International Jury. Mr. Willimott had a very large and varied experience in handling exhibits of this kind. At the end of June Mr. Faribault was replaced by Mr. A. P. Low, of the Geological Survey, (the well-known explorer of Labrador) and I was allowed to take Mr. Willimott's place. Under Mr. Low's supervision the greater part of the exhibit was re-arranged in order to make it more conformable with the catalogue, a sample copy of which had been received from Ottawa. This work occupied several weeks, and included re-labeling almost every exhibit. The net result of all this work is that the exhibit has gained the name of being the best arranged and classified in the entire exhibition—and is consequently immensely interesting to technical people who visit it in great numbers every day.

The collection of economic minerals displayed in the Canadian pavilion is arranged in natural groups and series as follows:—

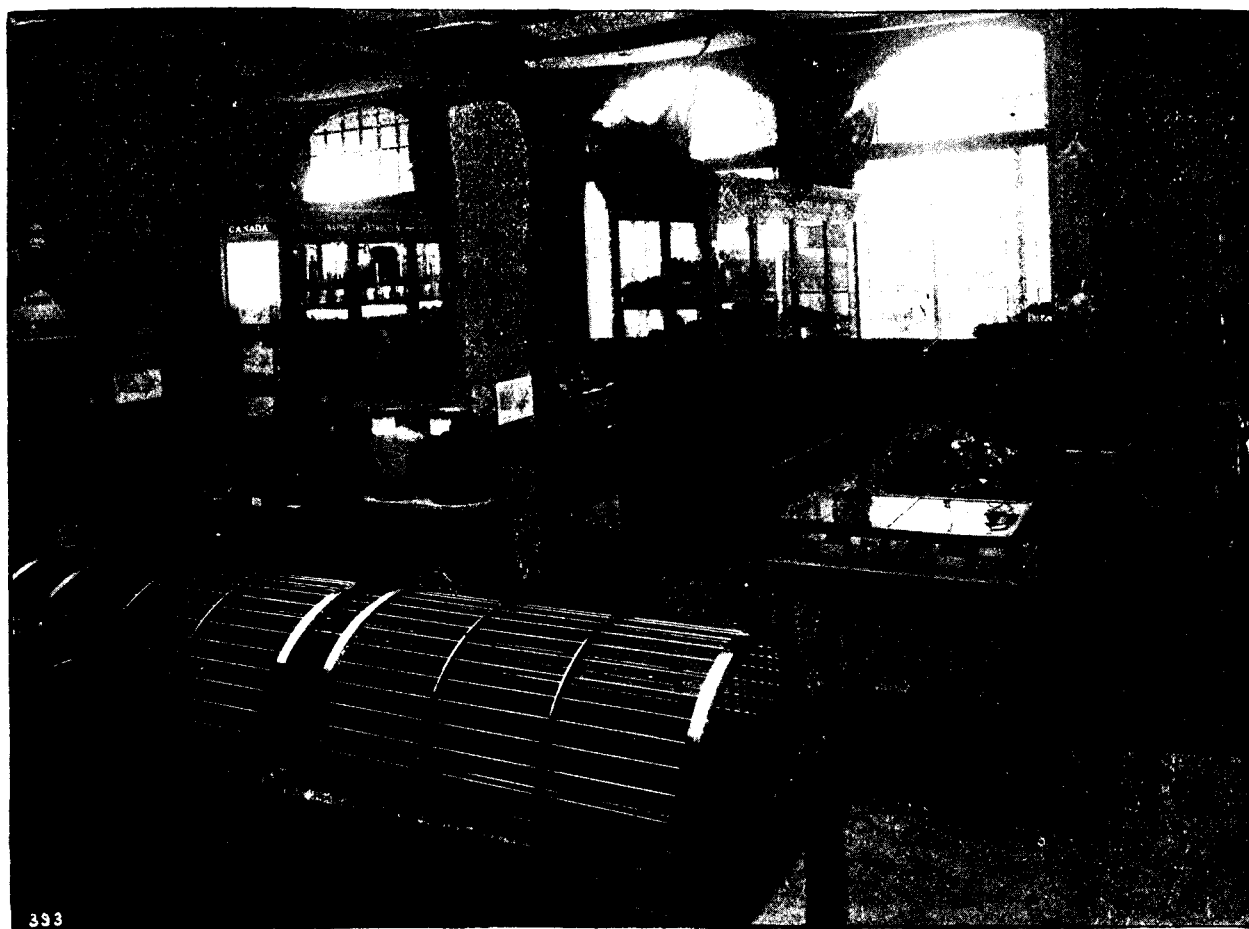
1. Metals and their ores.
2. Materials used in the production of light and heat.
3. Minerals applicable to Chemical manufactures—and mineral fertilizers.
4. Mineral pigments.
5. Salt and Brines.
6. Refractory materials and materials applicable to the manufacture of china, etc.
7. Materials for grinding and polishing.
8. Minerals applicable to fine arts and jewelry.
9. Materials applicable to common and decorative construction.

As to the arrangement of the exhibits in the courts it will be easily seen from the photographs sent that all the smaller specimens are placed in glass cases and the larger blocks of ore on open pyramids. Various special exhibits are scattered here and there and the whole of the window spaces are covered with photographs and transparencies illustrative of various mining industries of the Dominion—while geological

and other maps are placed in advantageous positions. These photographs sent to the RECORD were taken before the exhibit was re-arranged. The building itself is very badly "cut up" by pillars which make it practically impossible to secure a proper view of the exhibit as a whole. This section, like all others in the Canadian pavilion, suffers from bad architectural planning. The blame of this cannot be laid to the door of the Canadian Commission or any one employed by or connected with it, the building having been erected by the British Imperial Commission. Under the circumstances the very possible best use was made of the space at the disposal of those handling the mineral display.

The collection of Canadian economic minerals contains in all 1,191 separate exhibits, so that it would

ings); gold dust and amalgam from Thibert, Mc-Dame, Dease, Messetoe, Rosella, Snow, Quartz and Walker Creeks and the Liard River and Poorman Gulch, in the Liard Mining Division, all from sluice workings; nuggets, gold dust and amalgam from the Quesnelle, Fraser, Smoky, Cottonwood and Horsely Rivers, Eight Mile Lake, Stout Gulch and the following creeks: Shepherd, Coffee, Slough, Lightning, Nelson, Burns, Williams, Upper Williams, Lower Williams, Lowhee, Cunningham, Grouse, Cariboo, Mosquito, Summit, Stevens and Keightley, all in the Cariboo District and includes the result of dredger, hydraulic and hydraulic elevator workings and the milling of cemented gravels (from the Horsely) as well as ordinary sluicing. The Lillooet and Yale Mining Divisions are represented by



General View Canadian Mineral Exhibit.

be perhaps as well to take each group separately—any attempt to enter into much detail being quite impossible in the time (and space) at my disposal.

To begin with the gold exhibit. This is divided for all practical purposes into (1) alluvial gold (2) gold bearing quartz and (3) other auriferous ores.

Alluvial Gold.—The display of alluvial gold consists of three steel cases containing nuggets, gold amalgam and models of nuggets. Two of these cases contain a collection made by the Department of Mines of British Columbia. This includes nuggets and colors from McKee, Spruce, Pine, Birch, Willow, Wright, Boulder and Otter Creeks, in the Atlin Mining Division (all except the last from sluice work-

ings); gold dust and amalgam from Cadwallader and Texas Creeks, the Upper and Lower Bridge Rivers and the Fraser River, and the rest of British Columbia placer gold exhibit is made up of dust and amalgam from the various creeks of the Big Bend country. Rock Creek, Fire Valley and Hall Creek in West Kootenay; Quartz Creek and Wild Horse Creek in East Kootenay; and Manson Creek in Omineca. To this has been added five models of nuggets sent by the Geological Survey, and specimens of gold bearing black sand. In the same cases (for purposes of safety) have been placed the British Columbia exhibits of platinum, arquerite nuggets from Omineca and models of same, also specimens of British Columbia cinnabar and mercury. It will be seen from

the above that British Columbia placer diggings both past and present are thoroughly well represented. Very few large nuggets are shown, but the collection is particularly interesting on account of the variety in quality and appearance of the different colors. It would be difficult to get such a collection together a second time, as many specimens come from creeks which "played out" many years ago.

The placer gold exhibit from the Yukon is exhibited together with that from Quebec in a steel case similar to those of B. C. Bonanza, Dominion, Sulphur, Eldorado, Hunker, Eureka, Gold Run, Last Chance, Livingston and Forty Mile are the creeks represented. It is principally interesting on account of the size of most of the nuggets and the remarks printed on the accompanying cards such as: "Gold dust, value \$61.19, one-tenth part of the amount re-

cubic foot of auriferous gravel containing \$93 in gold dust and nuggets, similarly exhibited and sent by W. Leek, Esq., Dawson. The third exhibit is the best of all and is perhaps the most practical of all the exhibits connected with the alluvial gold display as it is easily explained to everyone and is readily understood by the *profanum vulgus* which would have driven Horace out of his senses had he had to stay day after day in this "mineral court." It consists of sections of gravels reconstructed from actual samples taken from Claim No. 27 above Discovery, Bonanza, by Mr. R. G. McConnell, and shows the actual beds encountered in mining before pay dirt is reached. These consist as follows: About one foot of surface muck and moss, then nine feet of alternating beds of sand muck and gravel. The pay gravel and the broken auriferous bed rock underneath are also



Another Point of View.

covered by four men sluicing for 17 hours." In the sign above the case the word Klondyke is substituted for Yukon—a very sensible idea—many thousands visiting the exhibition having heard about "Klondyke" who never heard the word "Yukon" in their lives. One very great attraction is a rosary lent by Rev. F. P. E. Gendreau made entirely of nuggets in the rough from the various diggings. Accompanying the Klondyke collection, and explanatory of it, are three very good exhibits indeed. The first of these is a section of gravel showing pay dirt placed in a large glass jar from the United Mines, Adams Hill, Bonanza Creek, and sent by the Geological Survey Department. The second is one

shown. The upright case containing these sections is placed close to the placer cases.

The gold of the Northwest Territories is represented by two samples of dust from the North Saskatchewan River, and that of Quebec by samples of dust and models of nuggets from the upper waters of the Salmon River and the Chaudiere and its tributaries. All of these are sent by the Geological Survey Department.

(2.) Gold Bearing Quartz and Other Gold Ores.—The display of these ores is not only large but very varied—more so than in any other similar exhibit in the exhibition (there being in all 317 exhibits)—and includes gold, silver, copper and gold-copper smelt-

ing ores from B. C. The specimens are those of ordinary workable ore and not picked samples purely interesting from a mineralogical point of view. To classify a great many of them which come from B. C. was no easy matter, many specimens representing undeveloped or only partially developed deposits, so that often the ore had practically to be judged by its appearance, no data being at hand by which it could be grouped with certainty.

**Milling Ore.**—The milling ores from B. C. are represented by 73 specimens in all. The number is not surprising, but the interest in this exhibit lies in the fact that the samples come from so many different districts, viz.: Alberni, Victoria, Clayoquot, Phillips Arm, New Westminster, Cariboo, Lillooet, Yale, Kamloops, Fairview, McKinney, Boundary, Carnes Creek, Ground Hog Basin, Revelstoke, Trout Lake, Blue Grouse Mountain, Nelson, Ymir and both N. E. and S. E. Kootenay. Every property of any prominence as a milling, concentrating or cyaniding proposition is represented by a sample—one comes across such familiar names as Doratha Morton, Bend d'Or, Minnehaha, Fontenoy, Waterloo, Cariboo-Amelia Jewel, C. O. D., Athabasca, Fern, Tamarac, Dundee, Porto Rico, Ymir, R. E. Burns, etc. This collection though not very attractive to the general public (few of the samples show free gold) is interesting on account of the variety in appearance of the exhibits—"free milling ore" evidently being a very elastic term.

The Ontario and Nova Scotia milling ores comprise practically the whole gold exhibits from those provinces. That from Ontario comes principally from the Lake of the Woods, Shoal Lake, Rainy Lake, Seine River, Shebandowan, Thunder Bay, Jackfish Bay, Michipicoten Districts and Wahnapiat north of Sudbury. The specimens are very similar in appearance. A few samples, however, from Hastings County of auriferous mispickel lend a little variety to the collection. The exhibit is made up of 86 samples, comprising specimens from, *inter alia*, the following well known mines: Mikado, Sidar, Britannia (Gold Hill), Sultana, Regina, Foley, Olive, Golden Star, Sawbill, Hammond Reef, Independence and Deloro. A large number of these show plenty of free gold. In the Nova Scotia exhibit the quartz has also a great uniformity of appearance, even as to the width of the vein (about 13 inches) plainly shown by the specimens. Practically every exhibit shows a great deal of free gold—some so much in fact that a special steel case (similar to those used for the placer exhibit) was made to hold the finest specimens. The Nova Scotia collection is very interesting to the crowds visiting the exhibition on account of the richness of the samples sent—just suited to an exhibition such as this where crowds visit our mining section simply to see the rich free gold samples and nothing else. It is a pity that a larger quantity of this class of ore was not sent, as though it is of little interest to mining people, still it helps immensely to advertise our mineral resources among the general public. (The West Australia mining exhibit, to which I will refer later on, consists practically of nothing but rich free gold samples. West Australia can give us several pointers on advertising.) In connection with the Nova Scotia gold ores, and explanatory of the formation in which the ore is found, is a very interesting model sent by the Geological Survey Department. This was made by Mr. E. R.

Faribault, B.A., Sc., and the information it conveys is the result of many years work and study. Briefly described, this sectional model of the gold district of Goldenville, N.S., shows that the formation there is similar to that of Bendigo, Australia, and that deep mining can be carried on there with every certainty of success, provided that the zones of special enrichment are followed.

The Nova Scotia gold exhibits come from the following districts: Goldenville, Isaacs Harbor, Wine Harbor, Laurancetown, Caribou, Waverley, Montague, Salmon River, Cow Bay, South Uniacke, Mount Uniacke, Renfrew, West Gore, Leipsigate, Cranberry Head, North Brookfield and Molega Barrens.

**British Columbia Gold Smelting Ores**—British Columbia is the only province sending an exhibit of various kinds of this class of ore, which is really the most interesting portion of the Canadian exhibit of gold ores. Though so familiar to all Western mining men, it is really wonderful how little they are understood or known of here—even by people who have a fairly thorough knowledge of the gold mining industry in general—and write articles for the continental mining press. A great many technical people of all kinds and from all the European countries have visited the exhibit and made a careful study of it. They were very much interested therefore in an exhibit sent by the Canadian Smelting Works, Trail, illustrating the process followed in the treatment of the Rossland ores, and consisting as follows:

Pyrrhotite and chalcopyrite (War Eagle mine.)

Pyrrhotite and chalcopyrite (Centre Star mine.)

Pyrrhotite and chalcopyrite (Iron Mask mine.)

Flux limestone, Kootenay Lake.

Coke fuel, Crow's Nest Pass.

Coal, Crow's Nest Pass.

Roasted ores from roast heaps, 1st class.

Roasted ores from roast heaps, 2nd class.

Granulated matte.

Granulated matte calcined and briquetted.

Flue dust from flues.

Flue dust briquetted.

Slag brick used in flooring the works.

High grade matte.

Waste granulated slag.

According to the catalogue 54 ore samples sent are classed as straight gold smelting ores. Among these are specimens from the following properties: Golden Crown, Gold Drop, Winnipeg, Humming Bird, Pathfinder, Lexington, Lincoln and City of Paris in the Boundary, and the Colorna, Virginia, Homestake, Giant, Deer Park, Evening Star, Iron Mask, Le Roi, Monte Christo, Nickel Plate, Velvet, Victory, Triumph, War Eagle, White Bear and Columbia and Kootenay in the Rossland district. Of the samples of smelting ores classed as gold and copper or gold-silver-copper propositions there are in all 56, among which are included specimens from: The Alberni and Clayoquot Districts, the Van Anda Copper and Gold Co.'s properties (including an exhibit of furnace products), other Texada claims and the following mines: Lenora (Mount Sicker), Big Copper and Mother Lode (Boundary), True Blue (Kaslo), Lily May (Rossland), Paris Exhibition Group (Tracy Creek), etc.

The collection of silver ores may be summed under three heads, (1) Silver Ores Proper, (2) Silver Lead Ores and (3) Silver Copper Ores.

**Silver Ores Proper**—In this class only three specimens appear from B. C. From the Fisher Maiden (Silverton), the Dolly Varden (Carpenter Creek), and the Evening Star (Slocan.) There is also an exhibit of arquerite nuggets and models of same (from the Omineca) sent by the Geological Survey. The other exhibits come from the Silver Mountain, the



Copper Gold Ores from British Columbia.

Rabbit Mountain and the Porcupine mines in the Thunder Bay district of Ontario. The samples contain a great deal of leaf argentite, and make a very fine display.

**Silver Lead Ores**—These all come from B.C. and make up a collection of 147 exhibits. The greater part of the specimens are clean solid argentiferous galenas from the Slocan, though many other varieties of silver ore are shown, and the Ainsworth, Lardeau, Trout Lake, Revelstoke, Illecillewaet, Goat River, Golden, Windermere and Fort Steele districts are all well represented. The collection from the Slocan makes a very handsome exhibit, and is shown on a special pyramid. Generally speaking, there is a specimen from every well known silver-lead property in B.C. It is a wonderful exhibit considering the newness of the silver mining industry in the province. Other countries (notably Hungary) which have been producing silver for centuries show very little in the way of silver ores either as regards quantity or variety. As with some of the British Columbia gold ores very large chunks were allowed to be sent. These are a great attraction as their size catches the eye. The smaller specimens in the silver case (more interesting on account of their variety) are passed by unnoticed except by those making a serious study of the exhibit. Of course few people visit the collection with a view of examining specimens or exhibits or even acquiring information about any special property, even any district, but still some do so, and there is no doubt whatever that many have been led to make enquiries about the silver lead industry in British Columbia entirely on account of the large ore

specimens sent by certain mines, among which are: The Best, Goodenough, Noble Five, Trade Dollar, Payne and Last Chance (Sandon); Whitewater, Whitewater Deep, United, Blue Bell and Tariff (Ainsworth); the Monitor (Three Forks); Lucky Jim (Bear Lake); and Sullivan Group (Fort Steele.) Strange to say there is no exhibit from one of the principal producing mines the St. Eugene (Moyie) Southeast Kootenay. One thing which has to some extent astonished technical visitors is the area of the silver producing districts in British Columbia—much greater than those of other countries—according to the statements of learned Germans who have gone into detail.

**Silver-Copper Ores**.—This collection is also made up entirely of specimens from British Columbia, and though small (there being only 21 exhibits) is none the less interesting. Most of the specimens are from the Nelson district and from East Kootenay. There are however a few from the Boundary. The most important exhibit in every way is sent from the Hall Mines, Ltd., Nelson, and is well worth describing in some detail, as it is explanatory of the metallurgical industry of that town: Copper ore (Silver King mine) matte, white metal, copper bar, section of anode, copper slag (granulated), copper slag (coarse), lead matte, lead bullion, lead slag (granulated), lead slag coarse, coke, coal, limestone flux, iron ore flux.

**Copper Ores**.—This collection is made up of 130 samples of which 97 come from British Columbia, 7 from Ontario, 6 from Quebec, 17 from Nova Scotia, and one from the Yukon. Native copper is represented by two specimens from Blake township and Point Mamainse, Ontario. One magnificent sample of natural copper from Atlin, B. C. is also on exhibition, having been loaned by Mr. Achille Daumont, Paris. It is undoubtedly the finest exhibit here.



Too Like a Museum.

Of the British Columbia copper exhibits a great many might come under the class of gold-copper ores and the greater part of the specimens contain other values as well as copper. Practically every variety of copper ore is represented which makes this collection a particularly good one. The samples come from Alberni, West Coast, Skeena, Kamloops, Boundary, Revelstoke, Nelson, Goat River, Golden, Winder-

mere and Fort Steele. Among the better known claims contributing may be mentioned the Hayes mine (Alberni), Iron Mask, and Pothook (Kamloops), War Eagle, Old Ironsides, Brooklyn, Stemwinder, Knob Hill, Snowshoe, B. C., Oro Denoro, Diamond Hitch and Royal Victoria (in the Boundary), Hidden Treasure, (Spillamachine, Golden) and the Dibble Group (Fort Steele).

**Ontario Copper Ores.**—This collection, though small, is none the less interesting and instructive. The samples come from the Lake Superior, Algoma and Parry Sound districts and from Hastings county. One especially fine specimen of bornite comes from Parry Sound district and from Hastings county, seen from the Algoma district.

**Quebec Copper Ores.**—This display is entirely made up of samples sent by Dr. J. Reed, of Reedsdale, Que., and the department of Geological Survey. The specimens come from various parts of the Province where copper mining operations were formerly carried on.

**Nova Scotia Copper Ores.**—These are practically all specimens of chalcopryite. Those which attracted most attention come from the deposits of Coxheath, near Sydney, the George River and Antigonish County and have the appearance of being high grade.

**Lead.**—To all intents and purposes the producing lead ores have been mentioned before when describing the British Columbia silver exhibit. There is, however, a collection of galenas from Ontario and Nova Scotia (14 specimens in all) which, though evidently low grade, may represent deposits which will be workable at some future period.

**Zinc.**—Though Canada has at present no zinc industry, blende occurs in so many galena deposits in the East and British Columbia that further exploitation may lead to such being established. In the exhibit, here, however, are only two specimens of blende—one from the Zenith mine, Thunder Bay, Ontario, the other from Calumet Island, Pontiac County, Quebec.

**Platinum.**—This is a very interesting exhibit, the specimens coming from British Columbia and Ontario. Those from British Columbia are samples of crude platinum from North Bend, Fraser River (obtained in dredging) from Quesnelle Forks (obtained in hydraulicking) and various samples from the Tula-meen. The Ontario samples consist of gossan holding sperrylite and palladium and platinum ore from the Vermilion mine in the Algoma district and sperrylite from Sudbury.

**Mercury.**—British Columbia is the only Province represented in this exhibit, the specimens being cinnabar and metacinnabarite from Copper Creek and Hardie Mountain, near Kamloops.

**Antimony.**—This exhibit consists of a sample of antimony ore from Wolfe County, Quebec, and specimens of stibnite from York County, New Brunswick and Hants County, Nova Scotia.

**Nickel.**—This is one of the most important and attractive exhibits in the entire collection and one which has been very interesting to the many geologists, mineralogists, mining engineers, etc., of so many nationalities, who have visited the Canadian pavilion. With the exception of four samples, sent by the Geological Survey and which originate from Pontiac County and Brome County, P. Q., and Charlotte County, N. B., the ores all come from the

Sudbury region. The latter consist of nickeliferous pyrrhotite chalcopryite, bornite and chalcocite, some being very similar in appearance to our British Columbia gold-copper ores. The principal exhibit is a joint display made by the Orford Copper Co., and the Canadian Copper Co., of Sudbury, consisting as follows: Pyrrhotite (nickeliferous), chalcopryite, pyrrhotite and chalcocite (copper-nickel ore), from the Copper Cliff mine, Sudbury, standard copper-nickel matte, single-blow bessemerized nickel matte, pyritic matte produced from the first run of fifty tons of copper ore, with cold blast; no carbonaceous or other fuel used other than sulphur and iron contents of the ore, heap-roasted copper-nickel matte, granulated slag waste, Vermilion mine copper-nickel ore, nickel oxide, nickel sulphide, powdered nickel, nickel shot, nickel plaquettes.

A great deal of extra interest has been taken in this exhibit here on account of the fact that the French colony of New Caledonia is, practically speaking, at the present time, the only nickel producing district in the world, and has a large exhibit of nickel ore in the French colonial section.

**Cobalt.**—This exhibit consists of one specimen of cobalt bloom from Goat Mountain (Goat River) B. C., sent by the British Columbia Department of Mines.

(To be Continued.)

#### \*THE CHOICE OF SLAGS FOR LEAD SMELTING.

(By Capt. C. C. Longridge, M.Inst.M.E., M.I.Mech.E.)

THE nature of the ore and the character and prices of the fluxes available, indicate, in each case, the constitution of the most suitable slag for lead smelting in the blast furnace. In general, the choice is easily made, as experience has established the relations that should preferably exist between the slag constituents, the chief of which are:

**Silica.**—The slag percentage of  $\text{SiO}_2$  may range between 28 per cent. to 36 per cent. The lowest limit is from 14 per cent. to 15 per cent., and the highest 40 per cent. The former is used only with barytic ores; the latter necessitates a very high smelting temperature, and therefore heavy consumption of fuel, with considerable volatilization losses. The slags, moreover, are viscous and likely to retain much lead as silicate. There is also danger of the formation of iron sows or crucible accretions. In ordinary circumstances, therefore, and with any usual ore mixture, not too rich in zinc, a suitable silica percentage in the slag lies between 30 per cent. and 35 per cent. There should not be less than 30 per cent. of silica, unless there is more than 10 per cent. of zinc oxide in the charge. As the zinc percentage rises that of silica may drop to 25 per cent., which, in general, is the lowest practical limit. When the charge does not contain much zinc, it is often advisable, especially when fluxes are dear, to use a sesquisilicate slag. For though more fuel is used, the quantity of slag is less, and thus the total lead and silver losses in the slag are lower.

**Ferrous Oxide.**—The percentage of  $\text{FeO}$  may vary from 24 per cent. to 52 per cent., both figures being extremes. High percentages of iron are not only costly, but by raising the specific gravity of the slag increase the difficulties of separation, and cause matte

\* The Mining Journal, London.

and lead to be left in the slag. They are also liable to form iron crusts in the furnace. A high iron percentage, however, is necessary, if the ore contains much zinc. If the FeO is reduced below 24 per cent. the earthy bases, which, in such a case, must be used in lieu of iron, render the slag very refractory.

**Lime.**—The amount of CaO in a slag usually ranges between 12 per cent. and 28 per cent., perhaps extremes are 6 per cent. and 30 per cent. With zinciferous ores, the less lime and the more iron used the better. With from 9 per cent. to 12 per cent. of zinc in the charge, it is not advisable to go beyond 16 per cent. of lime in the slag. With 28 per cent. of lime, zinc is volatilized, and incrusts the furnace, but does not enter the slag. The effect of CaO is to lessen the specific gravity of the slag, and to increase its viscosity. To promote the fluidity of a slag rich in lime, a higher temperature, and, therefore, more fuel and a stronger blast, is needed. When hot and fluid, limey slags chill slower than slags rich in iron, and they are more readily separate from matte, etc. At equal prices burnt lime is preferable to raw limestone. Dolomite, on account of its magnesia, should be avoided, when other limestone is available.

**Magnesia.**—The presence of magnesia in lead smelting is undesirable, as it causes a viscous slag, especially when zinc is present. In a slag carrying 8 per cent. of zinc, and from 2 per cent. to 3 per cent. of baryta, magnesia to the extent of 2 per cent. to 3 per cent. is bad; while 5 per cent. is very troublesome, and, being liable to cause chills, may necessitate more fuel to create a high temperature. When a slag is rich in alumina, the presence of magnesia, perhaps on account of the formation of spinel, does not seem to be nearly so objectionable.

**Alumina.**—In the presence of a large excess of silica, alumina may be treated as a base and *vice versa*. When the percentage of silica is just enough to form a monosilicate of iron and lime, the acidity or basicity of the alumina will depend on attendant circumstances. Generally speaking, for any percentage of silica, slags rich in lime will bear more alumina than those rich in iron. Heinrich, cited by Hofman, gives the following two types of silicate-aluminate slags, for ores rich in alumina:—

Theoretical composition of the Slags.	No. 1 Slag.	No. 2 Slag.
SiO <sub>2</sub> .....	16.1	35.0
Al <sub>2</sub> O <sub>3</sub> .....	18.2	13.2
FeO .....	25.7	37.3
CaO .....	40.0	14.5

Combinations of these can be made to meet all cases. When the ores have little or no zinc, and sufficient alumina to yield a slag with from 8 per cent. to 12 per cent. Al<sub>2</sub>O<sub>3</sub>; and when at the same time, iron flux is dearer than limestone, No. 8 slag in Table I. should be used.

**Flour Spar.**—Fluoride of calcium alone has little or no effect. Combined with barium and calcium sulphates, it produces very fusible compounds, the fluidity of which assists zinc and other less fusible compounds to enter the slag. It is therefore, a valuable fluxing component of gangue. Speaking of Mexican ores, Mr. O. H. Hahn says: "Flour spar, which is not often found associated with Mexican ores, which like cuprous sulphide of zincy matte, only in a differ-

ent way. It renders the slag so hot and liquid that the zincy matte remains with the iron matte, and does not segregate as in the case of a slag of a lower temperature. Such ore (with fluor spar gangue in notable quantity) permits a considerable reduction in fuel, and is also beneficial in the treatment of ores carrying barite."

**Sulphates of Baryta, Lime, and Sodium.**—Heavy spar is partially reduced to sulphide of barium, which is detrimental to separation, and partially through the action of iron, to a very fusible double silicate of baryta. Calcium and sodium sulphates act in a similar way. Of the sulphur in these sulphides only 10 per cent. should be considered available for combining with iron to form sulphide of iron.

**Oxide of Zinc.**—The evil influence of zinc should be minimised by removing as much as possible of this metal before smelting. For this purpose roasting, or distillation, chemical leaching, electro-chlorination, &c., are employed. The effects of zinc in smelting are to decrease the fusibility of the charge, to thicken the slag, thus impeding separation, and to carry metallic sulphides into the slag.

If much zinc oxide has to be slagged off, care should be taken to prevent its reduction to metal in the furnace; for the metal becoming volatilized would not only cause lead and silver losses, but might form troublesome furnace accretions. To hinder the above difficulties, the smelting should be done as quickly and at as low a temperature as possible, while to increase the fusibility and fluidity of the slag, the percentage of silica should be kept low or at least moderate, and that of iron should be raised. If sufficient iron cannot be used, and a slag high in lime has to be employed, one half of the ZnO may be considered as replacing an equal amount of the CaO in the slag. If this is done the total of SiO<sub>2</sub>, FeO and CaO will have to be made more than 90. According to Collins when the zinc oxide is 4 to 8 per cent., it may replace lime in monosilicate slags, 10 parts of ZnO being substituted for seven parts of lead.

Some metallurgists reckon that, in practice every five parts of ZnO require the lime to be reduced by more than equal amount and the iron correspondingly increased. In this way the No. 3 slag in Table I., 33 SiO<sub>2</sub>, 33 FeO, 24 CaO, ZnO (vide 1-2<sup>o</sup>) becomes No. 10 slag 33 SiO<sub>2</sub>, 36 FeO, 16 CaO, 7 ZnO, when running on zincy ores. It is however, better to diminish the silica also; thus a very good slag for zincy ores is No. 11, 30 SiO<sub>2</sub>, 36 FeO, 16 CaO, 10 ZnO its formula being 3 (2 RO<sub>2</sub>SiO<sub>2</sub>) + CaOSiO<sub>2</sub> in which

R is  $\frac{4}{5}$  Fe,  $\frac{1}{5}$  Zn. If the proportion of zinc is more

than 8 per cent. in a high lime slag, or is from 16-20 per cent. in a slag carrying 12-15 per cent. lime, the slag becomes too pasty and heavy to separate readily from the matter. Generally speaking if the quantity of ZnO rises above 10 per cent. all ordinary slags become pasty and tend to form accretions above the lead. With a monosilicate slag, according to Hofman, 16 per cent. ZnO is the maximum with which it is possible to run, and this soon closes up the crucible. But Greenway, according to Collins, has found that over 20 per cent. of ZnO can be easily run, provided the slag is rich in iron, and that the silica and lime are kept within narrow limits, those for the former being between 23.5 and 26 per cent., and for the latter between 12 and 16 per cent. This is easy where the zinc-lead ores are accompanied by much pyrites to serve

as flux after roasting; but if this is not so, a good deal of barren iron ore has to be used.

The following are cited by Hofman as successful combinations for zincy slags high in lime.

Table of Slags Suitable for Smelting Lead Ores with High Percentage of Zinc.

.....	34	35	27.9	30.0	26.0	27.0	24.5	26.0	27.0	26.8	30.8	31.96	16.90
.....	34	38	33.9	29.0	33.4	31.5	29.4	32.1	26.5	22.7	24.5	31.82	35.05
.....	17	13	14.8	14.0	14.4	19.0	21.5	19.0	24.3	24.0	22.8	6.8	6.03
.....	9	12	16.8	15.8	19.8	15.0	14.5	15.9	14.1	21.0	17.7	13.84	19.61
ZnS	—	—	—	—	—	—	—	—	—	—	—	6.71	—
BasO <sub>4</sub>	—	—	—	—	—	—	—	—	—	—	—	—	10.24
OR	—	—	—	—	—	—	—	—	—	—	—	—	or
Bas	—	—	—	—	—	—	—	—	—	—	—	—	8.13
Al <sub>2</sub> O <sub>3</sub> .	—	—	—	—	—	—	—	—	—	—	8.77	—	6.31

Copper.—The influence of copper in lead smelting depends on the sulphur present. In smelting raw ore, copper pyrites loses about one-fourth of its sulphur, and fuses down into copper sub-sulphide or matte, into which other copper sulphides enter unchanged. If there is not sufficient sulphur present in the charge to convert the whole of the copper into cuprous sub-sulphide, the residue of the copper will be reduced to metal, and alloyed with the lead, forming a heavy and hard mixture that sinks to the bottom and closes up the passage of the lead well. Even when sufficient sulphur is present, this is likely to occur in concentrating copper-lead matte, carrying 12 per cent, and upwards of copper, if the slag is highly ferruginous. The reason is that in the presence of highly ferruginous basic slags some of the sulphur is taken up by iron, and an equivalent proportion of copper goes into the lead. When running on coppery ores, therefore, slags fairly high in lime give cleaner lead, and in such cases, slags with an excess of iron are to be avoided. With a slag high in lime, and therefore, melting at a high temperature, it may be reckoned that nearly half the sulphur not appropriated by the copper will enter the slag or pass off as gas.

Antimony.—This is a very prejudicial impurity, causing heavy losses by volatilization, and also injuriously hardening the lead. As antimony is more likely to combine with lead than with iron, antimonial speiss is seldom found, and, in calculating ore charges therefore, the small quantity of iron that may combine with the antimony can be neglected. In cases where antimonial speiss is formed, although it always abstracts copper, it rarely takes much iron unless arsenic is present. Antimonial absorbs more silver than arsenical speiss. In smelting antimonial by-products of refineries, containing little iron, a high temperature is needed, and the volatilization losses of silver and lead, and antimony are heavy. If such by-products contain much iron, antimonial speiss may be formed and lost in the slag. Of the two evils a ferruginous slag is generally the lesser.

Arsenic.—This, in a lesser degree than antimony, causes loss by volatilization and injures the lead. It also readily combines with iron to form arsenical speiss (Fe<sup>2</sup>As; Fe<sup>4</sup>As; Fe<sup>5</sup>As<sup>2</sup>; Fe<sup>6</sup>As<sup>2</sup>), containing notable quantities of Pb, Cu, and Ag, separable only with difficulty and expense. Of the above combinations, Fe<sup>5</sup>As<sup>2</sup> is preferable, as it is more fusible and separating better from the lead, and not so readily forming hearth accretions. If the arsenic percentage is low, speiss can be avoided by working with less fuel and lime and with an open charge, thus promoting the volatilization of the arsenic. The shortness of lime causes the silica to combine with the iron, leaving little or none of this metal to form speiss. If,

on the other hand, the arsenic percentage is high, speiss will inevitably be formed. As this is liable to chill, a high temperature is needed, and the slag used therefore, should not be too readily fusible. With very arsenical ores, then, it is advisable to make slags high in lime and somewhat more acid than monosilicates. As the fusibility of the slag must be inversely proportionate to the quantity of speiss, if this is great, a sesquisilicate slag such as No. 7 in Table I. may be advisable, so as to keep the temperature of the slag as high as possible and prevent chilling of the speiss.

## HEAT ECONOMY.

(By A. A. Watson, B.Sc., Provincial Assayer, Vernon, B.C.)

DOES it ever occur to the average householder when he sits by his warm stove or fireside on a cold winter day watching the smoke issuing from his neighbour's chimney what a waste of combustible material is displayed there? Probably not often, but if the householder is still content to waste his fuel, the manufacturer is not. The latter has to effect all economy in every direction or go down in the struggle for existence. During the last half century or so means have been devised whereby nearly all the heating effect possible may be obtained from fuel. When coal burns in an ordinary furnace a great deal of it escapes in the form of hydrocarbons, carbonic oxide and fine dust. Smoke is produced in the greatest quantity when fresh coal is introduced into the furnace or when the fire is first started and is due to the distillation which at once takes place evolving a large portion of volatile matter from the coal which there is either not sufficient air to fully consume or the flame of which is cooled so much by contact with cold surface as to cause a deposition of solid carbon. The prevention of smoke does not, however, prove perfect combustion, as if it be prevented by greatly limiting the supply of cold air a large portion may be ascending the chimney invisibly in the form of carbonic oxide, a combustible gas which burns with a large supply of air.

One of the best patents taken out with the idea of economizing fuel was one by Gardiner, a London ironmaster, in the year 1788. The hot gases from the furnace were not burnt over again, but were simply carried under steam boilers and the heat of the gases was sufficient to boil the water. This was certainly better than allowing the gases to escape altogether, but in modern practice the object aimed at is to turn the coal into gaseous fuel, the supply of which can be controlled, and then burn that. Later on patents were taken out by an inventor, of the name of Robertson, for introducing a current of hot air into the flame in order to burn the smoke. Messrs. Howard & Co., invented a special kind of furnace shaped very much like a reverberatory furnace. The coal was burnt near the mouth of the furnace and the boiler was fitted into the space usually occupied by ore, a space of about a foot being left between the bed of the furnace and the bottom of the boiler in order that the flame might play underneath it. The supply of air to the coal was regulated by slides in the ash-pit door and air was blown in underneath the boiler. The fresh coal at such firing was fed as near the mouth of the furnace as possible and the partly burnt coal pressed back so that the hot gases distilled from the



new supply of coal pressed over what was practically red-hot coke and were there ignited before meeting the blast of air underneath the boiler and thus an almost perfect combustion of the smoke was obtained. The saving in fuel was found to be from a quarter to half the total amount used. As it was found that the greatest loss of combustible material always took place when a fresh supply of coal was introduced into the furnace mechanical stokers were invented which, by introducing fresh coal in very small quantities continuously, prevented there being at any time a large volume of distilled gases in the furnace. It was easier to deal with a small quantity of gas at a time than with a sudden accumulation at intervals. Many different kinds of mechanical stokers were invented but the most satisfactory have been the screw grates first invented by Mr. J. G. Bodmer. In this invention the coal is fed into the furnace through a hopper near the charging door. The grate bars are moveable and coincide with the threads of screws which move them alternately backwards and forwards, causing the coal to gradually travel from the front to the back of the furnace. In the Frisbie stoking apparatus a different idea is adopted, the coal being fed from below and this coming into contact with the incandescent mass above evolves its gas to be considered on rising through the fire.

It has been found, however, that no arrangement for burning solid fuel can be compared for a moment with the method of gasefying the fuel and burning the gas, as regards economy. In order to have complete combustion it is necessary to have an intimate mixture of the particles of fuel with those of oxygen and to maintain the temperature high enough to allow of chemical action taking place freely. When fuel is burnt, only the particles on the surface come into contact with oxygen and if we employ methods of burning the smoke by blowing air into it the temperature is lowered by the introduction of so much cold air. With gaseous fuel we have neither of these disadvantages. On the other hand coal possesses one advantage for boiler fires which is not possessed by gas and that is the large amount of radiant heat it yields when the coal is fully coked and the solid mass on the fire bars is incandescent. Nevertheless it has been shown by experiments on a large scale that a ton of coal will evaporate more water if coked first and the gas and coke burnt separately than it will when burnt directly under a boiler.

One of the earliest used of gaseous fuel was made a great many years ago when the waste gases from blast furnaces were used for boilers in the iron smelting industry. Bunsen was one of the first to analyse the waste gases and he took for his experiments gases from the furnace of Veckerhagen in Hesse, where wood and charcoal was used as fuel. He found that the greatest percentage of carbonic oxide and marsh gas existed about two-thirds of the way up the furnace. The combustion was as follows:

Nitrogen . . . . .	62.47
Carbonic acid . . . . .	3.44
Carbonic oxide . . . . .	30.08
Marsh gas . . . . .	2.24
Hydrogen . . . . .	1.77
	100.00

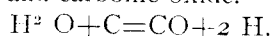
The gas is usually conveyed to the front of boilers by overhead mains with vertical branches leading

downward. The air for combustion is generally admitted through openings in the furnace door. Not only is a great saving of coal effected but there is also less wear and tear on the boiler.

Several appliances have been adopted by generating combustible gases. One of these, known as the Bischoff producer, is shaped something like a blast furnace. A layer of burning fuel is thrown upon the grate and the furnace is then filled to the top. The door below the grate is then closed and air is only allowed to enter through three two-inch holes. The carbonic acid first produced from the ignited coal on traversing the upper layers of red hot coal is reduced to carbonic oxide in accordance with the equation  $C + C O^2 = 2 C O$ .

The carbonic oxide is a combustible gas and is collected along with marsh gas and hydrogen evolved from the hot coal. Thus instead of losing the heating power of the distilled gases, or, more correctly, products of destructive distillation, we are enabled to use it all and the coke remaining in the producer can also be used. The hot gases can also be used for boilers on their way to the storage cylinders and thus no heat need be wasted. The gas obtained by this process is somewhat similar in composition to coal gas, but it is not suitable for lighting purposes.

One of the most economical methods of using coal for heat is to manufacture water gas from it. The principal of the process is that if steam be passed through red hot coal, the carbon of the latter reacts with the steam to form two combustible gases, hydrogen and carbonic oxide.



Thus beside the hydrogen and marsh gas which distils off from coal in an ordinary producer we are enabled to use, in addition, the heating power of hydrogen contained in steam and have so many available heat units to the good. For this purpose an apparatus invented by Messrs. Lowe & Strong consists of a generator, superheater, purifier and scrubber. The generator and superheater are built like cupola furnaces, having a chimney rising from the top. The superheater, which is made half as high again as the generator, has near the bottom an air-space formed by a perforated arch above which it is nearly filled with loosely stacked fire-bricks. A pipe connects the top of the generator with the bottom of the superheater, and a pipe, controlled by a valve, leads the gas from the top of the superheater to the purifier and thence to the hydraulic main for storage. In starting work the generator is charged with coal and fired with the aid of an air blast under the grate. The gases, consisting chiefly of carbonic oxide, pass into the superheater where, meeting an air-blast, they ignite and gradually bring the bricks to a white heat. The air blasts are now shut off, the gas outlet opened and superheater steam is blown into the mass of coal in the generator. Here the steam is decomposed as indicated in the equation above and then passes through the superheater and purifiers to the main. Sometimes petroleum oil is passed into the generator at the top of the coal and the gases evolved mix with the hydrogen and carbonic oxide. The object of the purifier and scrubber is to cleanse the gas from traces of nitrogenous gases which are useless for burning. Many modifications of this apparatus have been made, but the general principle is the same in all of them.

## THE RED STAR AND IRON CASK.

## A Resume.

If there's one fact that's apparent  
To the thoughtful British parent  
As worthy of transmitting from the father to the kid,  
'Tis the logical foundation  
Of the Anglo-Saxon nation  
That law is law and right is right, and Justice must  
be did.

Which it happens in the mountains  
That we sometimes tap the fountains  
Of justice a la Mining Law (and pay for it like men)  
And so for British glory  
I'll put you up the story  
Of a fracas which the like of it may not occur again.

It was Evil-pork, the seller  
Of rye whiskey—and a feller  
Called the "Colonel from Spokane" had bought con-  
tagious mining claims  
And a difference of opinion  
Re the laws of this Dominion  
Resulted in their hauling off and calling naughty  
names.

But as they were merely spasms  
They soon dropped their crude sarcasms  
And stoping out their pocket books retained such  
legal lights  
As were strong on Extra Lateral  
And could (for good collateral)  
Amend the woe of torted Doe and win for Roe his  
rights.

Doe opened up the function  
By securing an injunction  
Which Roe had quashed and Doe in turn the quash-  
ing got annulled  
But with six months' hocus pocus  
Things were sorted to a focus  
And from the facts in evidence these postulations  
were culled.

(Taken subject to exception  
For a higher court's inspection)  
Both claims were bad locations and improperly trans-  
ferred,  
Staked by miners without license,  
Unrecorded—in a higher sense  
The claims were proved invalid—non-existent is the  
word.

But (and here the court recanted)  
Since the claims were both Crown granted  
It might be shown they *did* exist in spite of law and  
fact  
So the court doth now decide that  
Litigants be notified that  
The game is up to them with costs according to the  
Act.

Tho' the feud was now a stand-off  
Neither party had command of  
Sense and temper quite sufficient for to call the **game**  
a draw.  
So they played the bank wide open  
And when rich men get a copin'  
It's pie for honest witnesses and minions of the law.

Counsel, barrister, conveyer,  
Mining engineer, surveyor,  
The analyst, the rubberneck, the expert from the  
South,  
Broker, jumper, miner, mucker,  
Mining shark and mining sucker  
Made a living for a season by the shooting of his  
mouth.

'Twas the Roe brigade which had a  
Mining expert from Nevada  
To show his veins by shearing, their schistosity ac-  
quire.  
And by tests experimental  
To expound the fundamental  
And scientific principle that Doe's man was a liar.

But the Doe man (King of experts)  
Gave the court selected excerpts  
From his work on "New Geolog"—or "How them  
Rocklets grow."  
And with logic quite impressive  
Proved the fissures were compressive  
With parallel filtrations from the magma tank below.

Then with profile, plan and section  
Did the plaintiff prove connection  
Of ore from adit level three with vein in Red Star  
winze  
Cinching every demonstration  
With a black-board calculation  
(The weary judge he groaned aloud, and listened—  
for his sins.)

But the defendant with a model  
Made it clear to any noddle  
That dip and strike continued on an oriental plane  
Would when properly projected  
Show the bodies disconnected  
(The weary judge he groaned aloud and listened in  
his pain.)

Space at my command prohibits  
Any list of the exhibits  
From A & B to X Y Z and twenty thousand more  
But the clerk who did the filing  
Now, they say, is busy piling  
Imaginary documents upon a padded floor.

Leaving him with his delusion  
We must haste to our conclusion,  
The judge's wise decision when the last long speech  
was said  
Well, to give it in a trice—he  
Took the matter sub-judice—  
While the lawyers went to Europe, and the litigants—  
to bed.

L'Envor.

Doe and Roe, much out of pocket  
Each by a leg loose in its socket  
Came together by appointment—and here my lan-  
guage fails  
For—I tell it to my sorrow  
Roe and Doe from me did borrow  
A silver dol. to arbitrate with good old heads and  
tails.

—J. H. McG.

## AN ECCENTRIC ASSAYER.

A correspondent of the *New York Engineering and Mining Journal* sends our contemporary a copy of a very original certificate of assay, for the authenticity of which he vouches, at the same time asserting that it was received from an assayer (?) in the regular course of business. The certificate runs as follows: "Well I received your ore and have been working on it since and I find that it contains the following:

Gold sulphide about . . . . .	.001%	
Silver sulphide . . . . .	.0005	
Zinc sulphide . . . . .	.008	
Iron sulphide from . . . . .	.2	To 5%
Iron oxide from . . . . .	.5%	To 1%

"Then there were some others that are not worth anything and will not interfere with the assaying such as organic matter, silica and a free acid or two. The gold and silver will not be very hard to get out, but it will have to be crushed pretty fine, and if there is much of it you have got a good thing.

"If you find anything else in that line I will be glad to get a sample and mabe I can help you in some in anything of that kind, if so I will be glad to do so, as I want all the practice I can get, and in simple analysis I can do as good work as anybody, and don't charge, anything. Those quantities are not exactly right as I have just broke my scales and could not weigh them, but I will have the apperatrice for volumetric analysis soon and I can do better work then.

"Yours Truly,

(Signed) "A. B."

## BRITISH COLUMBIA ON THE LONDON MARKET.

The improvement reported in my last letter has not been wholly maintained, and British Columbia shares have in a number of cases receded, as the comparative table of representative values given at the end of this letter will more clearly exhibit. To a certain extent this is no doubt due to the general state of the London mining market being decidedly unsatisfactory, and even, I am afraid, unpromising. The prolongation of hostilities in South Africa keeps South African gold hard and diamond mining shares very much in subjection, while the recent revelations as to Westralian mining and financial methods have disgusted the public, and it need hardly be said that the miscellaneous section, which includes Indians, Copper issues, New Zealand, American, West African and British Columbians, suffers with Kaffirs and Westralians. But in addition to this sympathy with the two leading sections British Columbians have suffered because in the section in which they are dealt in, Stratton's Independence—an American mine purely—is a leading feature, and Strattons have been having a bad time lately owing to the labour troubles. The fall in these, the general conditions, and some nervousness as to the Le Roi dividend, have combined to upset British Columbians, so that as will be seen there has been a marking down in values all through the list. What puzzles me most of all is the low price at which the British America Corporations stand in the market, especially in view of the big profits which they have made over the flotation of the Le Roi No. 2, the Rossland, Great Western and the Kootenay Mining Co. You will remember that the British America Corporation shares with the London and Globe Corporation all profits

made in joint ventures and it has been estimated that the British America Corporation must have earned in scrip or cash 66 per cent. in the year. As a matter of fact the shares stand in the market at little more than 66 per cent. of their face value. Can it be that Mr. Whitaker Wright has so many irons in the fire that he cannot afford to keep them all hot, or is it due to the fact that the market has not been able to digest all the shares which have, according to reliable information, been realized by the "shop" of late. Anyway, in view of the enormous profits which the B. A. C. has made on paper, their low market is a poor compliment to Mr. Whitaker Wright and his group.

The New Gold Fields of B. C. group has been less prominent, although the news from the Velvet continues to be most satisfactory. The London & B. C. Goldfields Companies attract little notice in London, and although the Ymir maintains its position in the market, the group generally has not justified entirely up to the present the very hopeful anticipations indulged in regarding it at the outset of its career. The Whitewater meeting did not create any excitement in the "House," and the price for these shares is no better than 12s. 6d., equal to a discount of 37½ per cent. Le Rois have sharply reacted, but the enormous figures recently attained by Le Roi No. 2 has been added to this month, so that at the time of writing the quotation stands at the exalted level of £23 17s 6d, or nearly five times the nominal figure. The opinion in the City is general that the high prices quoted too for the Rossland and Great Western and Kootenay shares of the same group are quite unjustified.

The Athabasca has attracted a good deal of notice owing to the favourable statements made regarding this company, and at one time the shares were quoted at 15s. 8d. "buyers." I understand that the market is "short" of these shares, and that several operators, not entirely unconnected with the company, have sold large quantities of shares they do not possess, and that it is not intended to let them in under £2 a share; so that some fun is probable. According to all accounts the company is doing well and regular dividends may be expected in view of the latest developments at the property.

Klondike companies are quite dull and neglected and mostly stand at heavy discounts in the market. One or two of the best companies seem to have done fairly well according to all I can gather, but the public long ago discarded these ventures, and the disclosures in connection with the wretched Morris Catton group did a lot to discredit this section.

Your welcome remarks upon the Bureau for the dissemination of statistics regarding the British Columbia mining industry have attracted considerable attention here, as it has long been urged that some such department was urgently needed to bring before Europe in general and Great Britain in particular what the various districts were doing. Of course, the general report issued by the Government is excellent in its way, as is also the British Columbia Board of Trade annual statement. But both these valuable records are largely useless because they are published too late to be of any practical utility. What is wanted is a regular monthly statement collated and published under official auspices, giving the results of the various districts. In connection with this subject and your remarks thereon, the British Columbia Review makes some excellent comments,

pointing out that such statistics would be useless unless they were inclusive. It is no use allowing the various districts to exercise their own discretion as to what results shall be included in such a table. What we want is an exact record of the monthly development, output, and result of same; and this should be compulsory and collected by government officials. Whether or no working expenses and profits attained should also be compulsory is open to debate, but in considering the matter mine owners and companies would do well to remember that it was entirely owing to the publication of regular statements under official auspices that the South African industry attracted such enormous sums of capital and the world wide interest in the progress of its mines. British Columbia has not been much advertised so far. There is a splendid chance for the government to help the industry, for they could easily disseminate the statistics through their agent-general.

BRITISH COLUMBIAN AND CANADIAN MINING LIST.

NOMINAL CAPITAL IN £1 SHARES. In some cases only partly issued.	COMPANIES REGISTERED IN ENGLAND All with Limited Liability.	AMOUNT PAID.	PRICE OCT. 5th.	PRICE NOV. 7th.
£				
100,000	Athabasca Gold Mine.....	19s. pd.	1 11-16	1 9-16
301,000	Alaska Goldfields.....	fy. pd.	15-16	15-16
1,500,000	British America Corporation.....		17 6	16 9
325,000	Hall Mining and Smelting.....	18s. pd.	7 6	5-6
150,000	Klondyke Bonanza.....	fy. pd.	1/2	1/2
400,000	Kootenay Mining.....		6 5-16	7 3-8
	(80,000 Shares of £5 each.)			
1,000,000	Le Roi Gold Mining Company.....	"	8 1/2	7 13-16
	(200,000 Shares of £5 each.)			
200,000	London and B. C. Goldfields.....	"	1 9-16	1 7-16
600,000	Le Roi No. 2.....	"	19 3-8	23 7-8
	(120,000 Shares of £5 each.)			
250,000	New Goldflds of British Columbia.....	"	1 11-16	1 3-8
500,000	Rossland Great Western.....	"	8 1/4	9 1-16
	(100,000 Shares of £5 each.)			
200,000	Velvet (Rossland) Mines.....	"	1 7-16	1 1/4
125,000	Whitewater Mines.....	"	11-16	5-8
200,000	Ymir Gold Mines.....	"	1 13-16	1 3/4
100,000	Yukon Goldfields.....	"	1/2	1/2

COMPANY REPORTS.

WHITEWATER MINES, LTD.

At a meeting of the shareholders of the Whitewater Mines, Limited, in London on the 29th of last month, the following very interesting report was presented by Mr. Fowler:

"The work done during 1899 was not satisfactory for the reason that at the time when the machinery had been adapted to the varying treatment of the ore the strike occurred, necessitating the shutting down of the mine for seven out of the twelve months covered by the accounts. During the greater part of this period the mill was kept going by using up the refuse from the dumps, from which only a very small profit was obtained, nearly if not all of which was absorbed by the proportionately heavy expenses which naturally continued in expectation of the strike ceasing at any time. Owing to these causes the profits for the year amounted only to £3,909, which the directors have applied to writing off the preliminary expenses and the amount expended on mine development and the general expenditure in London,

brought forward from the 1898 accounts, leaving £2,623 to the debit of development account at December 31, 1899, to be written off future profits. The miners' strike terminated about the middle of February of this year, but it was not until some time later that a full force of men could be produced and the mine and mill placed in running order. From this time on, in part due to the poorer grade of ore then available, and in part due to a temporary difficulty in getting suitable men, the profits produced have been smaller than the directors had reason to expect, but from the latest information to hand, ground containing higher grade material, which has hitherto been inaccessible, is now available, and is expected to produce a considerable improvement in the returns.

PRODUCT TO DATE SINCE WE TOOK OVER THE PROPERTY.

March 24th, 1898, to December 1st, 1898—	Tons.	Average Assays.	Returns.
Crude Galena.....	576 4	95.7 oz. 37.2 per cent.	\$26,020.28
Carbonate.....	36 0	66.1 oz. 21.2 per cent.	944.73
December 1st, 1898, to May 31st, 1899, when mill was closed—			
Concentrates.....	1,312.6	101 4 oz. 50.9 per cent.	74,747.96
June 1st to Dec. 31st, mine closed, mill ran on dumps—			
Concentrates.....	601.2	99.3 oz. 40.2 per cent.	30,217.52
March 1st to August 31st, 1900.			
Concentrates.....	2,277.	70.5 oz. 29. per cent.	68,133.71
Summary.....	4,803.2	85.5 oz. 37.3 per cent.	\$200,064.20

Tons of feed milled, 53,445, of which about 21,100 came from dumps.

"In my original report dated January 8th, 1898, I stated that 1,930 feet of drifting had been done on the vein by old owners up to the time of my examination, viz., January 1st, 1898, and about 5,900 tons of crude galena ore had been shipped. At that time I estimated that 2,205 tons of crude ore were in sight, and between the time of my report and March 24th when our option of purchase was exercised, the development was somewhat increased, and most of the shipping ore was extracted. At the latter date the total drifts and connected workings extended 2,570 feet; the total ore shipped was 7,709 tons, and the returns from smelter had amounted to \$339,300, or \$44.00 per ton.

"In taking hold of the property, we therefore had very little crude galena ore to work upon, and although there was a large amount of low grade material in sight, we had no plant with which to treat it.

"Development was then vigorously pushed and shipments of ore were continued to December 1st, 1898, with the result that 612 tons were shipped, yielding \$26,965 from smelter, or at the rate of \$44.00 per ton, the grade averaging the same as under the old owners.

"To September 1st, 1900, our surveys show total drifting done by us to be 2,275 feet, of which 285 feet only have been done since June 1st, 1899, the mine having been shut down from that date to March 1st, 1900.

"The general result of our development has shown that although we have had more or less almost continuously, both clean galena and mill feed, the average thickness is much lower than was the case in earlier days, and we have not encountered any such thick bodies as were stoped from under the former owners. This is better shown by comparison: From October, 1895, to March 24th, 1898, the area stoped was 75,700 square feet; tons product, 7,709, averaging 98 oz. silver and 30% lead, and yielding \$44 per ton. During our period of tenure to September 1st,

1900 (20 months), area stoped, 75,500 square feet; product, 4,803 tons, averaging 85 oz. and 37% and yielding \$38.75 per ton. But of this 4,803 tons only 3,745 tons, yielding \$146,200 came from the stopes, the balance having been derived from treatment of old dumps. To get one ton of product therefore, we have had to stope slightly over 20 square feet, as compared with 9.8 square feet in the old workings, or in other words, the mineral including that in concentrating material, has been with us only half the width it formerly was. Besides this we have had to contend with the fact that we have had available for several months past only a very low grade mill feed, the product containing only 60% as much silver as formerly, although the loss in tailings has been lower than ever. The work of development has also shown several barren areas of considerable extent, but we are unable to prescribe any definite relation of these or of the ore bodies to each other. It may be remarked that in most deposits definite outlines to the ore chutes are discovered, and with the aid of these one may predict certain results. With us, however, those limits are lacking; but the vein has continued from the beginning to be free from faults and although the ore is thinner, there is no reason to believe that it gives out, except temporarily for several hundreds of feet ahead of the present faces, all of which are now looking better than they have done for nearly two years.

"In general it is to be noted that the lower levels, 6 and 7, are in lower grade material than the upper ones. At present we are beginning to take some ore from the upper ground, which has been inaccessible for a long time. We therefore expect to show a considerable increase in the value of product from this month forward.

"We cannot at present say that we have more than six months' mill supply blocked out, and it therefore becomes necessary to pay attention to pushing our levels ahead. In this connection it would seem advisable to run two drifts as rapidly as possible to the end of our good ground, for by doing this and stopping from the inside outward, we shall avoid the necessity of our costly maintenance and renewals of timbers; moreover, we would hope to mine a more uniform mill feed and thus tend to gain a greater degree of efficiency in the milling operations, for although we get excellent results when the lead in the feed is up to 5%, the percentage of loss is considerably greater when the lead falls, to say, 2 to 2½%. With a more extended stoping area available we might thus improve the milling by avoiding frequent radical changes in quality of feed."

#### CENTRE STAR MINE.

The annual meeting of the Centre Star Mining Co., Ltd., was held in Toronto Nov. 27th. The following is an abstract of report and proceedings

"The directors' report showed that a reduction of over 30 per cent. in the cost of mining had been made during the year; that development was proceeding rapidly; labour troubles had been happily settled at Rossland, while a superior class of miners were coming into the camp. The Canadian Pacific Railway had offered to reduce the rate for freight and treatment of the company's ores by \$1.25 in consideration of their obtaining a larger tonnage. The directors,

however, while appreciating the very fair spirit in which the offer had been made, had not been able to see their way to accept it. Negotiations were still pending on other lines which it was hoped would soon put the smelting question on a permanent and satisfactory basis. The very full explanation which was given by the president, George Gooderham, and the vice-president, T. G. Blackstock, in moving and seconding the report as to the objects the directors had in view in stopping shipping in February last gave general satisfaction and was heartily applauded. The annual report embodied extracts from reports made by Wayne Darlington, the eminent American mining engineer, down to as late as the 23rd day of October last, in which that gentleman pointed out that the Centre Star was improving in depth and expressed his belief that it would yet prove the biggest mine in the Rossland camp. The report of the general manager, E. B. Kirby, was also laid before the meeting. This showed the great progress that had been made during the year in the development of the mine and in the installation of first-class permanent plant and equipment. Mr. Kirby also went very fully into the reasons which had led to the adoption of the contract system, whereby miners were paid according to the amount of work performed, instead of by the time spent in doing it, and explained how impossible it was to have introduced this system without closing down for some months. It being the general feeling of the shareholders that dividends should be resumed, a resolution to that effect was passed. Messrs. George Gooderham, T. G. Blackstock, W. H. Beatty, W. G. Gooderham, A. Gooderham and Charles R. Hosmer were elected directors for the ensuing year. At a subsequent meeting of the board, Mr. Gooderham was re-elected president and Mr. T. G. Blackstock vice-president. A dividend of 1 per cent. was declared, payable on the 1st of January next."

Following is the financial statement for the year ending Sept. 30:

ASSETS.	
Centre Star Mine . . . . .	\$3,300,000 00
Cash in Bank of Toronto, Toronto . .	365 45
Stores on hand as per inventory . . .	11,258 08
Machinery, buildings and equipment . .	225,835 97
Furniture of Offices . . . . .	1,113 46
Invested in War Eagle Hotel . . . . .	12,000 00
Unexpired Insurance . . . . .	500 00
Accounts Receivable . . . . .	74,040 49
	<hr/>
Profit and Loss . . . . .	\$3,625,113 45
	182,122 10
	<hr/>
	\$3,807,235 55
LIABILITIES.	
Capital Stock . . . . .	\$3,500,000 00
George Gooderham . . . . .	30,108 03
Bank of Toronto, Rossland . . . . .	227,127 52
Working Capital . . . . .	50,000 00
	<hr/>
	\$3,807,235 55

PROFIT AND LOSS ACCOUNT.

To Balance . . . . .	\$113,547 59	
To Cost of Mining and Developing . . . . .	\$238,715 52	
To Diamond Drill Pros- pecting . . . . .	11,565 94	
To Extralateral Litigation	30,953 22	
To Other Legal Expenses	2,500 00	
To Registration Fees ..	2,117 20	
To Consulting Engineer's Salary . . . . .	3,000 00	
To Toronto Office Expen- ses . . . . .	735 00	
To Travelling Expenses ..	244 50	
To Sundry Expenses . . . .	3,347 41	
	<hr/>	293,179 43
To dividend No. 1 . . . . .	35,000 00	
	<hr/>	\$441,727 02
By net proceeds from ore sales . . . . .	\$259,108 19	
Less Provincial ore tax ..	3,152 45	
	<hr/>	\$255,955 74
By Transfer fees . . . . .	117 75	
By Interest . . . . .	3,531 43	
By Balance . . . . .	182,122 10	
	<hr/>	\$441,727 02

TECHNICAL PERIODICALS.

JOURNAL OF GEOLOGY.

“THE origin of Beach Cusps,” by J. C. Branner.

Branner repudiates the theory advanced by Jefferson some months ago that beach cusps are formed by the modification of waves by seaweed on the shore. He asserts that these peculiar forms may be seen on a beach where there is no sea weed; and would ascribe them to “the interference of two sets of waves of translation.” Of the origin of these two sets of waves Branner is doubtful, but thinks they may be formed by sudden change of wind.

In the two articles, “Natural History of Marl,” and “A Remarkable Marl Lake,” by Charles A. Davis, the theory long advocated in regard to the calcareous deposits of hot springs is applied to the extensive marl beds of Michigan and adjoining States, viz., that fresh water algae have been the principal lime precipitating agents.

The two species of algae which he has found to be the most active in the precipitation of mineral matter in the marl lakes of Michigan are Chara—a stone-wort, and Zonotrichia.

The precipitation of lime on the stems and leaves of these plants may take place in two ways. If calcium and other salts are in excess and held in solution by carbon dioxide, when the plant takes up carbon dioxide, the salts are precipitated on the stem and leaves; if these salts, especially the bicarbonate, are present in a limited degree so that they could not be precipitated without the presence of some carbon dioxide in the water, precipitation may be caused by the liberation of oxygen from the plant.

“Results of Tests of Wisconsin Building Stone,” by E. R. Buckley, is admirably illustrated with eleven plates. These plates show results of crushing and of

exposing to different temperatures the principal building stones; also thin sections of sandstone, limestone, rhyolite and granite. By means of the sections the strength and durability of a rock can be estimated by a skilful petrographist.

GOLD DREDGING IN B. C.

(By R. Luid Watson.)

GOLD dredging was inaugurated in New Zealand in 1868. The first dredge, though crude, served its purpose, for from it has been evolved the modern dredge with all its latest improvements.

In British Columbia, within the past 12 or 15 years, several attempts have been made at dredging in the Fraser River. All were failures, with the exception of one at Boston Bar, three miles below North Bend, built in the fall of 1897.

The earlier dredges were designed to work either by “suction” or “endless chain with buckets.” Both types were unsuccessful, because of the nature of the bed of the Fraser, composed as it is of large boulders and cement.

The suction dredge, worked by means of a centrifugal pump, was expected to draw or suck up material from the bed of the river and deposit it in sluice boxes, where it could be washed and the gold separated from the gravel. But trial proved that suction could make no impression on the cement. The attempt to have a diver go down to loosen the cement also ended in failure.

The “endless chain with buckets” type was unsuccessful, because the machinery was too light, and the buckets were not of such a shape as could cut into the cement.

The '97 dredge, built by Beatty & Co., of Welland, Ont., is of the “dipper” type. The plant rests on two scows, each of which draws about 2½ feet of water. On one is erected the machinery, consisting of a 75 horse power engine, boiler, pump with a discharge of 500 gallons per minute, the arm that works the dipper and the dipper itself; on the other scow, anchored alongside the first, is constructed the grizzly, across which extends a water pipe connecting with the pump before mentioned; below the grizzly are the sluice boxes.

The grizzly is composed of iron bars laid about 1 inch apart. Into it the dipper discharges its load. The finer material at once passes through the grizzly into the sluice boxes, washed down by the water coming through the holes of the perforated water pipe. Large boulders and the heavier gravel are carefully washed by a man stationed at the grizzly, who throws the worthless material into the river.

The entire string of sluice boxes is 120 feet long, the first 30 or 40 feet being 3 feet wide, the balance 6 feet wide—in the latter part mercury is used.

The dipper is constructed of cast iron with a steel lip protected by steel prongs necessary to penetrate the cement. It has a capacity of raising one cubic yard of gravel each trip, and can make two trips in three minutes. The dredge works to a depth of 25 feet. Most of the gold is found in the cement adhering to large boulders. The scow on which the machinery is built has house room for the crew during the season. The length of the season depends upon the state of the water and the winter. Very high water or the running of ice prevents working. In case of

ice, a hole is made in the bank, and into it the scows are run.

This dredge has been successful; but it has been working the greater part of the time on Boston Bar—composed to a large extent of loose sand and gravel—only a comparatively small proportion of the time has it operated on the cement.

The latest dredge constructed on the Fraser River is near Lytton. Its machinery is designed after the most modern of New Zealand dredges, and was manufactured by Robey & Son, of Lincoln, England.

Some idea of the massiveness of the plant may be gathered by considering the fact that the total weight of the dredge housed in—excluding the weight of the tailings elevator, but including all gold-saving devices—exceeds 400 tons.

The boilers have a capacity to generate steam of 250 horsepower. One hundred and twenty-five horsepower is required to revolve the buckets which scrape the bottom of the river and bring up the material from which the gold is to be saved; the balance of the power is required to run electric motors connected with the pump and the revolving screen, and will furnish power to run the tailings elevator.

The winches are four in number, and controlled by levers so arranged that one man can handle the entire machinery on the starboard side of the dredge boat; another man is required on the port side to attend to the boilers and engines.

The principle upon which this dredge is designed is similar to the endless chain with buckets. Two of the buckets with the two links connecting them weigh 2,100 pounds, empty, and have a capacity of raising 5 cubic feet of material in each bucket. There are 36 of these buckets connected by heavy links, the whole revolving at whatever rate of speed is deemed advisable when the material the dredge is working is taken into consideration. A study of the machinery in place reveals the string of buckets as they are travelling along the ladder towards the large cog wheel, at which point each bucket is automatically dumped. After discharging its load the bucket passes down into the river and resumes its scooping operations.

So minutely is all the machinery adjusted that whenever a bucket in running along the bed comes in contact with any specially large boulder or material which offers resistance, the man attending to the winches can tell in an instant that something is wrong, and by a movement can stop the machinery, and by another movement can swing the line of buckets to the right or left of the point of resistance, by which means—in case of resistance being offered by a large boulder—an extra deep hole is cut out and the boulder allowed to topple over into the excavation; or, if this cannot be accomplished, by reason of the boulders being too firmly embedded or too large another movement of the lever would lift the string of buckets passing along the bed entirely over the obstacle, and at the same time another lever could be used which would tighten the head lines by which the dredge is secured to the banks of the river, thus working the dredge forward so that with another revolution the line of buckets would be clear of the obstacle.

A bucket is manufactured in three pieces; the bottom, or base, is of cast iron of the toughest description. charcoal Swedish or Scotch pig iron would probably be best adapted for the purpose; attached to the base is a steel side; to which side is attached a lip of the hardest steel manufactured, which, it is es-

timated; will be sufficiently hard to cut into any description of cement found composing the bed rock of the channel.

The depth to which dredging operations can be carried on is regulated by the addition or subtraction of one or more buckets from the chain. It is estimated that the greatest depth to which it can work satisfactorily is 40 feet.

Material hoisted in the buckets is dumped into a revolving screen made of boiler iron punched with holes  $\frac{1}{4}$  inch in diameter. The screen is 20 feet long; through its entire length extends a water pipe connected with the pump, which has a capacity of raising and discharging 2,400 gallons of water per minute. Of course the water pipe is stationary. As the screen revolves around it, water is discharged from the numerous holes, not only thoroughly washing the material dumped from the buckets, but, by the pressure exerted, tearing the cement to pieces, and thus aiding the revolving screen. Since all material which enters at one end of the screen has to travel about 150 feet before reaching the discharge end, it can readily be understood that the working of the screen added to the pressure of the water will have a crushing capacity sufficient to grind the gravel to such a degree of fineness as to release all the free gold from the quartz matrix and permit it to pass through holes in the screen on to tables. The tables are arranged under the screen with a slight inclination; on them the heavier particles of gold are saved, while the lighter particles and waste or sand pass over the tables into the sluice, which is at right angles to the tables and extends beyond the end of the dredge a sufficient distance to save all the gold. The method of catching the gold on the tables is gravity—the tables are covered by wire netting to act as riffles. Mercury is used in the sluice box to save the finer gold.

The tailings consisting of gravel and sand too large to pass through the perforations in the screen, proceed to the elevator. The elevator is so arranged that the tailings are dumped at some distance from the side of the dredge instead of immediately in the rear. Such a method of dumping permits of the dredge being backed from the location of its working, which could not be done if the dumping were immediately astern of the plant.

By the discharge of so much material and water from the screen it would at first sight appear impossible for any substance, however high its specific gravity, to remain on the table under the screen. It must be remembered, though, that the screen is about 4 feet in diameter, and that although an immense amount of material and water is discharged into it during 24 hours, yet the holes, being only  $\frac{1}{4}$  inch in diameter, permit but a small proportion of either water or material to pass on to the tables. It is estimated that little outside of gold and black sand, with their proportion of water, will find its way through the holes to be received by the tables. The balance of the material and water is discharged into the tailings elevator. The area of the series of tables is 20 feet by 22 feet.

Only one feature of this dredge calls for adverse criticism, viz., the direct dumping of the buckets into the screen. While this course will work satisfactorily in sand or small-sized gravel, when you come to consider the problem of hoisting a large amount of material consisting of boulders weighing from 100

to 500 pounds, it would seem that dumping such material into the screen directly from the buckets would make the wear and tear of the revolving screen so excessive as to seriously interfere with profitable results.

Of course this difficulty might be overcome by stationing a man at the bow to remove any materials from the buckets revolving from the river, which he considered too large or too heavy to be dumped into the screen. The adoption of such a course would tend to depreciate the capacity of the dredge, and, consequently, make operations more expensive and results less satisfactory.

Had a grizzly been constructed to receive the material directly from the buckets and to automatically dump all material too large to pass between the bars of the grizzly into the river, thus allowing only comparatively light material to pass into the screen, then, according to our judgment, this dredge would apparently be as nearly perfect as it is possible to construct such machinery.

The valleys of the Fraser and Thompson Rivers were apparently excavated at the close of the Miocene period. During the glacial period that followed, these valleys were filled with boulder clay. In the post-glacial and modern periods, when the country stood at its present level relatively to the sea, rivers cut through the drift-filling, and, swerving from side to side, produced a series of terraces or benches. These terraces thus represent the bed of the river at a former stage of its history.

In '57, '58 and '59 when placer mining in the Fraser and Thompson rivers was at its height, fully \$1,500,000 worth of gold was washed from the beds and benches with the rocker and by sluicing. The pay streak in the benches was found near the surface, the general mass of material composing the terraces was not payable worked by rough methods. What was not profitable worked by primitive means might easily yield good results to more improved methods. Terrace materials, especially in the vicinity of the mouth of a stream flowing from a known auriferous locality would justify test operations. But the present dredging law in British Columbia precludes such from being worked by the dredge miner. For, according to it, a lease gives the right to work in a river only below low-water mark.

In New Zealand, alluvial deposits extend into the banks for acres, and miners are allowed to work the banks as far as they find them profitable.

True bed rock is seldom seen in the Fraser River. In most places the bottom of the old valley is below the present river level.

The formation at Boston Bar is of a slaty and schistose character, closely resembling the Cambrian, but probably of later date. Similar rocks occur at Leech River, Vancouver Island. In each case the slates contain gold-bearing quartz veins. To the degradation of large areas of these slate the placer gold is probably due.

The present law for dredge mining in British Columbia is drawn so as to protect the placer mining along the banks of the various streams. According to this law a lease conveys the privilege of working material in the bed of a stream from bank to bank, below low-water mark.

Leases are granted by the government at \$10 per

mile; and five miles of a river bed may be taken up by a lessee each year. Lessees must enter into a contract to expend not less than \$1,000 per year on the territory occupied by each lease. These lessees must be either miners or joint stock companies holding a free miner's license. Every person over 18 years, regardless of nationality, is entitled to a free miner's license on the payment of \$5 per annum.

Up to the present, dredging in British Columbia has been almost entirely confined to the Fraser River. The yield of placer gold from portions of the Thompson, North Thompson, Columbia and other rivers on the Mainland, as well as from Leech and Sooke Rivers, on Vancouver Island, will probably attract the attention of dredging miners to the advisability of prospecting the beds of these streams to ascertain whether the conditions are favourable for dredging. In the foregoing estimate of likely localities, no mention has been made of the more northerly section of the Province, including the Cassiar, Omineca and Atlin mining districts. So far as we know, no attempts have been made to discover whether the streams in these districts are favourable to this mode of mining.

Undoubtedly if the companies which are at present using this method of winning gold from the bed of the Fraser demonstrate that the business is profitable there will be no lack of others to embark on a like enterprise.

Considering that there is hardly a river in British Columbia which does not show colors of gold, the field for the industry appears large. The time is not far distant, we may assure ourselves, when dredge mining will be one of the most profitable industries of the Province.

## THE MONTH'S MINING.

SHOAL BAY.

(From Our Own Correspondent.)

**I** UNDERSTAND that the B. C. Exploration Co.'s property in ESTUO Basin is looking A 1, and should the new tunnel strike the lead at a depth of 300 feet, as it ought, it will become one of the leading copper-gold properties of British Columbia. Since last spring they have installed a 4 drill compressor plant, and now there is talk of a smelter being erected, so that the ore can be treated on the property.

An expert is at present up here looking over some of the better known properties, doubtless with a view to bonding some of them.

News has just come to hand that work on the Sunset is progressing favourably, and it is confidently expected that the lead at a depth of 150 feet will be very shortly encountered. Should this property eventually become a mine, it will be of the greatest assistance in promoting the welfare of several other claims on the same lead, notably the Ajax group, directly opposite on Valdez Island, on which considerable work has been done.

There have lately been several new discoveries made here: one a bornite property at Green Point, the other a lead of copper carbonates, about 20 feet wide, which can be traced some little distance. This



claim adjoins the once celebrated Shoo-Fly on the northwest end. The Shoo-Fly, it is rumored, is shortly to be taken up as an iron proposition. It runs 60 per cent. iron and carries \$6 in gold.

#### REVELSTOKE.

(From Our Own Correspondent.)

A rumor, unconfirmed so far, has reached us that the small force working on the Prince Mining Co.'s property in Standard Basin (formerly under the control of the Boston and B. C. Co.) have struck a good vein of copper ore in the lower tunnel. There is no doubt in the mind of any unprejudiced person that there is a big body of ore there, though it may take some considerable work to disclose it, hence the rumor may refer to an accomplished fact, and it is to be hoped that it does.

With the exception of the small staff at present employed on this claim, the Big Bend will be practically deserted this winter. However, work on the long needed wagon road has actually commenced, (far too late in the season, of course, for much to be done) and no doubt will be continued as late as possible this year and again renewed next season. It is impossible to say how far reaching the good effects of this road will become; there are vast areas of land in the Big Bend still awaiting the venturesome explorer, while the very large bodies of ore now known to exist at Carnes Creek, Keystone Mountain, Standard Basin, Laforme Creek, etc., etc., will have a chance to become known to outsiders. A steamer on the river would be an immense help, though of course the stream is not safely navigable all the year round.

Mica.—In addition to the ore bodies just mentioned, the Big Bend district is rapidly achieving a great reputation as a producer of very fine mica, wonderfully clear and in large sheets. The growing demand for this mineral—so much in advance of the available supply—will make this a very valuable property in the near future, and steps have already been taken to make some considerable output. The country round about the mica deposits is reported to be quite agricultural in character, and there seems to be a very good reason for thinking that this empty district will before long be well populated. And even besides the mica and the ore deposits, there is still a great future for intelligent placer mining, the results obtained already being quite sufficient to encourage further work, especially if better transportation is provided.

If we in Revelstoke are congratulating ourselves upon the now assured prospect of a decent road towards the Big Bend, our neighbors in the celebrated Lardeau district are doing the same thing on account of the suddenly brightened hopes of the railroad, as a new party of surveyors have pitched their camp in Ferguson during the last week or so, and are said to be engaged in the mysterious (to an outsider) occupation called "cross sectioning" a road or line of road that has already been surveyed. This is good news, indeed, for the principal mines in the Lardeau have passed the prospect stage and can now be reckoned among the shippers.

The Nettie L., which was rumored to have "petered out," will "peter out" some 1,000 to 1,500 tons of high grade ore this winter—that is if there is snow enough, which there probably will be, though there

was too little last winter. It is not necessary to repeat what has already been said about this wonderfully rich property; it is sufficient to remark that the ore body but needs to be seen by the false prophets, and then even they will be convinced that there is some still left.

The Silver Cup hopes to ship 700 tons at least, also very high grade ore, so that the teamsters of the neighborhood will be kept busy. In addition to the properties named, there are the Towser, lately re-bonded; the Sunset group; the Metropolitan group possibly; the Old Gold, and several others that have arranged for a winter's work and will probably ship something worth recording. There is a fully confirmed report of the finding of free milling ore on Lexington Mountain (Fish River district), which has been bonded by a strong Nelson syndicate.

#### BOUNDARY CREEK.

(From Our Own Correspondent.)

The Winter season is now being experienced in the Boundary country, sharp frosts towards the middle of November having been succeeded on the night of the 16th of that month by a fall of three or four inches of snow. During several days immediately following more snow fell and then came a "cold snap," with the temperature ranging down to 14 degrees below zero at Greenwood and 22 degrees at Midway. Whilst this wintry change made the roads good for sleighing, it practically stopped all surface prospecting and compelled many prospectors to go into winter quarters. Mines and smelters still engaged in construction work are finding the cold impeding their operations, which in some instances are now being carried on with some difficulty.

#### BOUNDARY DISTRICT.

(From Our Own Correspondent.)

The Miner-Graves mines in Greenwood Camp, viz., the Old Ironsides, Knob Hill and Victoria, maintained throughout the month of November a daily shipment of 600 tons of ore per day to the Granby Company's smelter at Grand Forks. It has been stated by the Phoenix *Pioneer* that some time in January next this output will be doubled, but as an increase to that extent will be conditional that two more furnaces shall have been meanwhile provided at the Granby smelter, it is very probable that the daily shipments will remain as at present, at least until a few weeks later than January next. It is understood that there is an abundance of ore in the mines blocked out and available for the maintenance of the larger output.

It has been announced that work will shortly be resumed in these mines, also in Greenwood Camp, at Phoenix. They form part of a group owned by the Dominion Copper Company, of Toronto, Ont. No work has been done in them during the current year, but earlier some 340 feet of sinking and 1,710 feet of drifting and crosscutting were done in the Brooklyn and Stemwinder. Brooklyn and 325 feet of sinking and 165 feet of drifting and crosscutting in the Stemwinder. These workings opened up some nice copper ore in both properties, each of which is equipped with a small power plant.

James Breen, formerly connected with the Trail and Northport smelters, has obtained for himself and New York capitalists a controlling interest in the company, and that development on a large scale, and, later, the erection in the district of a smelter, are among the plans for operating these promising properties.

Another recent announcement intimated the probable inclusion under one management of the Gold Drop, Rawhide, Monarch, Tamarac and other claims. Of these, the Gold Drop, owned by a Montreal company, is the only one opened up to any extent, about 2,000 feet of work, chiefly drifting and crosscutting, having disclosed the presence of a big body of ore. Nothing definite is yet known of the suggested consolidation, nor is there any present indication of work being resumed on any of the claims mentioned. In the same neighborhood is the War Eagle, owned by an Eastern Townships, Quebec, company, which lately suspended operations; it is said only temporarily, though.

The Snowshoe, owned by the British Columbia (Rossland and Slocan) Syndicate, of London, England, is developing very satisfactorily underground. What is known as the railway tunnel is now in 400 feet, much of its length in ore, which cross-cuts have

#### THE SNOWSHOE.

shown to be about 50 feet in width. A railway siding has been put in to the mine and further shipments to the smelter for test purposes are being made. It is not yet intended to send out ore regularly, although there is much in sight in the mine. An assay plant has lately been obtained for use in the mine and an assayer placed in charge. The managing director, Mr. Anthony J. McMillan, is about to proceed to England, to there confer with his co-directors respecting extended operations with a view to placing the mine upon a permanent producing basis.

In November there were nearly 100 men employed at the Mother Lode mine, near Greenwood, a majority of them in construction work and the remaining 40 in mining and ore stoping. Towards the close of the month about 80 tons were being mined and sorted daily. Some 3000 tons of

#### THE MOTHER LODE.

ore were sent down to the Greenwood smelter, some of this having been taken from the dump and the balance from the stopes and other workings at the 200 and 300 foot levels. The work done underground during the month consisted chiefly of opening up stopes at both levels and of extending the north drift—now in 300 feet from the shaft—and mining crosscuts at the 300 foot level. Practically all of the parts of the 35-drill Ingersoll-Sergeant air compressor plant, details of which were published in *The RECORD* last July, have now been received. The two 100 horsepower boilers to furnish it with power have been built in, boiler and compressor houses erected and the compressor itself is now being installed. Part of the large Jenckes hoist ordered last June is now on the way from Sherbrooke, Quebec, and the foundations for it are about completed. Two 80 horsepower boilers for the hoist are in place and being housed. A 60 foot gallows frame is being built and two large and heavy platform cages are at the mine ready to be put in the shaft. Preparations are being made to put in place the ore sorting plant, in-

cluding the excavation of foundations for a 70 horsepower Nagle engine and a No. 5 Gates rock crusher. The ways for the Robins belt conveyor, shortly to arrive from New York, are nearly completed. The large new dining hall is now in use and one wing of the new dormitory is nearly finished. This latter addition will bring the sleeping accommodation up to the requirements of 135 men. Among other building improvements recently made on the mine is the erection of coal bins, trestles and chutes. Mr. W. G. Stephan, for some time past with the Gold Bay Mining Company, at Georgetown, California, lately arrived to take charge of the mine ore sorting plant. In connection with this mine it may be mentioned that there has lately been such an active demand in New York and Boston for stock of the British Columbia Copper Company, owning the mine and the Greenwood smelter, that prices of the shares have run up to \$20 and over. The capital of the company is \$1,000,000 in 200,000 shares of \$5 each.

The *Greenwood Times* states that the mining firm of Munroe & Munroe, of Montreal, has acquired all the properties of the Montreal-Boundary Creek Mining Company for a syndicate including Messrs. J. W. Greenshields, Q. C., and W. M. Mitchell, of Montreal, T. Crockett, manager of the Tamiscouat Railway and H. H. Melville, of the Northern Pacific Railway, who are said to be organizing the Montreal & Boston Company, Limited,

with a nominal capital of \$3,000,000 in 600,000 shares at \$5 each. It is further stated that extensive development is shortly to be undertaken, and it is hoped that the Sunset, which has hitherto been disappointing, will eventually be proved a property of much merit. The Sunset group includes the Sunset, Crown Silver and C. O. D., adjoining claims situate near the Mother Lode.

Mr. Oliver, the manager of the Morrison, will shortly—probably early in the new year—issue a report on the condition and prospects of the mine for the information of the shareholders, but at the present stage of development he is not disposed to say much about the property other than that it promises well for early and very satisfactory improvement. It is generally understood that some nice copper ore has been encountered, but that until more work shall have been done not much can be said about it. Meanwhile development is progressing and good results are confidently looked for.

Other claims in Deadwood Camp at work are the Marguerite, Great Hopes and Buckhorn. Two ledges were lately cut in east and west crosscuts respectively at the 100 foot level of the Marguerite, but these have not yet been opened up to any extent. There is nothing of importance to be chronicled just now respecting the other two properties named.

The reorganization of the Winnipeg Mining Company necessitated by conditions published in last month's issue of *The RECORD*, was agreed upon by the special meeting of shareholders held for that purpose on Nov. 16. Briefly the meeting resolved to reorganize the company, the new WINNIPEG AND GOLDEN CROWN, of \$1,250,000 in \$1 shares. Of these 1,000,000 are to be issued to existing shareholders, share for share, as paid up to 95 cents, leaving an assessable balance of 5 cents per

share, which will be called up as required. The remaining 250,000 shares are to be placed in the treasury and sold at times and upon terms apparently not yet decided upon. A second meeting to ratify this arrangement will shortly be held, and thereafter it is confidently anticipated, the Winnipeg will redeem its good name.

Not much is being done just now at either the Golden Crown or the Athelstan, both having ceased to ship ore for the time being. These, like the Winnipeg, are in Wellington Camp.

There have been reports current to the effect that the Oro Denoro, in Summit Camp, was to resume operations at once, but these were premature. There appear to be some negotiations in progress looking to that end, but no definite arrangements for operating the mine have yet been made. The R. Bell in the same vicinity is stated to be improving considerably as a result of underground prospecting, but the published reports that it will soon be a regular shipper seem to be somewhat sanguine. Later this property will probably send out a fair quantity of ore.

The B. C. is now maintaining an output of not less than 3,000 tons per month, and is at the same time pushing on with development work. The main shaft will shortly be down to the 400 foot level. The stopes already opened at three levels are yielding much ore and the mine will probably be in a position to ere long materially increase its

B. C. regular output. A promising strike of copper ore is reported from the

Rambler at Pass Creek, but the extent of the ore has not yet been proved. The Jewel, at Long Lake, has sent out 100 tons of gold quartz to be tested by a chemical process at the bullion works near Rosslund. There is a prospect of work being started afresh in the Republic group, near Boundary Falls, two or three months hence. Altogether, the outlook for increased activity throughout the district is promising.

Construction work is being pushed at both the Greenwood and Boundary Falls smelters, but space restrictions will not admit of de-

THE SMELTER. tails of progress being gone into this month. Machinery and plant are arriving and being placed in position, but there is little prospect of either of these reduction works being in regular operation before January or February next.

#### YMIR.

(From Our Own Correspondent.)

Since the last issue of The RECORD, it has been quiet here, the snow having driven in the prospectors, the only work now going on is that at the large properties.

Work is being energetically pushed on the Tamarac tramway; the right of way has been cleared a distance of 3,200 feet by 100 feet wide, and now the timbers for the stations are being made. Inside of two months it is possible that the tramway will be in operation. There is not much

#### TAMARAC TRAMWAY.

work being done on the Tamarac mine. This is presumably owing to the meeting of the shareholders, which takes place on the 30th of November, when it is hoped a practical mining superintendent will be appointed to the task of working the property.

The Ymir Gold Mines, Limited are working in all about 180 men, a detailed report on this wonderful property can be seen in the British Columbia Review, of England, commencing with the issue of October 20th. During the month there have been a number of accidents in the stopes, owing to the ground being loose, nothing serious, however.

William Cummings, who is working for Windsor, Ont., and Cleveland people, has a number of men at work on prospects belonging to his company. The Arlington mine is shipping clean ore to the Northport smelter, while the Yellowstone mine continues to turn out the yellow metal.

#### ROSSLAND.

(From Our Own Correspondent.)

The ore shipments from Rosslund mines for the first ten and three-fourths months of the present year amount to 191,275 tons. The entire shipments for 1899, from 1st Dec., '98 to 30th Nov., '99, were 172,665 tons. It will thus be noted that the tonnage so far this year exceeds that of the whole of 1899 by 18,610 tons. Of the above mentioned tonnage, 191,275, the Le Roi shipped 144,500; the Centre Star 30,000; the War Eagle 10,660; the Le Roi No. 2 2,500; the Iron Mask 2,200; the I. X. L. 530; the Giant 414; the Evening Star 351, the Monte Cristo, 273; the Iron Colt 80 and the Spitree 67.

The nearness of the close of the year justifies a forecast of the tonnage and valuation of the ore shipments from Rosslund mines for the

OUTPUT. present year of 1900. The weekly output from the mines now averages 6,000 tons at least. This is less than the average outturn of the summer and winter months and it is authentically stated to be due to the want of smelter capacity at Trail as well as at Northport.

Assuming this weekly average to continue until the end of the year, the total output then will be 216,775 for 1900.

The progress of development work and surface improvements are probably the greatest ever made in any one year in the history of Trail

SURFACE IMPROVEMENTS. Creek mining development. An outline of these improvements has already been furnished in the RECORD, and the surface improvements of Red Mountain alone, independent of actual development work in the mines, can certainly be not less than three-quarters of a million dollars.

The progress of development work in the Le Roi has not of late been maintained to the extent previously reported. There has been a decrease of the force and this is due to a variety of circumstances, chief of which may be mentioned the necessity of increased smelter facilities to keep pace with the expanding output.

LE ROI. When these are ready a largely increased output must follow, but it will be from eight to twelve weeks yet before this impetus will be given. In the meantime the general manager will begin to work out his plans for the future. The mine is in excellent condition. The ore reserve is simply prodigious—a fact which seems to be confirmed by the favorable reports of its stock quotations.

The management has intimated that ore shipments will not be resumed until after the new year—

probably not until after the next annual meeting, which takes place in Toronto during February. The retirement of Mr. J. B. Hastings

**WAR EAGLE.** from the position of consulting mining engineer to the Gooderham and Blackstock syndicate is regarded as a serious loss to the mining division. What is Rossland's loss, however, is likely to be a gain to Victoria, for I am informed that Mr. Hastings goes to the coast, where he has mining interests of his own, and where he will carry on his work. Mr. W. H. Ferrier, who succeeds Mr. Hastings, has had a superior technical training in the service of the Dominion Geological Survey. For the past two or three years he has been attached to the War Eagle staff here and consequently he is enabled to take hold with both hands. It is stated that Mr. Kirby will return next month, probably not until after the annual meeting of the Centre Star has been held and the future policy determined.

The Le Roi shipments so far this year (144,000 tons) are within 28,000 tons of the total shipments for 1899—172,655, while the Centre Star is nearly one-fifth of what the Le Roi shipped this year. The War Eagle has shipped only 10,660 tons, while the Le Roi No. 2 and the Iron Mask have respectively shipped between 2,250 and 2,600. The occasional shippers are the I. X. L., Giant and Evening Star.

The west flank of Red Mountain promises much for next year. The workings of the big mines are slowly entering new ground in this direction.

Little or nothing has been done this year in the south belt (locally so known), but next year a revival of interest is promised.

Recently an association was organized here under the name of the Chamber of Mines. This is a very dignified name, and much is expected from it. If it be well managed and carried out in the interests of the investor, it will accomplish much for Rossland's future. At no other time in the past could its citizens and promoters feel more confident in the outlook for legitimate mining than they can now.

**CHAMBER  
OF MINES.**

**FISH CREEK.**

(From an Occasional Correspondent).

A great deal more work is now being done than ever before in this camp and everything is looking very promising. The recent gold discoveries on Lexington Mountain are showing up better than even the most sanguine ventured to hope.

The three silver-lead properties bonded by W. H. Jackson during this season, the Black Bear, Wide

**SILVERLEAD  
ON  
POOL CREEK.** West and Eclipse groups, all on Pool Creek, are being worked with forces of from twelve to twenty men on each and large bodies of ore have been struck on all of them. The Lucky Jack group, also on Pool Creek, is still showing up well and the owners, Butler, Roland & Desrosiers, will push development work through the winter.

W. H. Jackson has just gone East to place the Alma and Daffodil groups. As these are by all odds the largest galena showings in the district, and the terms upon which he gets them are very reasonable, he should have no difficulty in forming companies to develop them.

The Imperial Development Syndicate, of Nelson,

have obtained control of fourteen claims on Lexington Mountain, all free gold propositions, and are putting up buildings to accommodate twenty-five men. This property includes the Eva and Imperial groups, upon both of which magnificent surface showings have been obtained, and during the last week a tunnel has tapped the lead on the Eva at a depth of 65 feet, and the ore encountered is richer than any yet found, in fact they have stopped work until they can get in sacks to save it.

The owners of the adjoining property, the Oyster, are making arrangements to put in the winter in developing their very promising claim. The work done during the summer gave the most encouraging results, a very fine lead being exposed with a fine showing of free gold.

The same parties, Allen & Ennest, made a great strike on another claim, the Criterion, about two weeks ago. The lead, which is rather small, is very rich in coarse gold on the surface, and in view of the fact that a neighboring claim has proved its depth, there is every reason to expect this mountain to take rank as a big gold producer in the near future.

**SLOCAN.**

(From Our Own Correspondent.)

True to its recognized title of "the poor man's country," the Slocan continues to furnish examples of mines developed and placed on a working basis without the slightest assistance from capital. The latest and one of the best of these is observed in the case of the Mountain Con, a property situated in the granite area some distance back of Cody, from which over \$8,000 worth of ore has been extracted by the sole efforts of the lessee during the last three months. Now that the value of the property has been established, there is every likelihood of its being turned over to an English syndicate for a large figure; but why in the name of common sense some of these companies do not see fit to operate first hand by constantly employing a capable and reliable man in the locality itself passes the comprehension of ordinary mortals. However, experience teaches that giving advice in matters of this kind is nothing more nor less than a waste of time, so it is needless to say more.

The reference that I made last month to the gold contents of some of the Slocan ores received a remarkable if somewhat curious confirmation in the last report issued by the manager of the Whitewater mine. The really interesting fact

**GOLD IN  
SLOCAN ORES.** brought out is that although the ore was known to contain traces of gold, it had never been obtained in

quantity sufficient to render it of commercial importance until recently, when by the substitution of Wilfley tables for the old round buddles, it was found that the fine concentrates thus obtained carried gold exceeding in value the minimum paid for by smelters. An explanation of this phenomenon is not offered, and perhaps under the circumstances is better not attempted; it may, of course, be due to several causes which cannot be correctly ascertained, the disposition of the gold in the ore being manifestly the chief factor in determining its recovery, provided always that the appliances in use are properly suited to the requirements.

What would appear at first sight to be a very unsatisfactory condition of affairs with regard to this

district is revealed in the report of the Minister of Mines for last year, namely: That the average grade of ore shipped from the Slocan is on the decline, being only 88 oz. per ton for '99 as against 97 for the year previous; that being the first occasion on which it had fallen below 100. That there is no cause for alarm, however, is shown from an explanation offered by the provincial mineralogist to the effect that it may be traced almost wholly to the increased tonnage of low grade material passing through concentrators, which even after treatment fails to come up to the standard of clean ore; as well as to the fact that economic conditions have so improved that there is no need to sort as carefully as formerly.

A recent shipment of 38 tons from the Rambler-Cariboo serves to show that high grade ore is not by any means a thing of the past, and emphasize at the same time the enormous profits which are sometimes realized from a small but rich pocket. The ore in question assayed approximately 550 oz. silver and netted in the neighborhood of \$14,000 to the company after deducting freight and treatment charges; while a smaller consignment from the Hampton, situated in the dry ore belt, went over 600 oz. to the ton. In recording these facts there is no intention to deceive by creating the impression that all ore shipped is of this char-

HIGH GRADE  
RAMBLER-  
CARIBOO.

its magnificent mill and tramway will be again helping to swell the shipments from Silverton.

Another chapter in the history of the ill-fated Comstock Mines, Ltd., is about to be written, tenders for the sale of that concern by the official liquidator having closed on the 20th. Just what percentage the creditors will receive is a matter of speculation, but the general impression seems to be that they will be fortunate if it much more than covers the interest on their several accounts. The prospect that it may be reopened and placed on a paying basis seems almost too good to entertain, but more than one mining man of experience has been heard to express the opinion that there is money in it yet under efficient management.

Those acquainted with the early record of the country lying between Ten Mile and Springer Creeks will be glad to learn that the Bondholder is again finding its feet. An initial car has already been sent out which it is thought will be followed by others as work progresses.

#### A PORTABLE ONE-STAMP MILL.

MESSRS. John Taylor & Co., of San Francisco, offer the mining profession a simple, effective and cheap one-stamp mill, which also possesses portability. The latter quality is very desirable for trans-

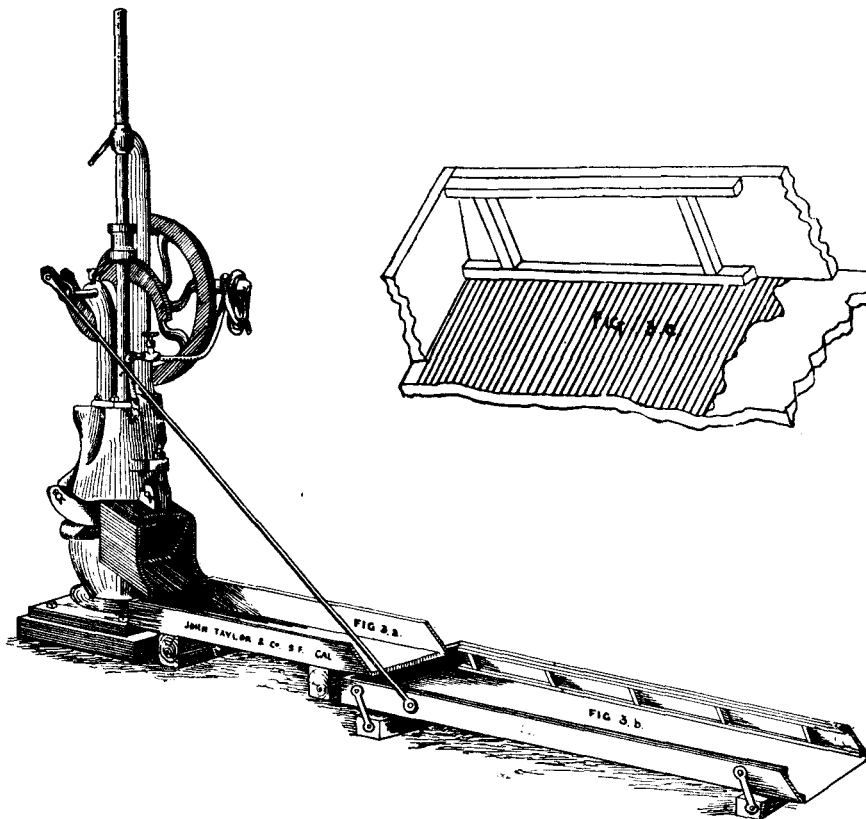


Figure 3.

acter, but to do the district justice it is only right that both sides should be presented with equal impartiality.

As predicted some months back, an engineer of standing has recently been sent to make a thorough, unprejudiced examination into the affairs of the Wakefield mine, and while his report is not of course made public, there is nevertheless hope engendered that it will be but a short time ere this property, with

portation to distant and somewhat inaccessible places.

The mill is designed to enable the miner to test ore by working it in an economical way, and thus determine whether it will be profitable to erect a large mill. It is so simple in construction and operation that it merits a detailed description.

The mortar is preferably made circular in horizontal section, and is oval shaped in vertical section. It is eight inches diameter inside; the shoe and die made

of chilled iron are four inches in diameter. There is ample room for feeding ore and for splash. The hole through the top of the mortar serves as the lower bearing for the stamp rod, which rod, with tappet and shoe, weighs 45 pounds, and drops 6½ to 7 inches with a force of 750 pounds. The upper part of the mortar supports the two iron columns or pillar blocks for the cam shaft. One of these columns projects above the shaft, and the top of it serves as the upper bearing for the stamp rod. There is a screw at this place. By turning it the stamp rod is held fast while "cleaning up" the mill. The ore is fed through a large hole at the side of the mortar near the top. There is also a half-inch pipe and stop cock to supply the mortar with water. The discharge at the front is square, 6 inches by 6 inches, and the screen is fastened by wedges in the usual way. The mill is furnished with five sheet-iron slot punched screens, one of each of the following meshes:

- No. 4 equals in discharge No. 20 Brass Wire Screen.
- No. 5 equals in discharge No. 24 Brass Wire Screen.
- No. 6 equals in discharge No. 30 Brass Wire Screen.
- No. 7 equals in discharge No. 35 Brass Wire Screen.
- No. 8 equals in discharge No. 40 Brass Wire Screen.

The mill will crush, per diem of ten hours, a half ton of ore of average hardness, to pass through a No. 40 mesh screen, or No. 8 punched screen.

The mortar is divided longitudinally into two parts, the upper part being fastened to the lower by a hinge-pin and one hinge bolt. When the nut of the latter is loosened, the upper part of the mortar with all its belongings can be turned over to rest upon the ground as shown in Fig. 2. This arrangement serves two purposes; first, to give greater facility for rapid and effective "cleaning up," and second, by withdrawing the hinge-pin the upper half can be entirely

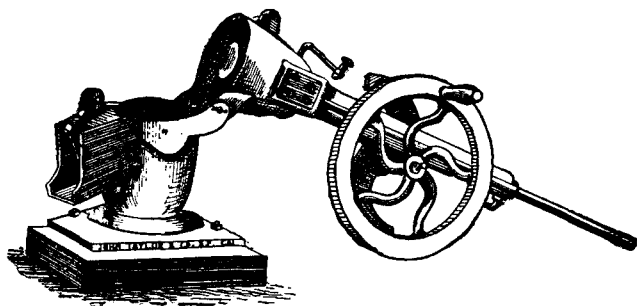


Figure 2.

removed, thus rendering it portable. A rubber gasket between the two parts of the mortar prevents leakage when the bolt on the front side of the mortar is tightened.

The fly wheel upon the cam shaft is 18 inches in diameter, and takes a 1½ inch belt. The mill can be operated by hand or by power, such as a small water wheel or a one-half or greater horse power gasoline engine.

Fig 3A shows a short sluice box 10 inches wide, 60 inches long, placed close to the discharge of the mill. The bottom of the sluice box is covered by a copper sheet plated with silver on the upper side, upon which free gold or silver is amalgamated. Also Fig. 3B shows a longer sluice box, 15 inches wide and 9 feet long, the bottom of which can be covered with sluice blanket with the nap pointing up stream. This box is mounted upon four links, and the rod which connects

it with the crank upon the cam shaft gives it a reciprocating motion, which practically converts this sluice box into a concentrator. Fig 3C shows the manner of fastening the sluice blanket in position so it can be quickly removed for washing and replaced.

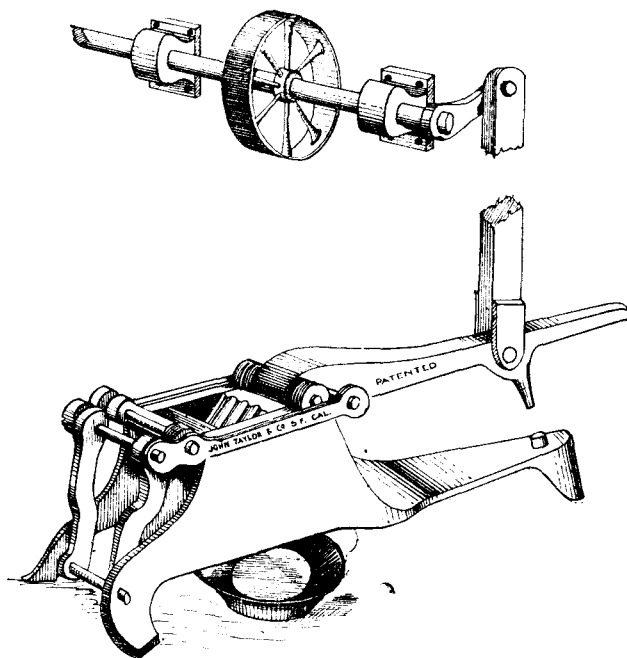


Figure 4

It will be well to have two blankets, one in place and one in use, while the other is being cleaned.

Fig. 4 illustrates a patent hand rock crusher with power attachment, which is simply a crank upon the end of an overhead revolving shaft, and a pitman connecting it with the lever of the crusher. This crusher is a valuable and cheap accompaniment to the above described mill. A hand screw regulates the size to which the ore can be crushed, and, of course, the finer it enters, the more work the mill will do. This crusher can be placed upon a bench somewhat elevated, and a chute provided to carry the crushed ore to the mill. This crusher also makes a fine sampler of the ore, which can be collected from time to time to be sent to the assay office.

### MINING RETURNS AND STATISTICS.

#### COAST.

THE following is the October output for the Coast

Mines.	Destination	Tons.
Copper Queen,	Van Anda Smelter (per week round figures) . . . . .	100
Marble Bay,	Van Anda Smelter . . . . .	Not known.
Lenora,	Everett . . . . .	908

#### SLOCAN.

Queen Bess Proprietary: Last month, 90 tons mined. Net value is estimated at \$3,850; estimated expenditure, \$5,050. Main tunnel, 1,380 feet. No. 7 level crosscut has reached the lode 40 feet from hanging wall of shaft. Lode strong and well defined; width of lode is 3 feet.

The customs returns of exports for the port of Kaslo for the month of October are as follows:

Ore (pounds) . . . . .	13,262,000
Value . . . . .	\$292,108.00
Lead (pounds) . . . . .	2,749,700
Silver (ounces) . . . . .	333,141
Coal . . . . .	5,127,900
Valued at . . . . .	\$5,089

Compared with September they show a great increase:

	Sept.	Oct.
Ore (pounds) . . . . .	4,137,000	13,262,000
Value . . . . .	\$176,392	\$292,108
Lead (pounds) . . . . .	1,839,000	2,749,700
Silver (ounces) . . . . .	190,430	333,141
Coal (pounds) . . . . .	3,892,000	5,127,900
Value . . . . .	\$3,897	\$5,089

TONNAGE OF ORE VIA KASLO DURING OCTOBER.

Mine.	Destination.	Tons.
Whitewater, Kootenay Ore Company's Sampler		
Kaslo . . . . .		573
Last Chance, Kootenay Ore Company, Kaslo..		485
Payne, San Francisco . . . . .		319
Slocan Star, (Destination not given) . . . . .		120
Rambler-Cariboo, Everett, Wash. . . . .		139
Ruth (Destination not given) . . . . .		100
Noble Five (Destination not given) . . . . .		32
Cork (Destination not given) . . . . .		20
Bismarck (Destination not given) . . . . .		17
Trade Dollar (Destination not given) . . . . .		40
Mountain Con. (Destination not given) . . . . .		21

BOUNDARY.

(Figures approximate only.)

	Nov.	To 30th Nov.
Old Ironsides and Knob Hill		
Group . . . . .	18,500	50,500
B. C. . . . .	3,000	17,000
City of Paris . . . . .		3,500
Golden Crown . . . . .		1,900
Winnipeg . . . . .		1,200
Athelstan . . . . .		500
Mother Lode . . . . .	3,000	3,000
Unenumerated . . . . .	1,500	2,400
<b>Total . . . . .</b>	<b>26,000</b>	<b>80,000</b>

CARIBOO.

Consolidated Cariboo Hydraulic Mining Co., Ltd.:	
August Clean-up . . . . .	\$135,275
October Clean-up . . . . .	154,765
November Clean-up (28 days) . . . . .	63,087
<b>Total for season . . . . .</b>	<b>\$353,127</b>
Previous yield of mine . . . . .	528,000
<b>Total yield to date . . . . .</b>	<b>\$881,127</b>

NELSON.

The following is the Athabasca mill run for October:

Period of run, 29 days, 1 hour.	
Tons milled, 445.	
Approximate value of bullion recovered . . .	\$7,000
Approximate value of concentrates recovered	2,200
	\$9,200
<b>Total values recovered per ton of ore milled,</b>	<b>\$20.67.</b>

Athabasca: October run, 440 tons milled. Approximate value, \$9,200.

Ymir mine.—September output, \$47,000; profit, \$35,000.

Ymir: During the entire month of October mill ran 29 days 1 hour. Bullion, estimated value, \$33,800; concentrates, \$15,250.

EAST KOOTENAY.

Mine.	Tons.
St. Eugene . . . . .	3,007
North Star and Sullivan (round figures) . . . . .	2,400

ROSSLAND.

Shipments from Rossland for the five weeks ending 1st December are as follows:

	Five Weeks	Year.
Le Roi . . . . .	20,200	150,798
Centre Star . . . . .	10,788	33,918
War Eagle . . . . .	99	10,762
Le Roi No. 2. . . . .	164	2,371
Giant . . . . .	130	519
Iron Mask . . . . .	663	2,398
I. X. L. . . . .	102	522
Evening Star . . . . .	0	351
Monte Cristo . . . . .	0	273
Iron Colt . . . . .	0	80
Spitzee . . . . .	69	89

Total . . . . . 32,215 202,111

Le Roi: October shipments amount to 16,000 tons, containing 7,466 ozs. of gold, 11,691 ozs. of silver and 201 tons of copper. Estimated value, £45,979.

COAL EXPORTATIONS.

The exports of coal from Vancouver Island collieries for October were as follows:

	Tons.
New Vancouver Coal Co . . . . .	32,805
Ladysmith . . . . .	24,237
Union . . . . .	10,013

Total . . . . . 67,055

For the first three weeks of November the New Vancouver Coal Company shipped:

Date.	Vessel and Destination	Tons.
3rd. SS.	New England, Alaska . . . . .	57
6th. SS.	Robert Adamson, San Francisco . . . . .	4,466
7th. SS.	San Mateo, Port Los Angeles . . . . .	4,361
11th. SS.	Duke of Fife, Kobe, Japan . . . . .	324
12th. SS.	Titania, San Francisco . . . . .	5,640
15th. SS.	Mineola, San Francisco . . . . .	3,201
17th. SS.	New England, Alaska . . . . .	58
20th. SS.	Robert Adamson, San Diego . . . . .	4,469

Total . . . . . 22,576

METAL MARKET—NOVEMBER.

SILVER.

Demand has continued strong throughout the month and prices remain steady. Price has varied from 63 $\frac{3}{4}$  to 64 $\frac{1}{4}$ , and the month closes at the best price. A further advance is expected.

COPPER.

The copper market is unchanged. Consumption

continues very large. Lake copper is quoted at 16 $\frac{1}{2}$  @ 16 $\frac{3}{4}$ .

## LEAD.

There is no change in the market. A good business is being done at last prices. New York quotations: 4.32 $\frac{1}{2}$  @ 4.37 $\frac{1}{2}$ .

## THE LOCAL SHARE MARKET.

**S**IGNS of an increased activity in the mining market are at last apparent. There is no sudden boom, no feverish desire on the part of brokers or outsiders to buy anything and everything that looks cheap, but just the same stocks that have an intrinsic value are being quietly picked up when they can be bought cheaply. Rambler-Cariboo is undergoing one of its periodical spasms, and is quoted anywhere from 24 $\frac{1}{2}$  to 29 $\frac{1}{2}$ . Speculators, however, are a little shy about touching this stock, as the controlling interest of the mine have a happy faculty of dropping the public at the exact psychological moment. From all accounts however the mine is in excellent shape. Crow's Nest has touched 50 again and looks like staying at that figure until its dividend paying capability has been demonstrated or otherwise. There has been a big demand for Fairview at and around 4 cents; White Bear has also been largely dealt in, though we are satisfied the investments are of a purely speculative character. We still consider American Boy the best buy on the market at 10 or 11 cents. This will prove one of the Bonanza mines of the Slocan.

## MACHINERY CATALOGUES.

**W**E shall be pleased to mail catalogues of any of the undermentioned firms to our readers free of charge, on application.

Ainsworth & Sons., Wm., fine balances; Armstrong & Morrison, riveted steel pipe ore cars, etc.; B. C. Assay & Chemical Supply Co., assayers' supplies; Braun & Co., T., assayers' supplies; Beatty & Sons, M., cables and tramways, dredges, pumps, etc.; Bennett & Co., Wm., fuse safety couplers, etc.; California Wire Works, cables and tramways; Canadian Rand Drill Co., drills and compressors; Canadian General Electric Co., electrical plants; Cooper Mfg. Co., The James, compressors, power and hand drills; Denver Fire Clay Co., assayers' furnaces, etc.; Fraser & Chalmers, mills, pumps, hoists, engines, etc.; Fairbanks, Morse & Co., steam and gas engines, compressors, etc.; Gates Iron Works, engines, boilers, crushers, etc.; Hamilton Mfg. Co., The Wm., crushers, mills, hoists, etc.; Hendy Iron Works, Joshua, modern mining machinery; Hinton & Co., Geo. C., electrical supplies and machinery; Hearn & Harrison, engineering, mining and surveying instruments; Hamilton Powder Co., explosives; Howells Mining Drill Co., drills, all kinds; Jeffrey Mfg. Co., elevating machinery; Jenckes Machine Co., hoisting and milling machinery; Krupp, Fried. Grusonwerk, mills, engines, pumps, etc.; Lexow, Theo., carbons; Link Belt Machinery Co., conveyors, elevators, etc.; McLennan, McFeeley & Co., belting, etc.; Mitchell, Lewis & Staver, compressors, drills, hoists, etc.; Perrin & Co., Wm., filter presses; Royal Electric Co., electric power, all kinds; Robertson & Co., James, wrought iron pipe, paints, etc.; Sturtevant Mill Co., ore breakers and mills; Stilwell-Bierce & Smith-Vaile Co., water wheels; Taylor & Co., John, assayers' supplies; Trenton Iron Co., cables and tramways; Taylor Air Compressor Co., drills, compressors, etc.; Union Gas Engine Co., gas engines, hoists, etc.; Whitstock, P. & R., mining engineering and surveying instruments; Wilfley Ore Concentrator Co., Ltd., concentrators.

## The Hall Mining &amp; Smelting Co., Ltd.

**NELSON,  
B. C.**

## SMELTING DEPARTMENT.

Purchases

**COPPER ORE,  
LEAD ORE.  
DRY ORE.**



## BUREAU OF PROVINCIAL INFORMATION.

**I**N ORDER that the Government may be in possession of definite information with which to supply those seeking investments in this Province, I am instructed to invite particulars from those who have properties for sale, and who may feel disposed to forward such particulars to this office for the purpose in question.

In view of the proposed early re-organisation of the Agent General's Office in London, England, the desirability of having on file a list of farms and other properties for sale, with full and accurate details, is obvious. Properties submitted may include farms and farm lands, industrial or commercial concerns, timber limits, water powers, or other enterprises affording opportunities for legitimate investment.

It is not proposed to recommend properties to intending investors, but to afford the fullest access to the classified lists and all available information connected therewith, and to place enquirers in communication with the owners.

The fullest particulars are desired not only of the properties themselves, but of the localities in which they are situated, and the conditions affecting them. For this purpose printed schedules will, upon application, be forwarded to those desirous of making sales.

**R. E. GOSNELL,**

Secretary, Bureau of Provincial Information.



## RE "COAL MINES REGULATION ACT."

## EXAMINATION FOR CERTIFICATES OF COMPETENCY.

**N**OTICE is hereby given that an examination for Certificates of Competency as Managers of Mines will be held on the 12th day of December, 1900, at the Court House, Nanaimo, B. C., and also at Fernie, B. C.

Candidates, not under twenty-three years of age, desirous of presenting themselves for examination, must deliver to Mr. Thomas Morgan, Chairman of Board of Examiners, Nanaimo, on or before the 3rd day of December, 1900, notice of such intention, in writing, together with a certificate of service from their former or present employers, testifying to at least two years' experience underground.

The examination will be in writing and will include the following subjects, viz:

1. Mining Act and Rules.
2. Mine Gases.
3. General Work.
4. Ventilation.
5. Mining Machinery.
6. Surveying and Levelling.

Any further particulars required may be obtained on application to Mr. Morgan, Chairman of Board of Examiners, Nanaimo, B. C.

RICHARD MCBRIDE, Minister of Mines.

Department of Mines, 6th November, 1900.



## NOTICE.

## Appointment of Deputy Mining Recorder.

**U**NDER authority of Order in Council passed December 30th, 1899, the Honourable the Minister of Mines has been pleased to sanction, and I do hereby give notice that I have appointed, Justinian Pelly, of Chilliwack, a Deputy Mining Recorder of and for the District known as Chilliwack, in the New Westminster Mining Division, with sub-recording office at Chilliwack.

w, S. GORE, Gold Commissioner for the District.



LOCAL STOCK MARKET FOR THE MONTH OF NOVEMBER.

Prepared by A. W. More & Co., Stock Brokers, Victoria, B. C.

Table with columns for COMPANIES, Week Ending Saturday (10th, 17th, 24th Nov, 1st Dec), Highest/Lowest prices (Asked/Bid), and DIVIDENDS.

LATEST LONDON QUOTATIONS.

(From the B. C. Review.)

Table with columns for NAME OF COMPANY, Paid up per Share, Mk. Up Price, Mk. up Price, Price Last Week, Price Oct. 8, Price Oct. 10, Price Oct. 12.

DIVIDEND PAYING MINES OF B. C.

SLOCAN DISTRICT.

Table listing mines in Slocan District with dividend amounts, such as Goodenough, Antonio, Idaho, etc.

EAST KOOTENAY DISTRICT.

Table listing mines in East Kootenay District with dividend amounts, such as St. Eugene, North Star.

NELSON DISTRICT.

Table listing mines in Nelson District with dividend amounts, such as Fern, Hall Mines, Ymir.

TRAIL CREEK DISTRICT.

Table listing mines in Trail Creek District with dividend amounts, such as Le Roi, War Eagle, Centre Star.

KETTLE RIVER DISTRICT.

Table listing mines in Kettle River District with dividend amounts, such as Cariboo (Camp McKinney).

Total dividends \$5,614,465

This list is incomplete, but is, so far as it goes, accurate.

DIVIDENDS DECLARED DURING NOVEMBER.

Table listing dividend amounts for various mines like St. Eugene, Slocan Star, Canadian Goldfields Syndicate, Centre Star.

Nanaimo Saw Mill and Sash and Door Factory.

OFFICE, MILL ST., NANAIMO.

A. HASLAM, Proprietor.

Complete stock of Rough and Dressed Lumber, Shingles, Laths, Pickets, L.ors Windows, Blinds, Moulding, Turning, Scroll Sawing, and all kinds of Wood Finishing, Cedar, White Pine, and Kedwood, &c.

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