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## THE MONTH.

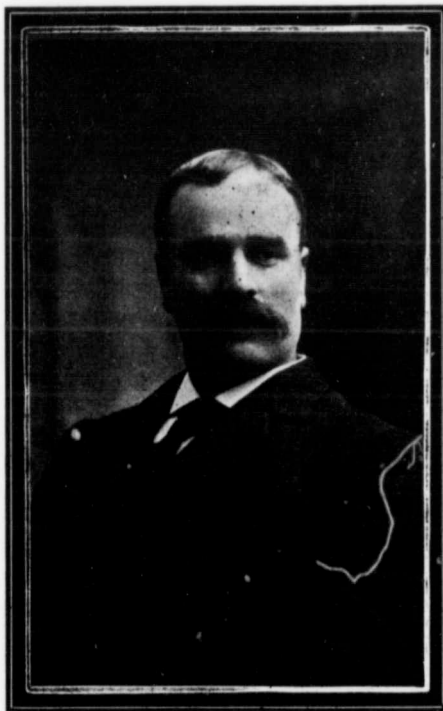
The effective and important work already done by the Provincial Mining Association constitutes for it a strong claim for the active co-operation of the mining districts particularly, and of all other sections of the Province generally, in its endeavours to promote the interests of the mining industry of British Columbia. This co-operation can be most readily ensured by the prompt organization of a branch of the Association in every part of the Province populous enough to admit of one being formed. Where the population is too sparse to be favourable to such organization efforts should be made to induce as many as possible of the numerous scattered units to either join the central organization or the nearest branch, so that both financially and as regards number of members the Association as a whole may have the benefit of general support. To thoroughly succeed in its commendable aims and intentions the Association must be in a position to speak as the voice of all interested in permanently securing for British Columbia the substantial benefits attendant upon the establishment of the mining industry upon a firm and profitable basis. It is gen-

erally admitted that this industry will in the future, under favourable conditions, take front rank among those connected with the development of the natural resources of the Province. The nearness or otherwise of that future should not, however, be left to chance; on the contrary, every effort should be put forth to enter upon it at once. This can only be done by united action. Never before in its history has any movement been so well-timed to bring about the changes necessary to gain for the Province a wider recognition of the enormous extent of its mineral resources and a consequent employment of a much larger amount of outside capital in their development. The experience of the past compels the conclusion that the Provincial Legislature, acting without the mature advice and well-considered recommendations of a responsible body thoroughly conversant with the conditions and requirements of the mining industry, may not be depended upon to legislate in such a manner as well promote its advancement and at the same time provide that its burden of taxation shall be judiciously imposed. The organization of branches is proceeding, but the active interest so widely displayed three or four months since, when delegates were being appointed to attend the general convention in Victoria, may not be maintained if advantage be not at once taken of the disposition to uphold the hands of the central executive. This reminder is therefore considered timely, so that there may be no encouragement of a spirit of laxity or inclination to let things take care of themselves. If the Mining Association be a necessity—and there is no doubt that much useful work awaits the earnest attention of such a body—then this is no time for a drifting policy. Prompt and general organization will alone give the Association the numerical and financial strength requisite to make it a power in the land. With a similar backing of public opinion in the conduct of its regular business as it had behind it at the general convention, there need be no doubt as to its influence with the Legislature, which is always prepared to heed public opinion representative of any considerable proportion of the population of the Province, especially when that opinion is supported by arguments and facts and figures carefully prepared and deliberately submitted for its consideration. It is therefore urged that this question of organization of branches

be not delayed, but that everywhere in the Province where the conditions will admit of its being obtained active co-operation be secured and that without further delay.

The Princeton (Similkameen) branch of the Provincial Mining Association last month passed two resolutions on which the Executive Committee of the Association has been asked to act. The first of these calls for the appointment of at least five practical miners as mine inspectors to carefully examine mines and request that changes be made where necessary for the protection of life, and to report at least weekly to the Minister of Mines or Gold Commissioner. What seems to be singular is that such a request should come from a district in which there are as yet few, if any, mines so far developed or regularly employing a sufficient number of men as to require frequent inspection. Surely if this so-called improvement of our system of mine inspection "were urgently needed" some one of the numerous parts of the Province where there are mines with extensive workings and a considerable force of men employed underground would long since have made a move in a similar direction. Further, Provincial Gold Commissioners have nothing at all to do with the inspection of mines, so that no practical good could come of reporting to them. The second resolution expresses the opinion that "the present Provincial Mineralogist is unsuited for the position he occupies, and that in the interests of the Province the Executive of the Provincial Association urge upon the Government the desirability of a change." The reasons assigned for this belief are, in short, that the official mentioned is invariably pessimistic, discouraging both the prospector and the capitalist seeking a suitable field for operations; that his official reports have an injurious effect on outsiders and retard the development of new mineral sections; and that in particular his report on the Similkameen (published last year) did that district a grave injustice. Here again it is surprising that Princeton should move in this connection, for its representative on the Executive Committee was a member of a sub-committee which a few weeks ago interviewed and interrogated the Provincial Mineralogist in the presence of the Minister of Mines upon these very matters, and afterwards reported itself satisfied with the interview, expressing the opinion that in the future official reports may be expected to be less pessimistic. Looking at the parts of the published report complained of by the Nicola delegate it is apparent that the Provincial Mineralogist reported as favourably of the "prospects" he visited as a man in his responsible position and hav-

ing very great importance attached to his statements, could reasonably be expected to do. In considering the reports of this official it must be kept well in mind that he must not be a "boomer" in any sense, nor even an optimist beyond the limits of reasonable conservatism. It may be that at times he has erred on the side of caution—if so, this fault is to be preferred, in the interests of legitimate mining, to a too sanguine view of existing conditions. It cannot be denied that the Similkameen has had its share of "hot air" supplied to the press by irresponsible boomers, and that so far it has not to any considerable extent justified the glow-



Mr. H. G. Seaman, President of the Miners' Union at Rossland, and a member of the Executive Com. of the P.M.A.

ing statements made by them. It by no means follows that in the future it will fail to realize expectations; on the contrary, the probabilities are that its mining industry will yet flourish and assume important proportions, but it is development and development alone that will attract capital, not mere reports. Let claim owners get to work and "prove" that the ore is there in quantity and of value sufficient to make it profitable to open up the mining properties, and they will soon be independent of reports, whether of the pessimistic character of which the Princeton branch of the Provincial Mining Association complains or of the

gross exaggerations sometimes published and to which the general public has much stronger grounds to take exception.

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Doubtless some of the Boards of Trade of the districts in the Province the British delegates to the Congress of Chambers of Commerce of the Empire, to be held in Montreal next August, are expected to visit before their return to Great Britain, are already alive to the importance of placing before the visitors facts and figures relative to the more prominent industries of their respective districts. Too much stress, however, cannot be laid on the advisability of full advantage being taken of this opportunity to properly impress these influential men with the extent and value of the natural resources of the Province, and the many openings there are in it for the employment of capital in undertakings that give promise of yielding a profitable return. The mining sections in particular will do well to afford the visitors every facility for obtaining a knowledge of the extent of the enormous mineral resources of their respective districts. In East Kootenay, coal and silver-lead; in West Kootenay, the silver-lead of the Slocan and the gold and copper of Nelson, Ymir and Rossland; in the Boundary, the astonishingly large bodies of copper ore, together with the exceptional facilities for mining and smelting at costs so low as to be almost beyond belief among those unused to the existence of such favourable conditions; and on Vancouver and Texada Islands, the coal and copper mines, and the valuable iron ore deposits which here, as well as in other parts of the Province, are awaiting development and utilization—all these important mineral resources should be made the most of. It is known that among the visitors will be some representing men who have already invested money in British Columbia enterprises, whilst others will be on the look out for suitable openings for the employment of capital backed by active energy and enterprise. It is therefore especially desirable that thoroughly dependable information supplemented by statistics and maps shall be readily accessible, and that the visitors be made to recognize that the Province has other attractions to offer than its magnificent scenery and enjoyable climate; that it has much mineral wealth that may be turned to profitable account, with, in places, tremendous water power available for the operation of machinery, and, in others, immense coal deposits to lessen the cost of the reduction of ores. Few, if any, of the delegates are likely to visit the little-developed Similkameen, the old-time famous placer gold fields of Cariboo and other parts, or even Atlin and the Yukon, now important contributors to the gold yield

of the West, yet should they also be fully informed as to these. Facts, incontrovertible facts, are what should be placed before them, whether concerning the great mineral resources of the Province or of its resources in its lumbering and fishing industries, and the sooner such responsible bodies as the Boards of Trade of the districts to be visited set about getting these together in effective and handy form the better, both for the convenience of the visitors and lasting benefit of the Province.

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The *Nelson Daily News* states that a determined effort is being made to prove that Canadian smelters treating silver-lead ores are unfair to the Canadian silver-lead mine owners, and that, strangely enough, the attacks upon these smelters emanate from the chief centres of the silver-lead mining industry in the Slocan. Further, it expresses the opinion that since the newspapers devoting considerable attention to this matter depend for their prosperity upon the welfare of the silver-lead mining industry it seems unreasonable to assume that they would adversely criticize these smelters unless they felt assured that in doing so they were acting in the best interests of that industry. Mr. J. L. Parker, manager of the North Star mine, an important silver-lead property situate in East Kootenay, defends the home smelters and urges that Canadian mine owners give them more general support by shipping their ore to them instead of to foreign smelters. He quotes figures to show that even at times when they had opportunity to "play the cinch game, by reason of the smelters of the American lead trust having declined to accept British Columbia silver-lead ores for treatment, the home smelters not only did not force the local mine-owners to pay more for treating their ores, as they might easily have required them to do, but they made reductions and so shared with them the advantage gained from the bonus on refined lead granted by the Federal Government. He asks what would these working silver-lead mines in Canada have done during the years 1901-02, when the lead trust was obtaining enough ore from its own mines and "practically left us to our fate," but for the home smelters? and then urges mine owners to keep the latter supplied with sufficient ore to obviate the frequently-recurring necessity of blowing out the smelters' furnaces for lack of ore, the maintenance of a regular and ample supply being the most effective means of securing lower treatment charges. On the whole Mr. Parker makes a strong plea in behalf of the home smelters, but the *Daily News* seems to indicate the best way of arriving at the facts of the position when it sums up its review of the controversy in the

following words: "If the local smelters are doing what is right by the mine owners the latter should say so in such a manner as will carry conviction. On the other hand, if the mine owners have a grievance against the smelters let them state it with equal clearness." The situation appears to be a simple one; either the home smelters are treating the mine owners fairly or they are not. If not, the latter should show wherein the unfairness lies. The silver-lead industry has enough difficulties to contend against in other ways without the local press adding to them by publishing statements tending to discourage the employment of capital in the further development of the industry, if these statements be not warranted. It is to be hoped that the efforts of the *Daily News* to get at the exact position will result in a better understanding being arrived at, and that soon.

It has become so customary to regard the ores of the Boundary District of British Columbia as all low-grade that it comes as somewhat of a surprise to find that in that district there are being developed properties that by no means come under this heading. Whilst specimen assays gave high values, with no smelter returns from car-load lots to confirm the occurrence in the quartz ores of gold and silver in sufficient quantities to make the opening up of these leads profitable, the opinion that the ores were of low-grade only seemed well warranted, but the development now taking place on several mineral claims situate in the immediate vicinity of Greenwood indicates that it may ere long be found necessary to considerably qualify the statement that the ores of the district are without exception low-grade. The Providence mine has now shipped more than 300 tons of ore containing values chiefly in gold and silver, with a little lead. From the smelter returns of 199 tons of this ore it has been ascertained that it contained an average of gold 1.79 ozs. and silver 253.28 ozs., giving an average value (with silver at changing prices) of \$133.27 per ton. The gold content of this ore varied considerably, ranging from .61 oz. in one carload lot to 5.40 ozs. per ton in another. There was less variation in the silver, the lowest having been 194.90 ozs. and the highest 300.80 ozs. per ton. One carload of rather less than 22 tons net gave a gross return of \$5,064.58, but this was exceptional, although the average value of the three last carloads including the one just mentioned, was at the rate of \$200.86 per ton. An adjoining property, the Elkhorn, is also developing satisfactorily, the ore showing much native silver in places, and it has a satisfactory gold content as well. Half a dozen other claims in the same neighbourhood are also opening up

well, with the result that from 80 to 100 men are regularly employed on these high-grade properties and the town of Greenwood is benefiting accordingly from this new development. It is worthy of note that when, in 1897, Mr. W. A. Carlyle, then Provincial Mineralogist, paid an official visit to the Boundary, he expressed a favourable opinion of the possibilities of the quartz veins he saw around Greenwood; and that Mr. R. W. Brock, geologist in charge of the Dominion Geological Survey party that spent the seasons of 1901-2 in the district, also considered these veins well worthy the attention of mining men prepared to develop them.

We learn with regret that one of the province's parliamentary representatives at Ottawa is not strictly in accord with the suggestion that has been made by the Provincial Mining Association in respect to the establishment of a Federal Department of Mines. This gentleman believes that quite as useful a purpose would be served by the appointment of a "Commissioner of Mines," for, he points out, the Dominion Government would have no actual jurisdiction in matters appertaining to mining in Canada excepting only in the case of the North-West and Yukon Territories. We do not, however, recognize the logic of this argument. Canada is already an important mining country and surely if agriculture has cabinet representation and a Department is maintained in the interests of that industry, on what grounds can be shown that mining has not almost equal claims to consideration? It is true that by the establishment of a Department of Mines British Columbia would perhaps be the first to benefit. As a mineral producing area it is the most important of the provinces, and there are yet immense tracts of territory awaiting exploration. Furthermore the older settled provinces of Quebec and Ontario are in a position, while British Columbia is not, to maintain a fairly efficient public service to assist in the exploitation and development of the mining industries in those provinces. But these surely cannot be regarded as sound reasons against the proposal. British Columbia is, after all, as much an integral part of Canada as is Ontario, and apart from political considerations, as much entitled to recognition.

The shareholders of the Payne Company have every reason to be satisfied with the report as presented at the recent annual general meeting, and the mine manager, and Mr. Garde is to be heartily congratulated on the excellent showing he has been able to make since assuming charge of the property. The outlook at the mine for a time was exceedingly unsatisfactory, in

fact it was very generally believed that the ore deposits had become exhausted. The company, after spending three years in searching for the main lead at depth, abandoned the effort in despair, but at the instance of Mr. Garde the work was again resumed, and this time with gratifying results, a strong and well-defined vein averaging two and a half feet wide having been encountered some few months ago. The mine has now, it is estimated, a total reserve of 87,000 tons of concentrating material, the net value of which, based on present low metal prices, is sixty dollars per ton. It should be noted, however, that the company has now exhausted its cash balance and unless the mine may now be considered self-supporting some sort of reconstruction may be necessary.

The Boundary Creek *Times* draws attention to the fact that a so-called mining paper, the *Mining Bureau*, published in Boston, has made the quite unwarrantable statement that two important Boundary mining undertakings, the B. C. Copper Company and the Montreal & Boston Copper Company, are "nothing but stock-jobbing propositions." The allegation is unsupported by proof of any kind: on the other hand both the companies mentioned are expending large sums of money in the development of their respective enterprises, and on our own knowledge, we are prepared to say this expenditure is being laid out to the best possible advantage having regard to the early establishment of the enterprises upon a profit-earning footing. But it might be pointed out to the Boston *Mining Bureau*, meanwhile, that it has omitted to expose some of the obvious instances of wild-catting and stock-jobbing in connection with recently American-promoted B. C. mining concerns, of which advertisements appear in its columns. We would suggest the early rectification of the oversight.

As is well known the smelting industry in the Kootenays is entirely at the mercy of the Crow's Nest Coal Company, not only as regards the price of fuel, which, however, is reasonably moderate, but under present conditions the metalliferous industry may at any moment be brought to a standstill as a result of too often recurring strikes and lock-outs at the coal mines. A new company, meanwhile, has been recently incorporated, in which the Granby Mining Company is said to be heavily interested, to develop and operate coal measures at Blairmore, some forty-five miles to the east of Fernie. The field has not yet been exploited to any very considerable extent, but nine seams are known to

occur on the property, the geological conditions being identical with those obtaining at Fernie. From an independent source we are assured that the Blairmore coal yields an excellent coke, giving not more than a 7 per cent. ash. In the interests of copper mining in the Boundary we wish the new enterprise every success.

The month has been very prolific of reported strikes—of ore, not the kind to which we are beginning to be most accustomed. Thus within the last two or three weeks important developments are said to have taken place at the Le Roi, Le Roi No. 2, and Velvet at Rossland, at the Athabasca and Silver King at Nelson, at the Arlington and Speculator in the Slocan City Division; at the Rambler-Cariboo at McQuigan; at the Gold Finch at Camborne; and discoveries of high-grade ore, too numerous to mention, in the granite belt near Greenwood. A number of "deals" are also reported to have been made during the month; the local stock markets have been more active and altogether the outlook has become decidedly more encouraging.

#### THE MINISTER OF MINES REPORT FOR 1902

THE Report of the Minister of Mines for 1902 was last week presented to the Provincial Legislature. It is dated March 11, yet eleven weeks were permitted to elapse before it was made public. The delay in its issue, though shorter than that of last year, was an unreasonably long one, particularly under the circumstances that no estimate by the Provincial Mineralogist of the mineral production of the Province for the previous year was published last January, as was done in January, 1902. This delay is in part attributed to the difficulty experienced in obtaining statistical returns from a few of the mines, some ten per cent. of the producers having failed to make returns promptly, thereby holding back all the statistical tables. The enforcement of the law, which provides for the infliction of penalties for such neglect, would probably have a salutary effect and in future remove this cause of delay. Apart from this though, the Minister of Mines can not be commended in this instance for promptitude, it appearing on the face of it that nearly three months passed between the time of the completion of the report and its being made available for public use.

Looking at the statistics of production during 1902 by themselves it would appear that no advance was made in the Province by the mining industry during the year under notice, the total value of the minerals produced having been but \$17,486,550 as compared with \$20,086,780 for 1901, as shown in accompanying tables:—

	1901.		1902.	
	Quantity.	Value.	Quantity.	Value.
Gold, placer, oz. . . . .	48,505	\$ 970,100	53,657	\$ 1,073,140
" lode, oz. . . . .	210,384	4,384,603	236,491	4,888,269
Silver, oz. . . . .	5,151,333	2,884,745	3,917,917	1,941,328
Copper, lbs. . . . .	27,603,746	4,446,963	29,636,057	3,446,673
Lead, lbs. . . . .	51,582,906	2,002,733	22,536,381	824,832
Coal, long tons. . . . .	1,460,331	4,380,993	1,397,394	4,192,182
Coke, long tons. . . . .	127,081	635,405	128,015	640,075
Other materials . . . . .		417,238		480,051
		\$20,086,780		\$17,486,550

This falling off in total values is disappointing when compared with the distinct advance made in each of several previous years since 1898 as appears below:

	Value.	Increase.
Total production in 1898. . . . .	\$10,906,861	\$ 457,503
" " " 1899. . . . .	12,393,131	1,486,270
" " " 1900. . . . .	16,344,751	3,951,620
" " " 1901. . . . .	20,086,780	3,742,029
" " " 1902. . . . .	17,486,550	-2,600,230

The decrease in total value of last year's production is largely due, the report states, to the lower market values of the various metals, for were the year's output calculated at prices prevailing in 1901 the shortage would be but \$965,742 instead of \$2,600,230, as shown. The tonnage of ore mined was, however, greater and in this connection the following table may be found of interest, for purposes of comparison:—

	Gold Produced in 1898.				
	1898.	1899.	1900.	1901.	1902.
Gold, placer (ozs.) . . . . .	32,167	67,425	63,936	48,505	53,657
Gold, lode (ozs.) . . . . .	110,061	138,315	167,153	210,384	236,491
Silver (ozs.) . . . . .	4,292,401	2,939,413	3,997,080	5,151,333	3,917,917
Copper (lbs.) . . . . .	7,271,678	7,722,591	9,997,080	27,603,746	29,636,057
Lead (lbs.) . . . . .	31,693,559	21,862,436	63,358,621	51,582,906	22,536,381
Coal (long tons) . . . . .	1,135,865	1,306,326	1,439,595	1,460,331	1,397,394
Coke (long tons) . . . . .	35,000	34,251	85,149	127,081	128,015

It will be seen that in both placer and lode gold, in copper, and in coke, there was last year an increase in the quantity produced, and that the decrease in coal was comparatively small. There was though, a large decrease in the production of silver, and a still larger shortage in lead. To this decrease in quantity together with the considerable shrinkage in average values for the year is directly traceable the seeming retrograde movement in the mining industry.

The comments of the Provincial Mineralogist on the situation assign reasons for this temporary check in progress. He observes, in part: The progress made by the mining industry of the Province, has during the year 1902, been less marked than usual. If the statistics of production alone are considered, it would appear that no advance has been made, as the gross value of the mineral production of 1902 is less than that of the preceding year, the first time that such a thing has happened since lode mining became an industry of the Province. While it is necessary to face this fact, it is also necessary to learn to what causes the fact is attributable, whether such causes are per-

manent or temporary, and whether they are removable or not. The diminished production is not due to any failure in the mines themselves, for no widespread failure has occurred, and, as a matter of fact, the mines are in a better condition than they were a year ago. The adverse conditions affecting the output appear to have been different in the various branches of the industry, but, as is the way with misfortunes, they came not singly.

"The placer mines showed in 1902 an increased production over the previous year of about 10 to 15 per cent. This is an exceedingly good showing, but it is not nearly as good as it would have been had not the rainfall for the year been exceptionally light, causing a shortage of water supply, which sadly diminished the output of the hydraulic mining companies. This shortage of water is, however, only a temporary trouble, and should disappear with another year.

"In the coal mining branch of the industry, the Coast collieries have had their principal market, California, invaded by fuel oil produced in the State itself, and yet, although this competition has come upon them suddenly, they have been able to dispose of within 8 per cent. as much coal as last year, and a greater

amount than in any year previous to 1901. The Crow's Nest collieries had an unlimited market open to them, but were met with, first, an explosion which crippled their principal mine, followed by strikes which diminished the output, causing the production for the year to be only about half what it should have been, and undoubtedly will be next year. Despite all this, the coal industry about holds its own, but, like the 'placer,' did not make that advance which the conditions of the mines and market would have justified.

"The lode mining of the Province has been the branch most sorely beset, and this not owing to any failure of the mines themselves, but to the unprecedentedly low market price of metals which has prevailed during the entire year, beginning, as it did, in the last month of 1901, while it is only in the early months of 1903 that the market has begun to recover. To realize what this drop in the market really was, it is necessary to make a direct comparison, as follows:—

"Taking the average value for the whole of each year of the various metals, as quoted on the New York Metal Exchange, we find:

	1901.	1902.
Copper . . . . .	16.11	11.62, a decreased value of 27.3 p.c.
Silver . . . . .	58.95	52.16, a decreased value of 11.5 p.c.
Lead (in bond) . . . . .	2.165	1.94, a decreased value of 10.4 p.c.

"This drop in the market value of the metals has had a double effect on the statistics, inasmuch as it has reduced the value of such ores as were mined, and has constrained the miner to restrict his output.

"As compared with the previous year the production of 1902 shows, as to market values, for—

Placer gold, an increase of . . . . .	10.4 per cent.
Lode gold, an increase of . . . . .	12.4 "
Silver, a decrease of . . . . .	32.7 "
Copper, a decrease of . . . . .	25.0 "
Lead, a decrease of . . . . .	58.8 "
Coal, a decrease of . . . . .	4.3 "
Coke, an increase of . . . . .	0.71 "
Other metals and materials, an increase of . . . . .	15.0 "

The remainder of the report may be briefly summarized. The tonnage of ore mined in the Province has been greater, amounting this year to 998,999 tons, as against 920,416 mined in 1901, an increase of 8.6 per cent. This great increase is entirely due to Rossland and the Boundary, more particularly the latter, in which district 521,402 tons of ore were mined and smelted.

The number of mines that shipped ore during 1902 was 124, these together employing 3,345 men, 1,126 above ground and 2,219 below. The statistics of the non-shipping mines are very incomplete, only 44, employing a total of 342 men, having reported to the Mines Department.

The gross output of coal during the year was 1,641,626 tons, of which 244,232 tons were converted into coke, leaving a net output of 1,397,394 tons of coal and 128,015 tons of coke. The net output of the Vancouver Island collieries was 1,173,893 tons of coal and 20,178 tons of coke, and that of the Crow's Nest Pass collieries 223,501 tons of coal and 107,837 tons of coke. Of last year's production 775,300 tons of coal and 38,780 tons of coke were exported to the United States. The recently-made addition of transportation facilities giving direct communication between the Crow's Nest mines and the United States, and the removal of the U. S. import duty of 67 cents per ton together promises a much larger export during 1903.

The combined placer and lode gold output for the year, as usual, maintained an increase, having reached a total value of \$5,961,439 the highest gold output made by the Province, and an increase over that of 1901 of \$642,706, or about 18 per cent. The greater part of the placer gold came from the Cariboo and Quesnel divisions of the Cariboo district, and the Atlin division of the Cassiar district. Hydraulicing

was not successful on the whole last year, a shortage of water having been the chief preventing cause. There was not so much dredging for gold done as in some earlier years. Lode gold mining, with a production of \$4,888,269, showed an increase over 1901 of about 12 1-2 per cent., this coming chiefly from the gold-copper mines of the Rossland and Boundary districts. The product of lode gold mining in British Columbia has shown the steadiest and most regular increase, and this is the most valuable mineral product the Province has. It can not, however, be classed as even a set branch of the mining industry, inasmuch as here the gold is found mostly in combination with other metals, such as copper or silver. A certain amount of this production is derived from stamp milling, etc., but chiefly it is due to smelting. The following shows approximately that the gold has been derived from—

Direct smelting of copper-gold ores . . . . .	\$4,232,948
Combined amalgamation and concentration . . . . .	655,321
Total . . . . .	\$4,888,269

The total amount of silver produced was 3,917,917 ozs., valued at \$1,941,328, a considerable decrease as compared with 1901, but practically the same output in quantity as that of 1900. Of this total amount about 25 per cent. was mined in association with copper, while the remaining 75 per cent. was mainly derived from the silver-lead ores of the Slocan district and of East Kootenay.

The lead production was 88,536,381 lbs., or only about half that of 1901, owing to the suspension of the East Kootenay lead mines. The production was, nevertheless, greater than that of 1899.

The output of copper was 29,636,057 lbs., an increase of 2,032,311 lbs. or 7.4 per cent. over that of preceding year, but owing to the reduced market prices of this metal the value of the year's output was \$1,000,290 less than was that of 1901. The Boundary yielded the greater part of the copper production, with an output of more than half a million tons of ore, while Rossland made the next largest output. The following shows the districts from which the copper output of 1902 was obtained:—

	Lbs.
Boundary . . . . .	14,955,582
Rossland . . . . .	11,667,807
Coast . . . . .	3,466,631
Nelson . . . . .	491,144
Other districts . . . . .	24,843
Total . . . . .	29,636,057

A good deal of iron ore was mined on the Coast during the year, but the only shipments made were from Texada Island, from which some 6,390 tons of magnetic iron ore, running more than 50 per cent, iron, were sent to the iron furnace at Irondale, Washington, U. S. A. From the iron mines at Cherry Creek, near Kamloops, 3,787 tons of magnetite were shipped to Nelson, for use there in the smelter as a flux. Included in the report is a lengthy special article on "The Iron Ores of the Coast."

In reviewing the general development of the year satisfaction is expressed at the advancement made in several districts. Good progress was reported from Atlin, where 600 to 700 men were employed in gold placer mining and hydraulicing during the summer and about half that number in the winter. The copper properties on Texada Island made a good showing, while others on Quatsino Sound, West Coast of Vancouver Island, commenced to ship ore. In the Rossland (Trail Creek) district the tonnage of ore shipped was 329,534 tons, an increase of 49,174 tons over the output of 1901, the Le Roi and Le Roi No. 2 mines having contributed most of this increase. The Boundary district, more than any other part of the Province, attracted general notice, the immense size of its low-grade ore bodies having been generally recognized, and the practicability of working them at a profit having been demonstrated, even with copper at low prices.

The work of the Provincial Bureau of Mines for the year is stated in detail. In this connection there is a full account of a visit paid by the Provincial Mineralogist to Mount Sicker camp, on the East Coast of Vancouver Island, together with descriptions of its copper mines and the Tye smelter. The report of the Provincial Assayer gives a summary of the work of the Assay Office, which earned \$1,387 during the year in assay fees, assayers' examination fees, and other work. This department melted 173 lots of gold, value \$135,098, mostly small deposits by miners, to whom Provincial Government Assay Certificates were issued. The gold dust received was from widely separated localities and varied much in value, the extremes being \$13.50 and \$19.60 per ounce.

Besides the customary reports on their respective districts or divisions of Gold Commissioners and Mining Recorders, which contain much information, there are reports on the examination for assayers and coal mine managers, respectively on the inspection of metaliferous mines; on coal mining, and that of the "Special Commission appointed to inquire into the Causes of Explosions in Coal Mines." There is, as well, much other detail relative to mines and mining. The im-

portant smelting industry of the Kootenay and Boundary is scarcely noticed, though. It may be there was little that is new to chronicle about it. The report is illustrated, the illustrations including 24 views, chiefly of Coast and Northern subjects, the lower interior being left out altogether in this respect from the 1902 report.

Other tables, additional to those already given, appear in the report. From these the following have been selected as likely to be of general interest:—

PRODUCTION FOR 1902 BY DISTRICTS AND DIVISIONS.

Cariboo District—	
Cariboo Mining Division.....	\$346,395
Quesnel Mining Division.....	160,000
Omineca Mining Division.....	40,000
	\$546,395
Cassiar District.....	426,636
Kootenay, East, District.....	1,477,466
Kootenay, West, District—	
Ainsworth Mining Division.....	\$ 873,967
Nelson Mining Division.....	818,484
Slocan Mining Division.....	1,608,827
Trail Creek Mining Division.....	4,936,395
Other parts.....	167,716
	7,806,399
Lillooet District.....	31,429
Yale District—	
Osoyoos, Grand Forks and Kettle River	
Divisions (Boundary District).....	\$2,782,263
Similkameen Division.....	3,700
Yale Division.....	58,574
	3,843,537
Coast Districts—	
Nanaimo, Alberni, W. Coast of Vancouver Island,	
Victoria.....	4,360,688
	\$17,486,550
TOTAL PRODUCTION FOR ALL YEARS UP TO AND INCLUDING 1902.	
Gold, placer.....	\$64,627,683
Gold, lode.....	22,049,732
	\$86,677,415
Silver.....	18,475,882
Lead.....	10,447,521
Copper.....	12,256,219
Coal and coke.....	58,999,572
Building stone, bricks, etc.....	2,800,000
Other metals.....	81,920
	\$189,728,538



## THE FRANK DISASTER.

**M**R. FRANK SMITH, Inspector of Mines for the Government of the North West Territories, who has since the recent disaster at Frank, made a series of observations on Turtle Mountain, brings forward some reasons for the sudden occurrence of the slide of rock, which appears certainly feasible. He assigns as a likely cause the melting of snow



Digging out the bodies at Frank.

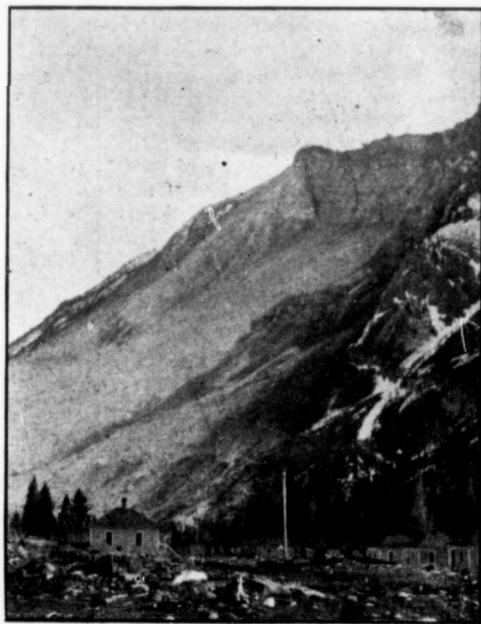
and ice in a fissure, the subsequent freezing expanding the side of the mountain already weakened to some extent by the mining operations. When the slide started it was about four thousand feet wide. It spread out like a fan in its progress, following a north-easterly direction, until it assumed a width of eight thousand feet. It covered nine hundred acres with a depth ranging from five to a hundred feet. Mr. Smith estimated that between fifty and sixty million tons of rock fell from the mountain.

The course of the slide, as already stated, was to the east of the town, and had its width remained at four thousand feet or thereabouts, the village would not have suffered. As it was, however, a number of cottages were swept away by the avalanche, which swept across the river, the railway line and up the mountain on the other side of the valley. The two peaks which formerly reared themselves about three thousand two hundred feet above the valley are now scattered in millions of tons over the area beneath. The present altitude of the mountain is in the neighbourhood of 2,500 feet.

Mr. Smith believes that further slides of loose rock will take place, but he does not apprehend that the village of Frank will be again endangered thereby. Meanwhile the former residents are returning to the town, and operations are being resumed at the mines.

Mr. W. Blakemore, formerly general manager of the Crow's Nest Coal Company, holds, however, accord-

ing to a report published in the *Fernie Free Press*, a contrary view to that expressed by Mr. Smith. He recently spent several hours in Frank and walked over the slide and made an inspection of the surface conditions. His opinion is that the danger is not yet over and that any resumption of mining operations will almost certainly precipitate another catastrophe. Mr. Blakemore from the first scouted the reports of volcanic or seismic disturbances of any kind as being entirely outside the reasonable probabilities and he strongly deprecated the sending out of such sensational reports as calculated to do injury to the financial interests of the West. His impression as given to the Montreal press when the first telegraphic advices reached there was that a huge mountain slide had been caused by the mining operations and having examined the slide he now confirms this view. His theory is that the workings in the Frank mine have removed what was practically a natural barrier at the foot of the mountain. This had induced a squeeze resulting finally in a collapse, bringing down a slice of the mountain which had been gradually fissured and released for months past. This theory is entirely consistent with the surface indications as now exposed and with the evidence given at the inquest as to the "squeezing" in the mine



The slide, showing peak which will have to be blown out.

and no other explanation is necessary to explain all that has happened. Mr. Blakemore considers that there is imminent danger of another slide as far back as the crevices reported by the experts and especially



A wrecked cottage—Seeking for its occupants.

of the projecting peak to the east. If the latter should fall the whole town would be buried. He also thinks the Dominion Government, which owns the coal areas in the North West Territories, should, in the interest of human life, prohibit further mining in the seam recently worked, and in any other seam similarly located.

Since the foregoing was written, a special despatch from Frank announces that a crack four feet wide and 3,000 feet long has opened a couple of hundred yards back from the face of the western peak of Turtle Mountain, at the summit.

Messrs. McConnell and Brock, of the Canadian Geological Survey, ascertained, meanwhile, that the most westerly peak of Turtle Mountain had moved about six inches during the period of their observations. This peak is a massive block of rock as great in extent as, if not greater, than the part which fell away. As it directly overhangs the town, there can be little doubt that it would destroy a part, if not the whole, of what remains of the village. In consequence of this alarming intelligence the inhabitants have again abandoned their homes.

Another theory advanced in explanation of the occurrence of the disaster is that it was not a rock-slide at all, but an upheaval of rock occasioned by a tremendous "blow-out" of natural gas. This theory is put forward

by the partner of a well-known firm of railway contractors, whose camp, including over a hundred wagons, scrapers, etc., was destroyed by the avalanche of rock. This gentleman, Mr. McVeigh, bases his opinion on the following grounds: That

petroleum and natural gas are known to exist in the immediate neighbourhood; a slide would have deposited the main portion of its debris at the foot of the mountain from whence it came. In this case the greater portion of the rock is on the side of the opposite mountain across the valley of the Old Man River. The workings of the Canadian-American mine are on the face of Turtle Mountain, and there are upraises which come within a very few feet of the surface of the hill. In fact, it was from these upper workings the imprisoned men dug their way out to freedom. Had it been an ordinary slide, the weight of the rock body moved was so great that it would have crushed into workings and destroyed the mine. But the mine was not injured in any way except by having the mouth of the tunnel covered up by the fallen rock. Another thing that would have been observed had it been like any other slide;

there would have been some of the surface of the ground passed over swept in front of the main body. But buildings and other materials were buried and not a vestige of them was carried down by the rock fall.



View of the slide from Main Street.

Again in one place, where there was a bluff fully 600 feet high, there is now a great canyon 200 feet deep, which cannot be accounted for by any slide theory. Then, it is also known that the miners imprisoned in

the Canadian-American mine were in two levels. Those in the upper level, close to where the slide, if such it was, would have passed over, hardly noted the tremor, while those in the lower level were thrown violently to the ground by the force of the upheaval, which, to them, had all the characteristics of an explosion. Another point is that great detached masses of rock, big as a three-story block were hurled distances and lie in the ground where they fell, and it is plain that they did not roll to where they are placed.

#### IRON ORE DEPOSITS OF VANCOUVER AND TEXADA ISLANDS.

(By W. M. Brewer, M.A.I.M.E., Etc.)

ATTENTION was first attracted to the iron ore deposits on the Pacific Coast in British Columbia twenty-one or twenty-two years ago, when some of the prominent stockholders of the Union Iron Works of San Francisco organized a subsidiary company under the title of the Puget Sound Iron Company and acquired the Crown granted land on the west coast of Texada Island on account of the extensive deposits of magnetite which there occur. These deposits are referred to by the late Dr. Dawson, in one of the geological reports issued by the Dominion Geological Survey and so far as we know at the present time these ore bodies were among the earliest discoveries of metalliferous ores on the islands under British rule on the Pacific Coast.

No further attempt, however, was made to exploit the iron resources of the British Columbian coast, except so far as the location of claims where prominent outcroppings of the ore occurred, until within the last four or five years. But since that time much development work has been carried on in the various localities where iron ore has been discovered both on Vancouver and Texada Islands.

Apparently there are two main zones in which occurrences of magnetite have been discovered. The eastern of these occupies the western portion of Texada Island, portion of Redonda Island and extends north-westerly from those islands crossing Rivers Inlet on the Mainland; the other zone occupies a position a few miles in from the general coast line along the west coast of Vancouver Island. There are a good many geological features common to all the deposits so far discovered in both these zones. In the first place it is noticeable that each occurrence of magnetite occurs either at the contact between basic igneous rocks and limestone or else in the igneous rock itself within close proximity to the limestone. This limestone is invariably fully crystalline, and the igneous rocks are intrusive dykes which have been thrown up by volcanic action and belong to a later period than the age of the limestone.

In the next place, such occurrences of the magnetite have been responsible for the advancement of several theories relative to its origin.

The following theories are copied from the recent report published by the Provincial Mineralogist on the Iron Ores of the Coast of British Columbia. The

first of these is credited to Mr. James P. Kimball, and taken from a paper published by that gentleman in the *American Geologist* in 1897, entitled, "Secondary Occurrences of Magnetite on Islands of British Columbia by Replacement of Limestone and by Weathering of Eruptives," and is as follows:—

"The occurrences here referred to clearly conform to two separate types of ferrous deposits, which it has seemed important to distinguish as hydro-chemical replacements. As previously described, one type is a morphological replacement of limestone by double decomposition between ferrous salts and calcic carbonate, the former being generated from ferrous silicates; the other type, a partial, and not necessarily pseudomorphic, replacement of ferrous silicates in weathered basic rocks, or, as more explicitly distinguished, a residual concentration or fixation of iron oxides incidental to development of soluble alkaline carbonates from weathering oxidation or splitting up of ferrous silicates."

The second is advanced by Kemp in his work on ore deposits, page 63, and is as follows:—

"The concentration of the magnetite seems to the writer best explained by its settling in the still molten mass until it formed considerable aggregates. When once these rich aggregates have formed they may, in the process of eruption or intrusion, take almost any place in the resulting rock."

After having made a thorough personal examination of the deposits on Texada Island, as well as several on the west coast of Vancouver Island, the writer is of the opinion that the latter theory is the most acceptable of the two, at any rate so far as the deposits under discussion are concerned.

There are also topographical characteristics common to all of the occurrences examined by the writer, which are that the outcroppings form prominent ridges, bluffs or knolls by reason of having withstood to a greater degree the destructive action of erosion and denudation which has carried off to a large extent the surrounding country rock. Apparently, there have been movements of the country rock at still more recent periods than that in which the magnetite bodies were originally deposited, because a close observation of any of these ore bodies shows evidence of the intrusion of dykes of igneous rock which cut through the ore.

The rocks in which the magnetite ore occur are classified by the late Dr. Dawson as belonging to the Vancouver series, which are referred by him to Triassic age, and include "not only the entire mass of volcanic materials which unconformably underlie the Cretaceous, but also the interbedded limestones and flaggy argillites and quartzite."

So far as the extent of each individual deposit is concerned, it is, in the writers' opinion, absolutely impossible from the present state of development to form any reliable estimate of the probable tonnage in sight. As a matter of fact the structure of these ore bodies is so irregular that the writer doubts whether it would be advisable to attempt to develop any of them for the purpose of ascertaining extent, for the reason that when the commercial value of the iron ore is consider-

ed, and the cost of any attempt at systematic development, such as is always advisable, in the case of other metalliferous mines is taken into consideration, it would be found that the dead work would have eaten up so much of the profit of the future mining operations as to cause such systematic development to be undesirable.

Each occurrence of magnetite, which has been examined by myself, is situated in such a position as to enable the miner to quarry, or to work in open cuts or by the glory hole system. By mining after such methods the cost is reduced to the minimum, and as little waste rock removed from the workings as is possible. In mining iron ore the chief desideratum is to keep the cost of mining at the lowest possible figure, because, in order to produce pig iron at a sufficiently low cost to meet the competition from the iron centres it is absolutely necessary to keep all costs at the minimum. With regard to the extent or probable tonnage of ore contained in such deposits as those on the west coast of Texada Island or on the west coast of Vancouver Island at the following locations: Bugaboo Creek, a tributary of the Gordon River, at the Sarita River, at Copper Island and Sachart. I do not hesitate to assert that these deposits contain a sufficiently large tonnage to warrant operations on an extensive scale and with the expectation that they will furnish a sufficient supply of ore to keep iron furnaces of large capacity in continuous operation for some years to come. This opinion may be considered by some to be too general in expression, but while this is a fact it is also a fact that it is an absolute impossibility to estimate with any degree of reliability actual tonnage.

Some idea of the extent of the outcroppings can be gathered from the fact that in very many instances these form bold bluffs, in which the vertical measurement of ore often exceed fifty feet, and the horizontal measurements on some of the deposits reach two hundred and fifty feet between the boundaries which enclose the ore. Usually though, there are intercalations of country rock which present the appearance of intrusive dykes injected into the ore bodies. In working such a body with an open cut or quarry there would be little difficulty in separating the rock from the iron ore and where the association of country rock and iron ore is so close as it is in some portions of the ore bodies that rough sorting would be extremely difficult, then magnetic concentration will always be found to result satisfactorily.

Rarely if ever, does the miner in mining iron ore of any description have the good fortune to be able to ship over seventy-five per cent. of the material mined. In fact in mining limonite or brown hematite iron ore log washes have to be operated, and the miner considers himself lucky if thirty-five or forty per cent. of the material mined is of a shipping grade.

While of course, the geological conditions surrounding the occurrence of magnetite are entirely different from those surrounding limonite, the former being of igneous origin and the latter of aqueous, yet I find that there is a striking similarity between the occurrence of clay horses in the limonite deposits and horses of country rock in the magnetite deposits, so far as in

each case this waste material is responsible for the irregularity in the structure of the ore bodies and consequently rendered it impossible in either class of deposit to estimate actual production until the deposit has been worked out.

Of course in red hematite iron ore mines probable tonnage can be estimated with a very fair degree of reliability by diamond drill borings, because this ore occurs in seams or veins in a similar manner to the occurrence of coal in seams.

The question of the establishment of iron furnaces and steel works on the Pacific Coast, whether on British territory or within the boundaries of the United States, resolves itself purely into a commercial question, for there is no doubt that the raw materials, iron ore, limestone and either charcoal or coke for fuel are present in ample supply on Vancouver and Texada Islands, the coal being confined to Vancouver Island. The consumption on the Pacific Coast of pig iron is sufficiently great, probably reaching half a million tons per year, to apparently insure the success of operations on a large scale. The only question which should be taken into consideration, is the fact that the cost of producing pig iron on this coast is about twice as much as in Alabama, and about twenty-five per cent. more than in Pennsylvania. The market quotations are not based on cost of production but on demand and supply, therefore, with pig iron at its present price—Southern iron on dock New York No. 1 foundry, \$21.50 per ton or Northern iron at tide water No. 9 foundry, \$22.50 per ton—it would appear on the face of it that with the freight added to the Pacific Coast of about \$12.50 a ton and the ability to manufacture pig iron here for from \$12.00 to \$15.00 per ton in coke furnaces and from \$18.00 to \$20.00 per ton in charcoal, that with the present prices there is a very large margin of profit in favour of the Pacific Coast manufacturers.

The grade of the iron ore on the west coast of Vancouver Island varies from 49 to 63 per cent. metallic iron with phosphorus within the Bessemer limit, no titanium, no copper and low sulphur contents. The silica contents are quite variable, sometimes reaching as high as 22 per cent. At the Serita deposit the content of lime in the ore is considerable. The ore in the Texada Island deposits usually carries near the surface a low percentage of copper, but at deeper levels this disappears and the percentage of sulphur also decreases very materially, while the percentage of metallic iron varies from about 48 to 65.

The question of cost of production has often been discussed and comparisons made between a cost in Pennsylvania and the cost on the Pacific Coast. As I am not sufficiently familiar with the detailed costs in Pennsylvania I shall not refer to them, but content myself with a comparison between costs in Alabama and those on the Pacific Coast. In the iron furnaces in Alabama the average cost for labour of twelve hour shifts does not exceed \$1.50 per day. During my own residence in Alabama it was \$1.00 per day. The cost for fifty per cent. limonite ore delivered in the stock houses at any of the Birmingham furnaces does not exceed \$1.50 per ton, the cost for red hematite or fossiliferous iron ore delivered in stock houses does not

exceed 75 cents per ton, possibly a dollar at the outside. The cost for coke during my own residence in the South was \$2.50 per ton, the cost for flux delivered in stock houses 50 cents per ton. When these costs are compared with costs on this Coast of average labour, \$3.00 per day, average cost for the delivery of iron ore not less than \$3.00 per ton; average cost of coke delivered about \$7.00 per ton; and the further fact is considered that in smelting magnetite greater difficulty is experienced in running the furnaces than in smelting either red hematite or limonite ores, it would appear that the commercial aspect presented is one that requires very close and careful investigation.

I know that such investigation has been made by parties interested in this industry, the conclusions arrived at being that the industry can successfully be carried on as long as the supply does not materially interfere with the supply at present furnished from the East and South, and as it is extremely desirable that the raw materials which we have in British Columbia in such profusion should be utilized to the fullest extent, I for one, sincerely hope the question I have raised in this article can be satisfactorily settled so that capitalists will see the desirability of engaging in the important enterprise of iron and steel making on the British Pacific Coast.

#### THE ATLIN GOLD FIELDS OF BRITISH COLUMBIA.

(By. J. H. Brownlee, P.L.S.)

**T**HERE is a prevailing opinion that the Atlin District is very inaccessible and that hardships are to be encountered in reaching it. This is not true—not even for winter travel. The summer steamer service into Atlin is as good as the service on the Kootenay and Okanagan Lakes.

The Atlin District proper is much more extensive than is generally supposed. It extends from the Dalton Trail west of the Chilcat River, easterly through about four degrees of longitude, a width of about 140 miles to the watershed between Surprise and Gladys Lakes. The northern boundary is the recently demarcated 60th parallel of north latitude; the southern limit is the provisional boundary line established between Alaska and Canada. The area of the District is probably 8,000 to 10,000 square miles. Of this vast area probably not one-twentieth of it has been exploited for alluvial gold. A greater area has probably been covered in an imperfect prospect for quartz. The development of the prospected portions of the district may be considered satisfactory for the season of 1902. In most every instance the gold was won at a profit. Taken as an average the individual miners throughout the camp made more than the going wages of five dollars per day. About one-half of the men remained in the camp this winter to drift, and the reports of the dumps they are getting out are encouraging. As high as \$30 a day to the man is reported.

There were five hydraulic companies operating in the Atlin camp last season, and all of them obtained

satisfactory results, insofar as gold values are concerned. The average value of the ground worked was not much less than \$1.00 per cubic yard. The cost of mining was excessive on account of the high price paid for labour and for supplies. It is anticipated that the cost charges will be reduced 25 to 35 per cent. this season on which will make all the hydraulic mines dividend payers.

The most important new companies entering the Atlin field in their order of importance are as follows:—

First—The British American Dredging Co., of Philadelphia, organized to dredge the lower flats of Pine Creek. This company will operate a modern electrically equipped dredge with the capacity of 3,000 cubic yards daily. Next in importance is the Consolidated Spruce Creek Placers (a Seattle organization). This company has decided to instal a plant this season with a capacity of 1,000 miner's inches of water. The extent of the holdings of this company and the prevailing conditions would warrant a much larger plant.

The Otter Creek Hydraulic Co., Ltd., is so far, a purely local organization with a moderate capitalization of \$100,000 provided to equip and operate bench ground on Upper Otter Creek that has been prospected continuously winter and summer for four years and have averaged over \$1.00 per cubic yard. This mine will be in operation by June 15th, 1903, everything being in readiness now to lay the pipe.

J. F. Deeks is installing a hydraulic plant on the Eastern Leases on Upper Pine Creek. Deeks has already constructed a ditch to carry 3,000 inches of water out of the profits derived from working the ground last year with a small plant.

The Birch Creek Company will resume operations this season and there is no reason why it should not be successful if economically managed. It is reported that the Atlin and Willow Creek Company will instal a steam shovel plant on their ground on Willow Creek this season. The ground is rich and will pay a handsome profit if worked in a modern way. In addition to the four new companies entering the Atlin field this season it will be observed that two companies are resuming operations.

Add to this some eight or nine steam hoists installed on Gold Run this winter and I think it will be conceded that the district is making good progress. O. A. Bulette and Wm. Hall, of Upper Spruce Creek are putting in steam hoists this spring. As it will take as much space to describe the quartz developments of the Atlin District this will be deferred until another issue.

In conclusion I may say that about \$3,000,000 has been recovered from the alluvial diggings of the Atlin gold fields. The country is not so rich as the Klondike, but it has compensating advantages in there being no frozen ground to contend with, an ample water supply on all the creeks and generally speaking good dumping facilities.

The geology of the district is thus described by Mr. J. C. Gwillim, B.Sc., in an official report:—

The principal geological formations of the Atlin District have been provisionally classified as follows, in natural sequence, the oldest first.

*Palaeozoic.*—A group of rocks containing some schistose varieties. A great mass of crystalline limestone. Wide areas of cherty quartzite, and some slates and magnesium rocks of local distribution, which are called in this report the *Gold Series*.

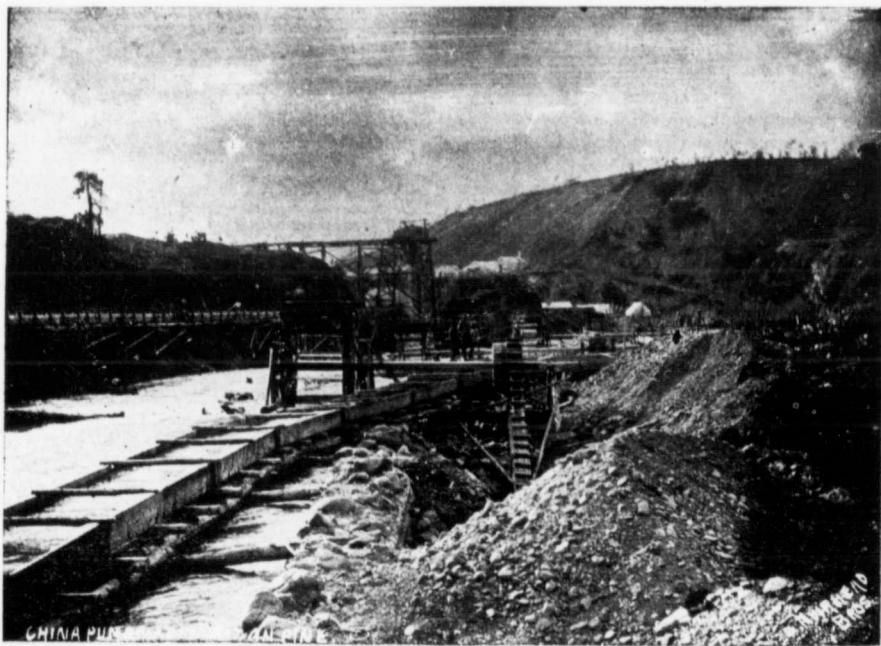
*Mesozoic.*—A wide distribution of sandstone and conglomerates, chiefly found about the shores of southern Taku and Atlin Lakes. Also mountain masses of andesite and various porphyrites apparently related to the sandstones, which are pyroclastic porphyry and andesite tuffs.

*Superficial Deposits.*—Both pre-glacial and post-

the coast granites and their isolated representations further inland. The peculiar and local gold series of slates and manganese rocks, chiefly confined to the basin of Pine Creek, is evidently older than the granites of the district.

The Mesozoic rocks were nowhere seen in direct contact with the Palaeozoic formations. Their origin is chiefly igneous and they often pass imperceptibly from a sedimentary and stratified form into the mountain masses of porphyrite and andesite. The few fossils found in some of the bedded sandstones appear to belong to the Jurassic period.

The district shows evidence of considerable volcanic activity and some great masses of granite have been formed since Palaeozoic times. Fossil evidence is



Mining on Pine Creek.

glacial, also some volcanic deposits of more recent formation than the present valley system.

Concerning the rocks classed as Palaeozoic it may be said that they have characteristics given by Dr. Dawson to certain formations found under similar conditions in the more southern parts of British Columbia.

The great exposures of limestone, forming mountain masses about Taku Arm and Little Atlin Lake, are placed in the Carboniferous system. The peculiar cherty quartzites are also found associated with these lime stones in other parts of the province and constitute one of the members of the Cache Creek series of the Kamloops sheet.

The schists occur only as more or less narrow developments near the contact of these older rocks with

very scarce, so that more can be said of the characteristics of these rocks than of their age, excepting relatively. The valleys contain pre-glacial gravels in some instances. And in many of the higher depressions the drift is also widespread.

*Palaeozoic.*—The great areas and mountain masses of cherty quartzite and crystalline limestone appear to have much resemblance to the Cache Creek group of the southern interior of British Columbia. The limestone which appears to be conformable with the quartzite and to overlie it, contains *Fusulina* and has been placed in the Carboniferous.

The quartzite is never heavily bedded or sugar-grained. It wears into rounded hills and does not form very important ranges. There is a wide varia-

tion in the field aspect of these friable thinly bedded quartzites, from a flinty grayish-white appearance to an almost carbonaceous shale. Irregular patches and bands of a gray crystalline limestone occur in the less shertlike areas. The carbonaceous variety appears to constitute one of the gold-bearing rocks on Wright and other creeks, otherwise it is not of economical importance so far as at present prospected. A microscopic examination of the cherty variety from the O'Donnell River by Mr. O. E. LeRoy, of McGill University, gives the following characteristics:—

"A dark gray flinty rock composed of crypto-crystalline quartz. Running through this fine-grained mass in all directions are small veins of quartz. These often anastomose or enlarge, forming pockets of irregular or oval outline. The quartz is generally clear or stained with iron or carbonaceous pigment."

This is classed as a pyroclastic rock, an acid tuff compacted by secondary silica and is called halleflinta.

A microscopic section of the Wright Creek variety which is more carbonaceous and shale-like in appearance gives as follows:—"Extremely fine-grained, almost crypto-crystalline groundmass consisting in great part of quartz with a subordinate amount of kaolin through which are many veins of quartz. Biotite in considerable amount is in rounded grains and is found all through the mass. Phleochroism is brown and light yellow. A few grains of pale-green chlorite and yellowish brown lemoite are also noted."

The distribution of this cherty quartzite, is very wide in the Atlin district between Atlin and Teslin Lakes, Consolation Creek, the basin of Gladys Lake and River, Ptarmigan Flats, Hurricane River, Rapid Roy Creek and Sucker River. All drain slopes which are for the most part quartzitic. The wide uplands or Arctic moors are also quartzitic. The granites of Surprise Lake, McMaster Mountain and Boulder Plains are in direct contact with this formation. A few intrusions of greenstone also cut through it about the end of O'Donnell River.

Generally speaking these quartzites may be said to floor the whole of the district between Atlin and Teslin Lakes excepting where the great areas of later granite have intruded. The small areas of the Gold Series being partly intrusive and of later origin have also disturbed the quartzite at such places as the Lina and Johnson Range, and at Chikoida or Merlin Mountains.

The limestones form conspicuous mountains to the south of Tagish Lake and were observed and described in the Yukon report of 1887, by Dr. Dawson as occurring along the east shore of Lake Laberge. They are usually quite crystalline and form solid white mountain ranges on both sides of Taku Arm for twenty-five miles southward from Tagish Lake. A short distance south of Tutshi Lake, on the eastern shore, there is a sharply defined contact with a shaly black rock followed by greenstone. This contact runs north-easterly probably up the wide valley of Tutshi River and south-easterly along the northern flanks of Taku Mountains in the vicinity of Atlin Lake. The limestone here dips 45 degrees to the northeast. The chief development of this formation strikes off to the east across Little Atlin Lake towards Teslin River.

Another more or less continuous belt of limestone forms mountain ranges north of O'Donnell River in the Johnson range, thence south-eastwards to the junction of the Silver Salmon and Nakina Rivers. It appears that this latter development is also part of the same formation.

Silicious stringers and patches are often present in the limestone, otherwise with the exception of a few dykes near the southern contact with the greenstones on Taku Arm, this limestone is not much diversified or broken up locally.

The only fossil remains collected were some obscure coral and crinoid forms. On the evidence of fusulina collected by Dr. Dawson these rocks are placed in the carboniferous, and together with the quartzites and some eruptives show a strong resemblance to the Cache Creek group of southern British Columbia.

#### ELECTRICAL POWER TRANSMISSION IN THE BOUNDARY.

(By W. G. McComan.)

ALL of the gold extracted from water is not taken directly in the form of metal. A power house for generating electricity proves a very efficient "stamp mill" for delivering "concentrates" in the form of volts. That this is appreciated by mining men is evidenced by the recently completed plant of the Cascade Water, Power and Light Company, situated at Cascade, B.C., and owned by the London and British Columbia Goldfields Co., Ltd., representing an investment, in round figures, of \$500,000.

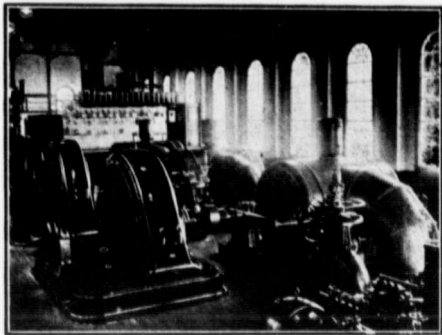
Cascade is a small town on the Kettle River, twelve miles east of the town of Grand Forks, and about thirty miles directly west from Rossland, B.C. Flowing from the west, the Kettle River descends 120 feet in passing through a half mile of narrow rocky gorge in a series of rapids and falls. For the utilization of this natural power, the Cascade Water, Power and Light Company has built a large dam, waterway, pipe line, power house, and transmission line from Cascade to Phenix, where the largest and most productive copper mines in the Boundary District are situated.

The dam, placed just above the entrance to the gorge, is of timber cribwork, with a 40-foot base and 24-foot top. The mid-section is 50 feet high, tapering to 25 feet at the sides, while the total length is 400 feet. This is built on a solid rock bed to which the foundation timbers are bolted, and filled with 10,000 cubic yards of rock. This dam raises the water 36 feet above the natural level, giving an effective head at low water of 156 feet.

The permanent water level is 10 feet below the top of the dam, being controlled during high water by 12 sluiceways which can be opened to 12 feet below the natural river level, giving a passway of about 2,000 square feet. These sluices are closed by means of 12 x 12 inch squared timbers in grooves, operated by a travelling winch running on a track over the top of the dam.

From dam to powerhouse the water first passes through a 225-foot open rock cut from which it enters

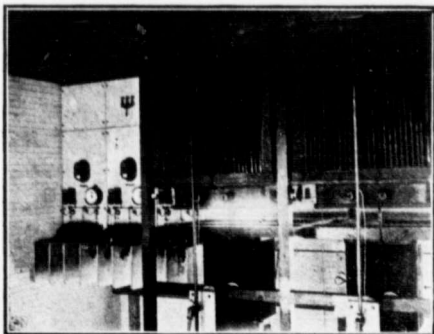
a tunnel driven through 410 feet of solid rock, passing under the track of the Canadian Pacific Railway, and then into another open rock cut 500 feet in length, at the end of which the bulkheads and controlling gates



are located. These cuts and tunnels, representing an excavation of about 35,000 cubic yards of rock, are of dimensions liberal enough to avoid any appreciable loss of head, delivering the water with a head almost equal to that at the dam level.

From the gates the water is conveyed through a wooden pipe, 7 feet in diameter, for about 1,400 feet. This pipe is constructed of Oregon fir, tongued and grooved, staves 2 3/4x7 inches cut in circular segments and machined to the radius of the pipe. The staves are hooped at 12-inch intervals, with three-quarter inch round steel bands, with cast iron connecting shoe for clamping.

Provisions have been made at the bulkhead and in the width of the cut shown in Fig. 1., for the installation of a similar and additional pipe.



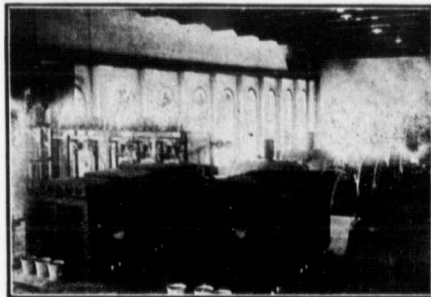
From the stave pipe the water is carried through 250 feet of circular steel pipe, 7 feet in diameter, resting on concrete piers and anchored into solid rock to avoid end thrust. Where this pipe passes alongside

of the power house, three 4-foot pipes and one 2-foot pipe are taken off below the floor level of the power house to supply three 36-inch turbines for generators and two 12-inch turbines for exciters.

Fig. 2 is a general view of the powerhouse showing the stand pipe at the junction of the stave and steel pipes. This stand pipe relieves the pipe line from excessive water-ram strains, and incidentally voids any air taken into the pipes.

About 10,000 cubic yards of rock were removed for the site of the power house, in a natural bay at the foot of the falls. This building is of substantial fire-proof construction, 150x50 feet, with stone foundation 22 feet deep on the lower side, and brick walls 30 feet above floor level, the height of peak to roof being 45 feet. It has been designed with a view to lengthening it when required.

Fig. 3 shows the interior of the power house, and the generating plant. The three generators are standard Westinghouse, three-phase, two-bearing, direct-coupled, 2,200 volt, 750 k.w., at 80 per cent. power factor, or 940 k.w. at 100 per cent. power factor, 60 cycles per second, 300 r.p.m. The two exciters, each



capable of exciting all three generators at one time, are 45 k.w., 120 volt, shunt wound dynamos, self-contained, two-bearing type, direct coupled to independent turbines, with 500 r.p.m. The turbines are H. Morgan Smith wheels made at York, Pa., and the governors the Echer Wies make from Switzerland.

Fig. 4. shows the transformers, nine in all, three in each bank, which are standard Westinghouse, self-cooling, oil-insulated type, having a capacity of 250 k.w. at 80 per cent. power factor, or 312 1/2 k.w. at 100 per cent. power factor, "Star" connection, and wound for a ratio of 2,000 to 20,000 volts, on both high and low tension windings, with full load efficiency of 97.6 per cent. As the taps are brought out near the neutral point, which is grounded, it is impossible to maintain a dangerous voltage in the auxiliary circuit.

The current from the high tension side of the transformers is carried to a row of high tension fused circuit-breakers, situated alongside of the building behind the main switchboard, as shown in Fig. 4. These switches are of the well-known Westinghouse type,



placed on independent marble slabs, with marble barriers between. The current leaving these switches enters a high tension bus and is carried to the line switches at the rear of the building. These line



switches are grouped, switches opening all three wires at the same time. Each switch is furnished with a time limit tripping device, and reversed current tripping coils, so that overloads can be carried for a period of from one to ten seconds, as the local conditions call for, or either line can be cut out automatically in case of trouble.

The switchboard for the low pressure side, Fig. 5, consists of seven panels of blue Vermont marble, one panel for each generator, one for the two exciters, and a feeder panel for each group of transformers.

The six lightning arresters, located just above the switches in the gable of the roof, are the "low equivalent" style of the Westinghouse Electric & Manufacturing Co., giving protection against lightning discharges for transmission at 20,000 volts.

A right of way 132 feet wide is cleared, and transmission lines erected from Cascade via Grand Forks at Phoenix, a distance slightly over 21 miles.

The high tension circuit consists of two separate three-phase transmission lines, each carrying three No. 3 B. & S copper wires, with room on each line for



another circuit. Throughout it is one of the most substantial and well constructed lines in the Dominion.

The poles are heavy cedar, and on tangents are spaced not over 100 feet apart, on curves at less

distances, in some cases as low as 50 feet. No angles are turned, but all changes in direction of line made with easy curves. No side or head guys have been used except at extra heavy spans across rivers, etc.

The work on this line, as well as all construction of the plant, is a decided credit to the company's local engineer, Mr. Wm. Anderson, who has designed and executed the work.

A three-mile feeder is taken off at Grand Forks, twelve miles from Cascade, to the Granby Smelter of the Granby Mining and Smelting Co., where current is used for driving Westinghouse induction motors of sizes ranging from three to seven hundred horsepower, and of an aggregate capacity of 2,400 horsepower.

Fig. 6 is a view of the sub-division at Phoenix, located at an altitude of about 3,500 feet above the power house. The building is of brick, with one end left for future extension, and contains the transformers, line switches, fused circuit breakers, switchboards, etc., substantially duplicating those at the power house.

Fig. 7 shows the interior of this sub-station, which, for the immediate present, will be called upon to supply current for two 700 h-p. Westinghouse, type "C" motors for driving two large compressors, a 100 h-p. motor for stone crusher, and a 150 h-p. motor for hoist, as well as furnishing the current for lighting the town of Phoenix.

The Cascade Water, Power and Light Co. estimates that it will have a supply, at low water, for about 6,200 h-p. This will enable the doubling of the present output. All the plans were made and carried out with the view of extending the plant to its full capacity, and from present indications it would seem that the company will have a demand for all the power it can furnish.

#### A MODERN COARSE CONCENTRATING PLANT FOR SILVER-LEAD ORE.\*

(By Ernest R. Woakes.)

OF late years there have been so many improvements made in the machinery used for crushing and concentrating and in the design of plants for this purpose, that a short description of an up-to-date concentrator of a quite simple construction cannot fail to be of interests to the members of the institution.

Regarding first the improvements that have been made in the crushing machinery, we find these to be confined almost entirely to the rolls, for although the rotary rock-breakers of the Gates type are undoubtedly better for large plants, the old Blake crusher is hard to beat. When we come to the improvements in concentrating machinery we find these are confined to the various devices for concentrating the fine products of the mill, the old buddle, both stationary and revolving, having been quite superseded by the modern tables and vanners, whilst the old concentrating machine *par excellence*, the jig, still holds its own, though many have tried to improve it to death.

\*A paper read before the Institution of Mining and Metallurgy.

The improvements in the design of the mills are no less marked than those in the machinery, and have mostly been made with the view of obviating the handling and re-handling the various products by hand; indeed the contrast in this respect between a 100-ton concentrator, such as is to be described in this paper, and a similar plant of twenty years ago is most marked. In the former three men alone look after the various machines, and 100 tons of concentrating ore is crushed and concentrated and the concentrates delivered by gravity into the concentrate bins below the mill in each shift of twelve hours without a pound of ore being touched by hand; indeed, it is not necessary to have a shovel or barrow in the mill. In the old mills, or dressing floors as they were appropriately called, the plant was spread out over acres of ground and a regiment of men, women and children were kept busy with hoes, shovels and barrows, whilst miniature mountains of heads, middlings and tailings were piled up in all directions. The following amusing incident occurred some years ago on the dressing floors of a silver-lead mine in South America. The manager noticed that the piles of middlings were accumulating on the buddle floor and remonstrated with the Welsh fore-

man; the ore was coming pretty rich at the time and the foreman did his best with the appliances available, but still the middling piles increased in size. Then the manager began to use more forcible language and said some means must be found to work off the pile and prevent the useless locking up of capital. The next time the manager came round he had nothing but smiles and good words for the foreman as there was no sign of the pile left. The foreman explained that he had found an improved method of working, and there would be no more piles of middlings in future to worry the manager. The simple man had just shoveled them into the tailings launder, and they had gone down the creek where they would be a cause of no more irritation to anyone.

The Highland concentrator was designed and built to treat the ore from the Highland mine owned by the Highland (Kootenay, British Columbia,) Mining Company, Limited. The problem to be solved was a comparatively simple one, the character of the ore being such that practically all the silver values were carried by the galena; the pyrites, pyrrhotite and zinc blende carrying very small values. The ore was low grade in silver, carrying about one-half ounce silver to the unit of lead. It was evident therefore, that a

concentrator of such proportions was required as would treat a large amount of ore at the lowest possible cost. In fact, the concentrator should be a complete unit and such that each machine, or component part of that unit, should be so proportioned that the whole would treat the largest amount of material, whilst saving as large a percentage as possible of lead, at the lowest possible cost. The concentrator was to be to concentrators what a properly designed forty-stamp mill is to stamp mills, namely, the most economical working unit of its class. The success or failure of a concentrator depends to a very large extent on this vital factor of proportion, it is so extremely difficult to say beforehand exactly how such and such an ore will crush, size, concentrate or slime, that it is by no means easy to arrive at all the proportions in the original design. It is of extreme importance that the coarse rolls should only crush the

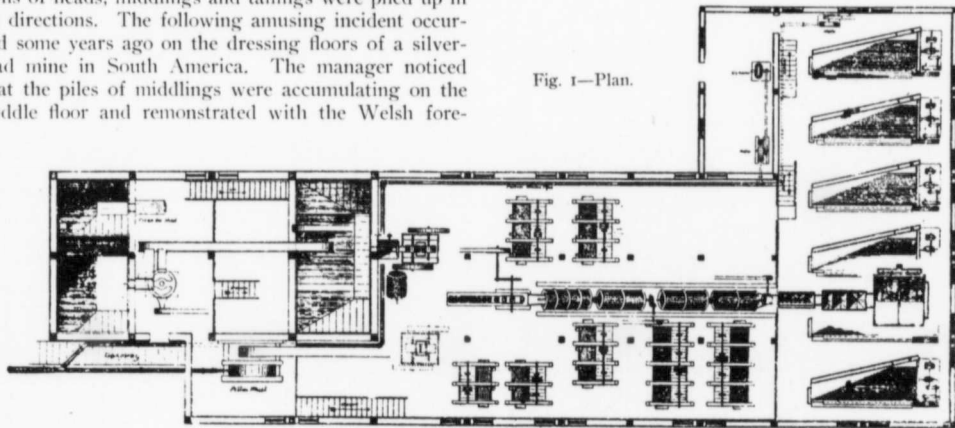


Fig. 1—Plan.

the proof that this proportion is true will be seen if the tailings from the machine are so poor that they can be run directly to tailings spout; that is to say, every machine in such a mill as is being described, with the possible exception of the coarse jig, must make tailings. Of course the writer is perfectly aware that there are cases where the silver values are carried in other minerals than the galena, where tailings require re-grinding and re-treating, but such cases are rarer than would be imagined if the proportions of the subunits of the concentrator be right. In the cases where the silver values are chiefly carried by minerals whose specific gravity differs so slightly from those minerals that are desired to be separated out, it would seem to be courting disappointment to attempt a concentration by water.

done. This plan, moreover, entails the lower boot of the elevator being in an inaccessible situation and practically under water. A properly designed and proportioned elevator can be run at a higher speed, and consequently have a greater capacity with less wear and tear, than one that does not possess these merits.

By referring to the plan (Fig. 1) and elevation (Fig. 2), the general design of the Highland concentrator will be clearly understood. The cross section (Fig. 3) shows the arrangement of the concentrate bins on the ground floor of the mill, into which all the products of concentration drain by gravity and are then run by gravity into cars which are pushed by hand over a platform weighing machine on to a self-acting inclined tramway, which transports them directly on to a wharf, where they are automatically dumped into a barge on the lake. The photograph showing the external view of the concentrator is taken from the wharf.

The ore is brought down from the mine over an aerial rope tramway, on the Hallidie system, a distance of 4,700 feet. At the upper terminal are separate ore bins for concentrating and clean ore; the breaks and automatic loader are worked by one man at that end. At the lower terminal, directly over the mill, as shown

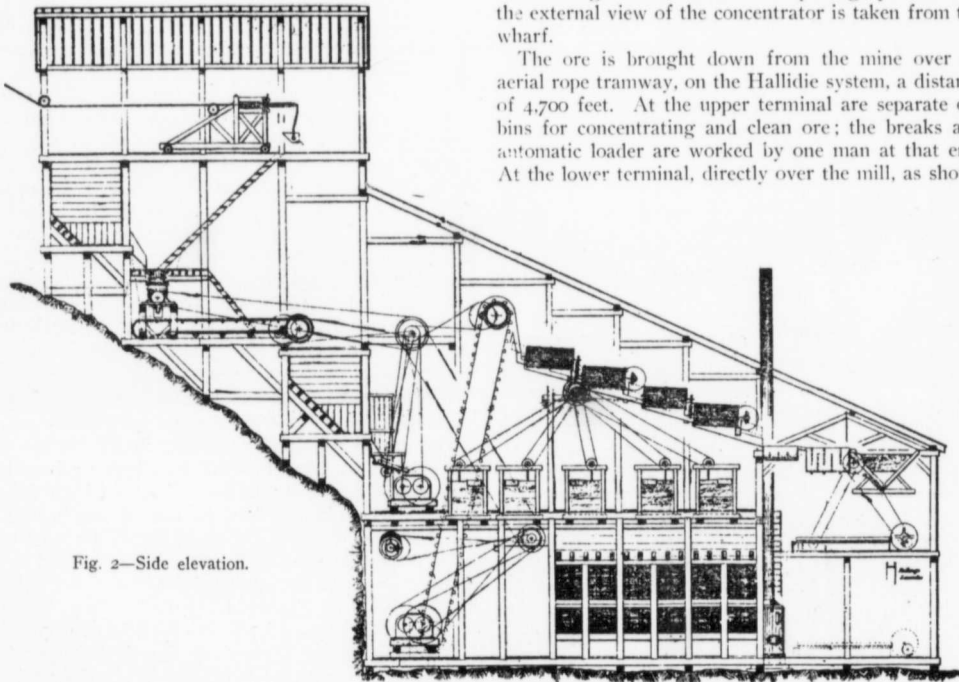


Fig. 2—Side elevation.

The capacity of a concentrator is not to be gauged by the capacity of its crushing plant, but by the amount of concentrates and tailings it makes. The writer has seen some beautiful looking concentrators, full of high speed rolls and elevators, all crushing and elevating to their utmost capacity, but in reality being little more than complicated circulating machines. The flow sheet of these mills, if ever such sheets were prepared, would be most interesting.

Light and cleanliness are co-existent, both are necessary for successful concentration; the practice of putting the crushing rolls at the bottom of what is to all intents and purposes a dark and dirty cellar is neither good engineering practice nor at all necessary in the design of a concentrating mill, yet in most cases it is

in the elevation, is an automatic dumping and self-righting device, by means of which the tram buckets are dumped as they come over the ore bin and right again before starting on the return journey to the mine. The ore bins below the lower terminal are so arranged that concentrating ore is dumped before the buckets pass around the lower tail sheave of the tramway, and clean ore is dumped into a separate bin after the buckets have passed this sheave. When clean ore is being shipped over the tramway, it requires a man at lower terminal to attend the dumping and righting of the buckets. The clean ore passes directly through an ore chute to a lower ore bin on ground floor of mill, from whence it can be handled by same cars and arrange-

ments as are used for shipping the concentrates. From the upper ore bin the concentrating ore passes over an inclined grizzly directly into a 3 D Gates crusher which discharges the crushed ore on to an 18-inch travelling belt conveyor, which delivers it into a second storage bin immediately above the coarse rolls.

Up to this stage the capacity of the plant is double that of the complete mill, the object being to run the tramway crusher and conveyor, during day time only, thus two men operating this part of the plant are only required to work one shift. If it is necessary to sort out clean ore on the belt conveyor, an extra hand is required during the day shift, any ore so sorted is dropped directly into a chute that delivers it into the clean ore bin in basement. It is seldom, however, that it is desirable to sort out clean ore in the mill; this is done in the stopes in the mine.

The automatic feeder for the coarse rolls is an important item. The most satisfactory feeder is of very

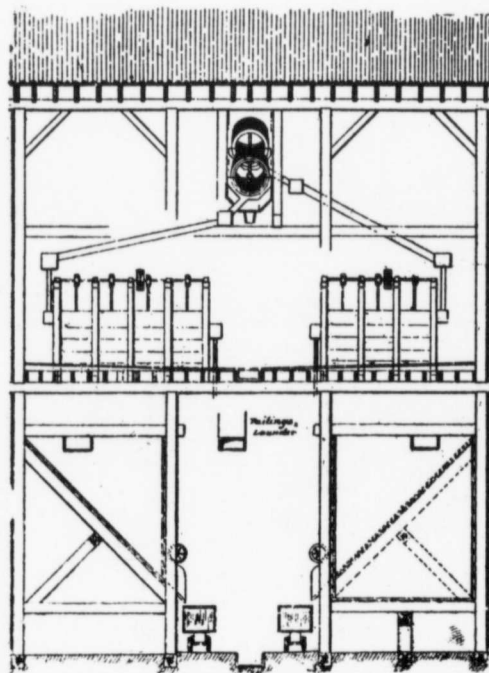


Fig. 3—Cross section.

simple construction, and is shown in Fig. 2. It is a sheet steel trough made a little narrower than width of rolls and inclined slightly down to them, and arranged to work something like a bumping table, the backward motion being given to it by a revolving cam, a spring performing the forward motion and causing the bump against an adjustable stop. By means of this feeder a continuous stream of ore 3 to 4 inches thick, if desired, can be fed uniformly over the whole width of the rolls. The feed sample, to be afterwards de-

scribed, can conveniently be taken from the stream of ore as it drops into the rolls.

*Rolls.*—These are, no doubt, the most important item of the crushing plant, and the efficacy of the whole depends on their performance. It is, therefore, necessary that they should be of the very best design procurable. It is also desirable that the rolls should be all of uniform pattern, so that spare parts of all rolls in the same mill are interchangeable. The fine roll shells, with their arbors, can be transferred bodily to the coarse rolls and there worn out, after they are too much worn for the efficient fine crushing, the new shells generally being put in at the fine end of the process. The writer has not had the opportunity of seeing the Argall roll, lately described by the inventor in a paper read before this institution, but the high grade rolls of the Gates Iron Works, Chicago, embody most of the essentials in a first class roll. The plant at the Highland mill consists of three sets of these machines, 26x15 inches. The coarse rolls are arranged to run at eighty-five revolutions per minute, the medium at ninety-five revolutions, and the fine at 105 revolutions. The speeds for the coarse and medium rolls are slightly higher than those advocated for dry crushing by Mr. Philip Argall in the valuable paper above referred to. From his arguments I gather that speeds should be the same for both dry and wet crushing for rolls of same size, working under similar conditions as regards size of feed and crushed product; it would be interesting to know if this is really Mr. Argall's opinion. I was glad to see that Mr. Argall has shown so clearly the absurdity of the craze for high speed rolls for ordinary crushing; no doubt a great deal of the trouble so frequently experienced with rolls is due to the excessive speeds at which it is attempted to run them.

The coarse rolls and automatic feeder are set up about three feet above the level of the jig floor, immediately to one side of the elevator. The medium and fine rolls are set up in a similar way, one on either side of the elevator boot on the ground floor of the mill; the latter cannot be seen in the elevation (Fig. 2); it is eclipsed by the medium rolls. There are four twelve-light windows on either side of the building opposite to these rolls. Immediately below the coarse rolls is a revolving screen thirty-six inches in diameter by forty inches long punched with seven-eighths-inch holes; the product from coarse rolls passes through this screen, the oversize going directly to medium rolls and screened stuff to elevator. The advantages of this preliminary screening are considerable, nothing that will not pass the screen goes to the elevator, and any flat pieces of rock that get through the coarse rolls pass on to the medium rolls and are there reduced in size before being elevated to the main trommels. This entails a large saving in wear and tear of elevator. The coarse screen also sizes for the coarse jig, which is a single two-compartment Hartz jig, with eccentric adjustable to a four-inch throw, the screening area of each compartment is 34x22 inches, the actual dimensions of screens being 36x24 inches. The tailings from this jig are generally run directly to tailings spout, but if the feed is particularly good they are returned to medium rolls, as indicated by dotted line on flow sheet.

The elevator is 48.5 feet between centres of upper and lower pulleys, and it is believed that this height should only be exceeded by a very few feet if the best work is to be got out of an elevator. The head pulley is forty-eight inches in diameter and tail pulley thirty-six inches in diameter. The belt is a fourteen-inch by eight-ply "leviathan" canvas belt. The buckets are spaced seventeen inches apart and are of No. 10 steel 12x6 inches. The elevator has a geared drive, and runs at a speed of 350 feet per minute. It worked very satisfactorily from the start and has shown a minimum of wear and tear.

The revolving sizing screens, or trommels, consist of four, all of ample dimensions; they are clearly

round punched steel and 16-mesh slot punched steel. They each deliver their sized product to their respective jigs.

The fine product passes from the trommels into a set of four hydraulic classifiers, modifications of the Lake Superior trough type of classifier. The series consist of a double V trough divided into hopper shaped sections of increasing area. The pulp flows through the inner trough, passing over the divisions from one section to the next. Clean water, under slight pressure, is admitted into the space between the two troughs near the top of each section. There is an opening in the bottom of the inner trough; in the centre of each section which communicates with this space and opposite to the opening a piece of 1 1/2 inch pipe passes through the outer trough through which the heavier material is drawn off, passing in its course the upward current of clean water. The fines from the

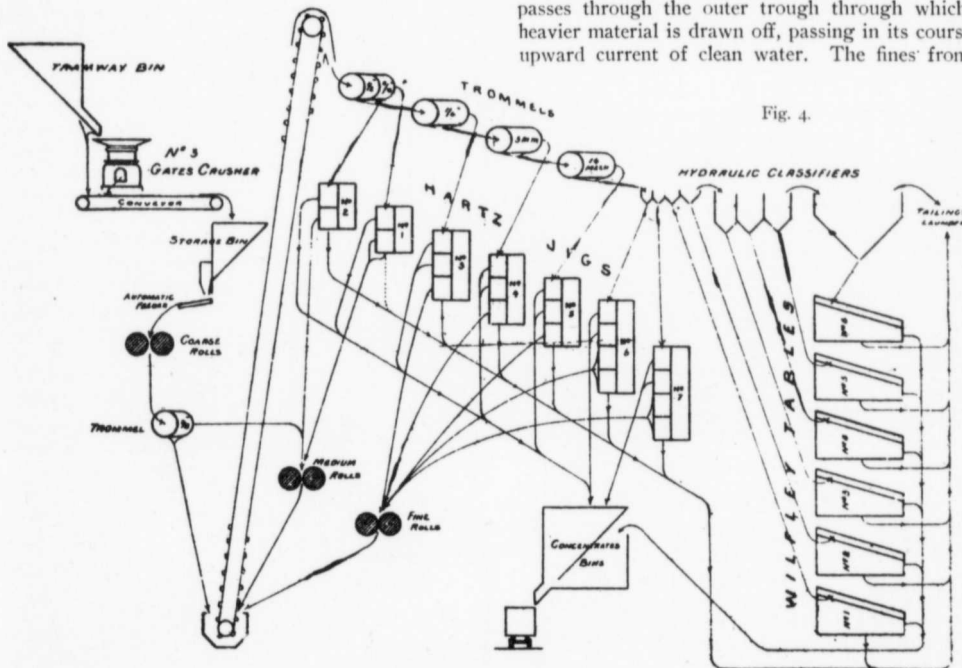


Fig. 4.

shown in the plan and elevation of the mill. They are coupled up in sets of two which are separately driven by a geared drive. The driven screen drives the one above it by means of spurred gearing and not by sprocket wheel and chain. They are all thirty-six inches diameter, and housed in by large tongued and grooved wooden housings. The first trommel is eighty inches long, made in four sections, the first two of which have one-half inch punched holes and the second two 11-16 inch holes; the oversize from this trommel goes straight to the coarse jig, it having been already sized in the manner previously described. The material that passes through the 11-16 inch section goes to a two-compartment Hartz jig, similar to the coarse jig. The remaining three trommels are each seventy-two inches long and are covered respectively with one-quarter inch round punched steel—3 m.m

hydraulic classifiers then pass into two pointed settling boxes, the first being 6x3x3 feet, divided into three compartments respectively, 18 inches, 24 inches and 30 inches long, the last settling box being eight feet square at top and five feet deep. In the former the current is arrested by partitions and "diving" boards, the coarser products being drawn off in the 18-inch compartment and the finer in successive stages in the larger ones. The opening in the bottom of each pointed box through which the sized pulp is delivered to its concentrating machine is connected with a goose-neck or inverted syphon, which controls to a certain extent the amount of water that is delivered with the pulp. The water and fine slime overflows from the last large settling tank and goes to the tailings, whilst the fine settled product is taken off from the bottom by four goose-necks and delivered to the last of the series of

Wilfley tables. Wilfley tables are selected for the concentration of the fine products of the mill, the writer's experience being that they are the simplest and best machines for this class of work at present on the market. There was no difficulty in adjusting them so that each machine made a clean product of the six different sizes with which they were severally fed.

We must now return to the jigs which take care of the products from the trommels. Besides the two coarse or bull jigs already referred to, there are three three-compartment and two four-compartment single Hartz jigs, with room on the jig floor for two more of the latter if found necessary. The jigs are all of the simple pattern above described, which is believed to be the best, but of very ample capacity, the screens in each compartment being 36x24 inches. The fine jigs only deliver their product through the screens into the hutches. The jig frames and hutches were all constructed on the spot. The eccentrics are adjustable from one inch to three inch throw, and the concentrates from each pass by gravity into the concentrate bins below the jig floor. By referring to the flow sheet, shown in Fig. 4, the course or flow of the material from start to finish can be readily seen. Owing to the variations in the quality of the feed coming into the mill, it is impossible and undesirable to draw hard and fast lines for the flow of the material from the third and fourth compartments of the jigs. The jig attendant must watch and adjust the height of discharge of the compartments of each jig, so that whilst the feed is good enough some of the jigs will be making practically no tailings. It will be found to be the case with most ores that the galena favours a particular size when crushed; in the case being described, the first three-compartment jig taking the oversize product from the one-quarter inch trommel generally made the most concentrates. The coarse product from the two first hydraulic classifiers goes to the two four-compartment jigs, whilst the two remaining classifiers feed one each of the first two Wilfley tables, the third, fourth and fifth Wilfleys being fed respectively by the three compartments of the first pointed settling box, the sixth Wilfley taking the fine product of the last one. The mill thus produces thirteen distinct sizes of concentrates.

The mill is operated entirely by water power. A four-foot Pelton wheel, with deflecting nozzle, is placed on the top floor, about on a level with top of elevator; this wheel runs under a head of 450 feet, and the power water from it is caught in a tank and used for concentration purposes. This arrangement is the best to adopt wherever possible, as the slight loss of head entailed is more than gained by the ample supply of water available for the feeds to the various machines in seasons when the water supply is short. A special feed water pipe is taken from this tank for the Wilfley tables. A six-inch main is taken off the pipe line to the large Pelton wheel and branches from it supply a 2-foot Pelton motor to operate the Wilfley tables, and a 12-inch motor to run the dynamo which supplies a 220-volt current for lighting the mill and offices and bunk houses, etc., at the mine. A fire hose service is provided on each floor from this six-inch main. All

the floors of the mill are heated by steam generated by a 10-h.p. boiler and placed in the basement.

The crushing and concentrating machinery, shaftings, pulleys and belting, with the exception of the Wilfley tables, were supplied by the Gates Iron Works, Chicago. The Pelton motors and gearing were supplied by the Pelton Water Wheel Company, San Francisco, and the Wilfley tables by the Mine and Smelter Supply Company, Denver, Colorado. The electric light was supplied and fitted by the Kootenay Electric Supply and Construction Company, Nelson, British Columbia. The erection of building and installation of machinery was done by the Highland Mining Company, under the superintendence of their foreman, Mr. J. A. Kelly.

The contour of the mill site and character of the bed-rock were such that no masonry was necessary. Lumber was cheap and was not spared in the construction of the building; 290,400 feet of lumber and 118 twelve-light windows were used. The roof is of corrugated iron. By setting back the top ore bin and Gates crusher and using the conveyor belt to bring the ore forward to the storage bins, it was possible to set the whole of the upper works on a solid rock foundation, and at the same time reduce the height of the building. The sides of the mill are covered with two thicknesses of one-inch dressed boards, with building paper between. The main driving belts are "Leviathan" canvas brand, and the shaft bearings are ball-and-socket type, with compression grease cups.

The cross section of the mill (Fig. 3) shows the construction of the concentrate ore bins and the inclination of the floors towards the centre, where there is a launder arranged to drain everything back into the elevator boot. Regarding the construction of these concentrate bins, it is necessary that great care be exercised in making them water-tight. The plan followed in this plant was to line them with double two-inch tongued and grooved plank. A water-tight discharge door is made of wood, secured by wedges on the outside of the bins; outside this again is an ordinary ore bin gate, lifted by a rack and pinion. This latter is merely to regulate the discharge of the concentrates into the cars after the water-tight door has been removed. No difficulty was experienced in running the concentrates out of these bins. The bins for Wilfley concentrates are of different construction; the concentrates in them require to be shovelled into the cars. The discharge from the Wilfleys being at a lower level, the bins are made flat-bottomed, as shown on right-hand side of cross-section (Fig. 3). The arrangement of the spouts or launders for carrying the crushed and sized ore to the various machines is indicated in this figure, and also in the photograph of Wilfley floor. These spouts should be as short as possible; the wear in them is great. Wherever a spout turns an angle, a box is provided; this prevents undue wear and the trouble from overflows. All the spouts carrying material coarser than 16-mesh should be lined with sheet iron not less than one-quarter inch thick. If there is an iron foundry in the district it will be found to be of very great saving, both in cost of material and time wasted in making repairs, to have these spouts lined with chilled cast iron plates one-half inch thick. In

this case the spouts should be made of uniform section, so that only two sizes of liners to be required, *i.e.*, liners for bottom and narrower ones for the sides. The side elevation of the mill (Fig. 2) will serve to show the general arrangement of the plant and especially the trommels, hydraulic classifiers and pointed boxes. The lower floor, under the Wilfley floor, is used as a workshop, and for settling tanks for the overflow water from the concentrate bins. There is also room there for three more Wilfley tables (shown dotted in Fig. 2) to take the tailings each from a pair of Wilfleys on the floor overhead, an arrangement which should have all the advantages of double deck concentrators without some of their disadvantages.

Work was started grading out the mill site towards the end of August, 1900. The carpenters started framing the timbers on September 15th. The mill was completed and in operation on January 18, 1901, and no stoppages for structural alterations have been made. The skilled labour employed was first class and highly paid. The total cost of the plant complete was as follows:—

Machinery and hardware . . . . .	\$16,693 05
Freight and duty on above . . . . .	4,126 98
Lumber . . . . .	3,590 66
Wages and salaries . . . . .	11,555 07
	\$35,965 76

*Capacity of Plant and Cost of Operation.*—The contractors for the machinery were guaranteed that it would crush a minimum of 100 tons per twenty-four hours. After erection it was found that the capacity of the plant was nearly double that amount, and as it stands may safely be said to be capable of treating 180 tons per day of twenty-four hours. The addition of two extra jigs and the three Wilfleys above referred to would bring the capacity up to 200 tons. Under the above circumstances it has never been necessary to run the mill continuous twenty-four hour shifts. The capacity of the mine at the time is about 3,000 tons per month, which amount can be treated during the one shift. Working under these conditions it is necessary to have a night watchman, who also attends to the running of the electric light plant. The concentrator requires three men besides the foreman and a blacksmith; the latter assists in running the concentrates out of the mill to the barge.

The cost per ton of ore crushed on the above basis comes out at a fraction over 20 cents. This includes cost of stores and materials used, and of placing the concentrates produced on the barge ready for shipment to the smelter. It is evident, therefore, that by running the plant to its full capacity this cost would be very materially reduced, only two more men being required to treat 6,000 tons per month. Under these conditions the cost per ton would be reduced to probably less than 16 cents per ton.

Very careful tests were made of the efficiency of the mill as a concentrator. Samples were taken of the feed going into the coarse rolls every quarter of an hour, and the bulk sample so obtained was assayed daily for a period extending over several months. A similar sam-

ple was taken of the tailings going out of the mill, and this latter was checked by the tailing sample taken from each machine. All the assays for lead were done by wet method. The above results, taken in conjunction with the actual amount of lead and silver contained in the concentrates produced, would give approximately the percentage of extraction obtained by the mill. By these means it was found that 81.5 per cent. of the lead was saved, whilst the average tailings assay for silver was 0.6 ounce per ton. These results may be taken as showing good concentration. It is not claimed that the above method of sampling is by any means perfect; in fact it is impossible to get an accurate feed sample of a mill without an elaborate system of mechanical sampling and re-crushing, which is obviously out of the question in a silver-lead concentrator. There are many simple mechanical devices which will take fairly accurate samples of tailings, that known as Lamb's automatic being one of the most satisfactory. It is manufactured by the Allis-Chalmers Company.

It is not safe nowadays to talk, or even write, about concentration without mentioning the oil process. I do not think the sponsors of that process claim that it is preferable to water for coarse silver-lead concentration. I am, however, inclined to believe, from the rough experiments made at the Highland concentrator, that with many ores there would be a very considerable saving effected by treating the tailings from fine jigs and Wilfleys or vanners by the oil process. I note that it is claimed that the process is quite clean. I can only say that our experiments were decidedly dirty.

I wish to acknowledge my indebtedness to Mr. Norman Carmichael, my assistant, for the very careful manner in which he has prepared the drawings to illustrate this paper.

#### THE SILVER-LEAD QUESTION.

THE following important speech bearing on this subject was delivered by Mr. W. A. Gallier, the member for Yale and Cariboo, in the House of Commons, Ottawa, in the course of the debate on the budget:

Mr. Gallier said: I wish to join the speakers who have preceded me on this side of the House in congratulating the hon. Minister of Finance and his colleagues upon the splendid showing detailed in the budget speech so ably delivered by that hon. gentleman, a showing which, I believe, has never been equalled in the history of Canada. It must be a source of gratification to every Canadian to know that his country is in such a prosperous condition as it is, to know that our finances are being ably administered by the Finance Minister and that those finances are in a healthy condition. I know that hon. gentlemen on the other side of the House are wont to attribute much of the prosperity Canada is enjoying at the present time to a beneficent Providence. We on this side of the House equally recognize that Providence has been kind to Canada. But whole we recognize this, we claim, and I think we justly claim, that Canada should feel herself fortunate in having an administration at

the helm capable of turning these beneficent gifts of Providence to good account. Now, I listened with considerable pleasure to the speech of the Finance Minister. I followed him closely throughout his speech, and I may say I listened to it with considerable pride. However, there was one thing that I did not like. It seems there is no cup so replete with sweetness that some person may not find therein a little bitterness. The sweetness lasted, so far as the people I represent are concerned, pretty nearly until the end of the minister's speech. The little bitterness that crept in came when the minister dealt with the question of adjusting the tariff on lead products. We were told that the Government could not see their way clear to grant the request that had been made to them by the silver-lead miners of British Columbia.

Now I may say that in British Columbia the people have always been an uncomplaining people. I have lived there myself for the past seven years, and before that I had lived for some fifteen years in the city of Winnipeg and west of that towards the Coast, and I am well acquainted with the western people. We have always paid taxes in British Columbia by way of duty, either directly or indirectly, on every product that was brought into that country. We pay a duty direct or indirect on all we consume, on all we wear, on all our mining machinery that is not manufactured in Canada, practically on all our mining supplies; and yet I do not think that this Government or any other Government has ever heard any serious complaint from British Columbia on that score. But when the conditions of lead mining became such that it absolutely required assistance in some way, then the people of British Columbia came to this Parliament. Delegations waited upon the Government, and their representatives in Parliament have urged their cause. We hoped therefore that so far as lead was concerned there would be a readjustment of the tariff.

Now let me contrast the duties on lead with the duties on other products which we have to buy in British Columbia. I think I am safe in saying that probably the duties will average nearly 30 per cent. on the articles that we consume and use in daily life in British Columbia. In regard to lead, let me first take the article of pig lead. We find that on pig lead there is a duty of 15 per cent.; with the preference of 33 1-3 per cent. deducted from all lead sent from London, that duty amounts to 10 per cent. Now probably every member in the House knows what pig lead is, but as possibly some one may not, I will explain that the lead ore is first smelted, and with the lead silver is frequently found. The smelted product of lead ore is called bullion. That bullion is then sent to the refinery where it is desilverized, and assumes the form of pig lead. Now note that the tariff of 15 per cent. is levied on lead which has reached that state; and as I said before, with the preference of only 10 per cent. as against London. Now we go further and take up the question of corroded lead, or what is known as white lead. Now note the anomaly. On corroded lead, which is lead advanced a further stage, the duty is only 5 per cent. Taking that fact into consideration, it is no wonder that we have no lead corroding works

in Canada. That duty of 5 per cent. would also have to be reduced by one-third in case the corroded lead came from England.

Now what is our position to-day? Canada is consuming to-day of lead products in various forms, such as sheet lead, white lead, shot and corroded leads, something in the neighbourhood of \$15,000 tons. This consumption is rapidly increasing from year to year, and in view of the great immigration coming into Canada at the present time it is certain to increase very rapidly in the near future. Therefore we should not be surprised to find that within a very few years Canada may be using 20,000 to 25,000 tons of lead in all forms. We have in British Columbia, particularly in the district I represent—indeed I think I represent most all the silver-lead mining interests in Canada, certainly all those in British Columbia—we have there at the present time mines capable of producing 30,000 tons of lead, and even more. As I have already said, Canada is consuming at the present time some 15,000 tons. Now how much of that lead is produced in British Columbia? About 4,000 tons, or at the outside, 5,000 tons. You may ask me how that happens. The reason is that we are thrown into competition with Mexican lead. As I have shown, we are protected by no existing duty that is of any practical benefit to the mine owner or the producer; certainly the existing duty is no benefit to the producer of lead as it stands to-day. Therefore we are thrown into competition with lead that is sent in from the United States, although not by any means produced in that country. But the United States have what is called a bonding privilege with Mexico, where there are large lead mines and where a great quantity of lead is mined. That Mexican lead is sent into the United States in bond, is treated by United States manufacturers in bond, and then shipped out of the United States into Canada. That lead is very cheaply produced. The cost of labour employed in producing that lead is only 50 cents a day. I understand the miners are paid 50 cents in the Mexican mines. Against that we have to pay our miners \$3.50 a day. You can readily see under these circumstances that we cannot possibly compete with the Mexican lead, unless some protection is afforded our miners in one way or another. If that lead is sent to London, or if Spanish lead is sent to London and refined there, and then sent out to Canada, that cheap lead comes in here with this preference deducted from the duty of 15 per cent. on pig lead and 5 per cent. on corroded lead.

Now, I wish for a moment to contrast the conditions of the United States miner and the Canadian miner of lead. For that purpose, I will take one of the Western States, which has the greatest lead producing camp in the world, the Cordellaines, in the State of Idaho, which is some 200 or 300 miles south of us. I select that because the conditions there are very similar to the conditions in British Columbia, where we are operating our mines. I find that in the United States at the present time the mine owner receives for his lead in ore \$3.90 per hundred. In Canada I find that the mine owner receives for his lead in ore \$1.90 per hun-



dred. That is based upon this: We receive and are settled with on the basis of the London price. The price of lead on the London market varies from time to time, varies probably every day, or few days, a few points, but at the present time the London price is \$2.90 per hundred pounds. The mine owner receives only \$1.90, the other dollar being taken for freight, treatment and what are called marketing charges. So that, as contrasted with the mine owner in the United States who receives \$3.90, the mine owner in Canada, 200 or 300 miles north of him, receives only \$1.90. Now, taking dry lead in the New York market we find that at present the price is about \$4.37 per hundred. In Montreal they buy pig lead (not the United States pig lead), and the price of pig lead in Montreal is \$3.07 per hundred. I am quoting these figures to come to the point that I do not see why the charge to the Canadian consumer of mixed paints should be as much as the charge to the American consumer of mixed paints, and yet we find that such is the case. Pig lead in New York is worth \$4.37 and in Montreal \$3.07. Then we find that corroded lead in New York is worth \$4.75 per hundred and in Montreal \$3.75 per hundred, but when it comes down to mixed paints we find that they are quoted in both countries at about \$6 per hundred. One thing is sure, that the mine owner does not get the benefit of that. Why when there is such a difference in the price of pig lead and the price of corroded lead in Montreal and in New York the price of mixed paints is the same, is something that is difficult to understand. When it is mixed in with the oil and becomes mixed paint we find that, although the American paint mixer has to pay much more for the corroded lead that is used in the mixing of the paint than does the paint mixer in Montreal, practically the consumer in the United States pays the same as the consumer in Canada. That is something the Government might look into.

I wish to place before the Government and the House the importance of this lead industry in British Columbia, to show what it was when the conditions were favourable to mining operations there and to contrast the conditions then with the conditions to-day and with the conditions that have prevailed for some little time. These figures have been carefully compiled by men who made it their special business to arrive at the figures in order to be able to present them to the Government when they came here as accredited delegates from British Columbia. There has been invested in silver lead mines in that district over \$20,000,000. That is the actual purchase price of the mines. It does not include any stock dealing or anything of that kind; it is the actual purchase price of the mines and money expended in developing these mines. In connection with that, there have been railway and steamship lines built, and they were built very largely for the purpose of conveying these ores, because there were practically no other industries in certain parts of the silver-lead mining district. There has been expended in that direction by the Great Northern Railway Company some \$3,000,000. There has been expended by the Canadian Pacific Railway

Company for a similar purpose some \$10,000,000. In Slovan district, which is entirely dependent on silver-lead mining, we find that in the various mining camps and small towns the assessed value of improved property amounts to about \$1,700,000. The assessed value of the City of Nelson, outside of that amount, is placed at about \$2,500,000. There has been invested in smelters for the reduction of these lead ores some \$750,000 or \$1,000,000, this investment being represented by the smelters at Pilot Bay, at the City of Nelson and at Trail. I will take the year 1900, because in that year the mines were working under favourable conditions and were working to their normal capacity. In that year while working to their normal capacity, these lead mines gave employment to 2,500 miners. This does not include men who might be employed in cutting trails or in cutting wood in connection with these mines, but actual miners, and the wages paid to these miners amounted to about \$2,750,000 in that year. The value of the ores shipped from these mines in 1900 was about \$5,000,000. These mines were supporting a population of some 20,000 people, I may say, almost absolutely dependent on the successful operations of the mines. Take the conditions two years later, and what do we find? We find that the value of the ores shipped from these mines had dropped from \$5,000,000 to \$1,154,000. We find that the population of 20,000 people that were being supported by these mines had dwindled to some 10,000 people, and that number to-day is greatly decreasing. We find that the 2,500 men who were employed in 1900, when conditions were favourable, are reduced to 500 men, and consequently, instead of having 2,500 men working in our silver-lead mines, as in 1900, we have 500 men. Instead of having \$2,750,000 expenditure in the shape of wages, we have now only about \$500,000. You will readily see, Mr. Speaker, the great necessity there is for something being done to help this industry. It is an industry which is not only of great value to my district, but it is an industry which is of interest to all of British Columbia, to the Northwest, Manitoba, and to Eastern Canada as well. If I were urging something that was only local in its character, I would not have such a strong case in coming to this House and to the Government to ask for assistance. But, Sir, this is an industry which concerns the whole of Canada, and in which all Canada has deep concern.

Now, Sir, this falling off in the production of the mines is not due in any sense to the fact that the mines have petered out. The silver-lead mines of the Slovan and of the East Kootenay are in a more advanced stage of development to-day than they have been in any period in the history of lead mining in British Columbia. They have ore in great quantity, and the ore is just as valuable as ever it was. It has been suggested by some that the falling off might be attributed to exorbitant freight charges on railways and exorbitant treatment charges by the smelters, but I can assure the House that such is not the case. The mines are as productive as ever; the ore is there to be taken out, and the railways and smelters have made

cut after cut in their rates in order to try and keep that industry alive. There was a two-days' session in the City of Nelson, last fall, where the representatives of the silver-lead mining industry met the smelter people and the railway people, and threshed the matter out. The representatives of the silver-lead mines in British Columbia satisfied themselves then, that they were receiving fair treatment both from the railway companies and from the smelters. In fact I am told that the rates charged were even better than the rates given to our neighbours across the line. It may be asked: What then is the cause of this slump in lead mining in British Columbia? Well, it is due to more causes than one. In the first place, a good deal of our lead carries silver with it, and the price of silver and lead in the markets of the world is low. The second reason is, that owing to the conditions that prevail we cannot get any appreciable amount of the Canadian market for the Canadian product of lead. We are thrown into competition with cheap Mexican and Spanish lead which is foisted into Canada through the United States and through Great Britain. Another reason, and a very strong reason is, that during 1900 and prior to that for some years we were shipping our lead ores into the United States first, under the old Wilson tariff of three-quarters of a cent a pound, but afterwards the Dingley tariff raised the rate to one and a half cents a pound against us. When we had the American market for our products, our mines were going ahead, everything was prosperous with us, and we were able to carry on our works to their fullest capacity. But suddenly what is known as the American Smelting Trust was formed, and so soon as that trust came into existence all the smelters gave notice that at the expiration of the contracts which they then had with the mine owners of British Columbia, they would take no more Canadian ore. Therefore, the American market has been shut off to Canada by the action of that trust. Now when these conditions got to be practically unbearable, when it was seen that unless something was done to relieve the lead miners, that industry would perish; we in the lead mining district, got together to devise some scheme which we could present to the Government for our relief. As the member for the district, I caused notices to be inserted last fall in the papers, asking that a meeting should be called at some stated place to discuss as to the best means of bringing about relief. That notice was heartily responded to and a meeting was called at Sandon, which is probably the centre of the lead mining district. That was a very representative meeting and all the lead mines of any importance in British Columbia were represented. The managers, or engineers, or superintendents, as the case may be, met at Sandon, and after carefully discussing the question, action was taken. I may say that the men who attended that meeting were men whose daily avocation is the operating of mines; men who should be, to my mind, in the best position to judge of what would grant the most relief to that industry in its depression. It was unanimously decided at the Sandon meeting that a delegation should be sent to Ottawa to present the facts to the Government, and

to ask them to give us a duty on our lead that would be sufficient to place our miners—not exactly in the position of the American miners, because we felt that we could not get that—but at all events to place them in a position so that they would be able to work their mines to advantage.

A MEMBER—What do you think a sufficient duty on lead would be?

MR. GALLIHER—What was asked was practically the Dingley tariff, which is two and one-eighth cents a pound on pig lead, and two and seven-eighths cents a pound, I think, on corroded lead.

A MEMBER—Would that be adequate?

MR. GALLIHER—Yes, that would be adequate, but I have some hesitation in using the word adequate after the explanation of its meaning given by my hon. friend from Brant (Mr. Heyd). As I have said, that was the decision arrived at at that meeting. The Sandon meeting was afterwards followed by a meeting at the City of Nelson where these industries were again represented, and at the meeting in the City of Nelson the resolution of the meeting held in Sandon was practically endorsed. That was followed up, as I said before, by a meeting between the mine owners and those representing the railway and smelting interests in order that the mine owners might be convinced that the railways and smelters were dealing fairly by them both in regard to railway rates and smelting charges. The meeting ended by the mine owners being perfectly satisfied on these points. It was followed by a third and last meeting in the City of Sandon, where again all these interests were represented and the original resolution was re-endorsed. At that meeting certain delegates were appointed to come to Ottawa to interview the Government with regard to that resolution; and I may say that the men who composed that delegation were all practical men, men whose daily avocation was the operating of mines and the treatment of ores, men who understood the A B C of mining, and were capable of presenting the case to the Government in a proper light, and who did present that case to the Government in a much abler manner than I am presenting it to the House to-night. These delegates were assisted by Mr. Buchanan, who represented the federated Boards of Trade, a gentleman who probably has given more time to the question than any one else. So that our case was very strongly presented to the Government, and we hoped that the Government, if it could not see its way clear to go to the extent we asked in adjusting the duties, would at all events give us what we all claimed was our right, and what I claim to-night on the floor of this House is the right of our people—to have the tariff on our lead industries so adjusted that it should be placed upon a parity with the other industries of Canada. That, I claim, the people and the lead mining industry of British Columbia are entitled to. The Government have intimated, through the Finance Minister in his budget speech, that they do not see their way to interfere at all at this session of Parliament with the tariff respecting lead notwithstanding the great anomaly that exists.

I was pleased to see that the Government have asked for power, if certain conditions arose, to impose a duty on steel rails. I think that principle is right. The manufacture of steel rails is a new industry in Canada; it may become a very important industry; and when we have the raw material and the means of converting that raw material into the finished article, I believe in the principle of encouraging all new industries of that description. Such, I claim, is our position with regard to lead. When the present tariff was framed, we had no such industry as lead mining in Canada; therefore, lead was practically put on the free list. Now that we have demonstrated beyond a question the value and importance of the industry and the fact that it can more than supply the demands of Canada, surely we should be placed in a position at least to control our own markets instead of seeing the lead in the different forms in which it is used in Canada come from the cheap Mexican or Spanish article, while our mines of British Columbia are shut down.

Now, I take it that the Government, in asking power to place a duty of \$7 a ton on steel rails, have placed themselves on record as willing to assist a new industry under special conditions. There could not be a stronger special case made out than has been made out on behalf of our lead industry. It is an exceptionally special case; but the hon. Minister of Finance stated, as the reason why he had practically differentiated between the steel rail industry and the lead industry, that to have afforded the relief asked for the lead industry would have necessitated interference with many other items in the tariff. That may be true; but let us see if that is a good reason. Having once placed themselves on record as adopting the principle of assisting a new industry under special circumstances and having applied it to a certain case, under special circumstances, I contend they should apply the same principle to the second case of special circumstances. The fact that the application of the principle to the second case may involve a little more trouble in working it out, does not, to my mind, affect the question. The point is, is the principle established? If it is, they should apply it in all similar cases, even if one case involves a little more difficulty than another.

In a country such as Canada is—a growing country, a country of great possibilities, a country where the conditions are changing with wonderful rapidity from year to year, and even in shorter periods—I think no government should lay down any hard and fast policy that must govern everything. I think there should be elasticity in the policy of every government. I think special circumstances should be dealt with specially, apart from any fixed principle or policy. If there is justice in the demand, justice should be done. It is all very well for an old country like England to adopt hard and fast rules of policy. It is different in Canada, where conditions are not settled, but where they are constantly changing, and those conditions should be met by any government in power, be it Liberal or Conservative.

Taking into consideration the sums of money which have been invested in that industry in that country, considering the importance of that industry, not alone

to British Columbia, but to the Northwest Territories as well, it seems to me to call for some energetic action on the part of the Government. There is no other industry, not even the mining of other precious metals which so effects the entire province as does the industry of silver-lead mining. Not only does the whole province feel the evil effects of the condition now prevailing, but those evil effects are also visited on the Northwest Territories. No doubt the Territories are prosperous at present, and I hope that they will long continue so. There is a large immigration pouring into them, but we must not lose sight of the fact that, right at their threshold in the Province of British Columbia do they find their natural market for their agricultural products. That Province furnishes a very good market for the products of the farm and the ranch. We require large quantities of butter, cheese, hay, oats, cattle, hogs and various other products of the farm and the ranch, and these we get from the Northwest Territories. Thus the Territories find in our province a remunerative market, and they are backing us up in our application. We have received endorsement from numerous boards of trade throughout the Territories and also from the boards of trade of the City of Winnipeg and other places in the province of Manitoba. Aye, Mr. Speaker, we have even received the support of the boards of trade in many parts of Ontario. So that we are not standing alone. We alone are not affected, but other provinces share in our loss, and that surely ought to appeal to the favourable consideration of this Government. Seven years ago I found this silver mining district, which, a very few years before, had been a solitary wild, a business centre and hum of industry. The bustle of life and business was evident everywhere. Prospectors, miners, investors, business men were pouring in from all quarters, putting their capital into the country, either in mining or business ventures. Mining camps, villages, towns and ambitious cities were springing up with incredible rapidity. Times were good, everybody was prospering, and the people naturally looked to a continuance of this condition. All the indications pointed to that district as being a profitable one for the investment of capital, and the people invested largely. But if the present conditions of affairs is to continue, if there is to be no help for us, what does it mean? It means ruin to every one of those business men who invested their money there, and there are numerous towns in that silver-lead district in which vast sums have been invested. The mine owners may close down their mines and leave the country. But the merchant, the man who has his money invested in business, cannot do that. There are bills to meet, and there are vast sums of money sunk in stores and buildings, which, if abandoned, will be irredeemably lost. It was suggested, however, by the hon. Minister of Finance—and that I confess is a ray of hope to me—that there would be some readjustment with regard to bounty and that a bounty would take the place of a duty. Well, I was pleased to hear that the hon. minister say so, and I hope that the bounty will be a liberal one. An adequate bounty would tide us over our difficulties for a time until the Government could see its way clear

to give us at least a fair, proportionate and reasonable adjustment of duties, so that our lead products, at all events, would be on the same basis as other products of Canada. If the Government decides to grant us a bonus, I wish to point out that if it is to be of any practical value, it will have to be an adequate one. There are two things we should not lose sight of in this connection. I wish you, Sir, to bear in mind that the Province of British Columbia contributes to the Dominion treasury more per capita than any other province and three times as much per capita as the average of the other provinces. I would also point out that it contributes in revenue to the coffers of this Dominion some \$2,000,000 per annum more than is expended in that province. I do not mention this to say that it should be the policy of the Government to expend in any one province all the money paid into its treasury by that province. But I merely wish to show that in asking for a large bonus, the Province of British Columbia is not drawing from the revenue or resources of any other province of the Dominion. Some two years ago there was an Act placed on the statutes providing for the payment of a bounty for refining lead. The purpose of this was to have our home product refined at home, that it might not be sent abroad to San Francisco or some other point, and freight charges and smelting charges paid upon it. That bounty ran for five years, and was \$5 per ton for the first year, \$4 per ton for the second year, \$3 per ton for the third year, \$2 per ton for the fourth year, and \$1 per ton for the fifth year, but in no year might the bounty exceed \$100,000. In order to gain the whole bounty the first year, it would have been necessary that 20,000 tons of lead should be mined in Canada. That bounty, so far, has cost very little to the country from the fact that the establishment of refineries cost considerable money. The only parties who took advantage of it was the Canadian Pacific Refining Company at Trail, a town near the silver-lead mining district. They have expended some \$40,000 or \$50,000 in a plant, and in an experiment in refining lead which was then tried for the first time outside a laboratory. The system experimented with has been demonstrated to be successful. It is known as the electrolytic system. The plant at the present time is capable only of turning out some 8,000 or 10,000 tons per annum. When the mining conditions again become normal in British Columbia, that plant will have to be largely increased. In view of the fact that the company have shown enterprise and have introduced this new system which is successful, and is in furtherance of science, and in view of the fact that probably only about \$10,000 of the bonus for the year ending 30th June, has been earned, I would ask that the time be extended for one year, within which they may earn bounty at the rate of \$5 per ton. Now, this bounty that already exists and the bounty that we propose asking must be treated separately. It will not answer the purpose of the producer of lead for us merely to have a modification in some way of the existing bounty paid to the refiner. What we will ask for, what we shall require in order that this industry may be stimulated by way of bounty, will be a bounty payable directly to the

producer of the lead. Here is the man to whom, we claim, if we are to receive assistance, by way of a bounty, that bounty must be paid. Taking the average price of lead for the last twenty years, and taking our settlement at the London prices, it brings to the producer about \$1.75 per hundred weight. By the closest and most careful figuring, the gentlemen who have had the matter in hand have decided that it is impossible for the mine owners in that district, outside of a very few whose quota would be small, to operate their mines successfully for less than a return of \$2.50 per hundred weight for their lead. So allowing for the price of \$1.75, the bonus should be such as would give to the producer the difference between \$1.75 and \$2.50, or 75 cents per hundred weight, or \$15 per ton. That is the bonus that will be asked. I may say that, since the speech of the Finance Minister was published throughout the country, I have received numerous telegrams, and resolutions from boards of trade both in the Territories and throughout the entire Province of British Columbia, urging upon me that I should ask the Government to reconsider the question of the adjustment of duties, so far as lead is concerned. I am only a young parliamentarian, and I do not know whether this can be done or not. I see no reason why not. At all events, I am going to ask that it be done, that the Minister of Finance reconsider the question in regard to the readjustment of the duties and the bonus to be given us. As to duties, I will only ask them to touch one item, this item of corroded lead. We are assured by two separate concerns that, if a duty of 30 per cent. is put on corroded lead, they are prepared to establish corroded works in the East here. If they do so—and they are responsible people—it means the establishment of a new industry in Canada, the expenditure of money in Canada, and the employment of labour in Canada; and it means the securing the white or corroded lead market for the Canadian producer of lead. It is something, I think (worthy of consideration. And if it is possible or in accordance with the rules to reconsider that and bring it down by way of what we may term a supplementary budget. I would ask the Finance Minister and the Government to do so. We in that country are placed in a position where, if adequate relief is not afforded us, either in one way or another, we can see the destruction of those erstwhile live businesslike towns that have sprung up in that country. We do not want that to occur. The people of my district are excited over the matter as it is now; and I urge in all earnestness upon the Government and, if the Government bring in any measure of relief I will urge in all earnestness upon the members of the House, to give this matter all due consideration. I hope I have made it clear enough that we are in dire need of assistance in one way or the other in regard to that great industry. We do not wish to see an industry of such magnitude perish; we do not wish to see our country supplied with the products of other countries while we have within our own border an industry of this kind more than capable of supplying our wants. I care not how the Government reach it, so long as they reach it.

## "FRENCH STEEL."

**T**O THE EDITOR:—The article upon "French Steel" upon page 637 of the May number of your journal reminded me of an experience that came to me in the summer of 1901. An agent exhibited samples of a French air-hardening steel of very good quality to the iron workers in Eastern Pennsylvania. While the steel was being exhibited at the Scott foundry in Reading, Pa., a corner of the tool broke off and the superintendent of the works "accidentally" noted where the broken piece fell. When unobserved by the agent he picked it up and preserved it in a properly labelled envelope. Orders for the steel were placed with the agent and in the course of time the material ordered was delivered. If I mistake not the purchase price was in the neighbourhood of fifty cents per pound.

The new material failed to act like the tool exhibited, so samples taken from it and the piece of steel saved by the above mentioned superintendent were sent to the laboratory of the Carpenter Steel Company, Reading, Pa. The results of my analyses showed that the steel delivered was merely an ordinary high-grade tool steel containing no "medicine" like chromium, nickel, molybdenum or tungsten, while the specimen tool was made from a high-grade molybdenum steel resembling in its properties the famous Taylor-White air-hardening steel. The fraud was at once exposed and the French dealers were the only losers by the transaction.

This information may interest you and the unfortunates who have been victimized by the swindler.

Respectfully,

W. C. EBAUGH, Ph.D.,

Analytical and Consulting Chemist.

Salt Lake City, Utah.

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 THE INCOMPETENT MAN AND TECHNICAL SCHOOLS.

**T**O THE EDITOR:—The conditions in this western country are such that a man can change his occupation at a moment's notice, there being a large demand for labour in any industry, and men offering their services without any previous experience. The result is that when the rush is over they are discharged, and they invariably drift from one industry to another.

Then there is another class who have learned some trade, or profession, before coming to this province. When they arrive here they find that there is no demand for their services in the trades, or professions, of their choice. What must these men do? No doubt large numbers join the ranks of unskilled labour; some obtain good positions; but the majority drift round from one industry to another and constitute the class of incompetent men.

Now what effect has this upon the industries of the country? Having no previous experience or theoretical knowledge of the work they are doing, such men when placed in positions of responsibility or trust in

our mines and factories, are a danger to the lives and property of others. An incompetent man in most cases must be a loss to his employers, no matter how cheap his labour, when skill is required.

Let us look at the case from the workers' standpoint. The skilled artisan who has learned his trade and follows it as a means of livelihood, is brought into competition with the incompetent. Now, while there is a demand for labour, the competent workman receives the most pay for his services, but when the demand slackens he is compelled to accept the same wage as paid to the inefficient men. Employers in most cases use the inferior man as an excuse for reducing wages. Trade unions, in order to protect their members in some industries, have adopted a standard, or uniform, rate of wage, and, in some cases this has proved satisfactory to all concerned. It has promoted a spirit of brotherhood so that the strong help the weak. In Europe this is the keynote of trade unionism; but a standard or uniform wage in this country under present conditions would be unfair to all concerned. Men who have spent time and money in learning a trade should be better paid than men who have had little experience. Still some recognized rate should be maintained—some locally fixed standard—for when no standard is recognized the conditions are generally unsatisfactory to both employers and employees.

A better solution of the question is the arrangement of a minimum rate to be agreed upon by both parties at stated periods, say, every two years.

While organized labour is seeking to improve the material conditions of members, it is their duty also to improve the mental faculties of the individual members as well. On the other hand, it is the duty of employers of labour to see that the proper facilities for improvement are provided. Surely educated workmen are to be preferred to careless and indifferent.

Manufacturers complain that they cannot compete against Eastern and European firms on account of the high price of labour in this province. There is another factor that has not been taken into account, viz., that others countries have educated their artisans along industrial lines.

What is needed in this country is that in every city, town, village and mining camp, technical schools should be open of an evening, so that every man may have a chance to improve himself in his craft. Not the trade school system as practised in the United States, but schools where men actually working at the trade of their choice may obtain that theoretical knowledge of their craft not to be obtained in the shop, factory or mine.

The trouble is that most employers of labour are apt to look on their workmen as so many hands, to be worked so many hours per day, for a fixed wage, no thought being given to their material or mental development. The result is in some cases no more work is done on the part of the men than is absolutely required; the work becomes to him a drudge. On the other hand let him be encouraged in his work, every possible means be placed in his way for his development, and while not solving the labour problem, it will promote

a better feeling, and create good will between employers and their employees.

J. W. BOLDEN,  
President Trades and Labour Council,  
Victoria, B. C.

#### COMPANY MEETINGS AND REPORTS.

##### THE YREKA COPPER COMPANY.

**T**HE annual general meeting of the Yreka Copper Company took place in Tacoma on May 2nd. The business of the Company and prospects for the coming year were discussed. It was decided in order to harmonize all the interests of Pennsylvania, Washington and British Columbia stockholders to increase the directors from five to eleven. This was accordingly done. The election of officers resulted as follows: President, C. W. Riddell, Tacoma; Vice-President, C. L. Lynn, of Pennsylvania; Secretary, S. T. Lewis; Assistant Secretary, C. D. Atkins, and Treasurer, W. C. Spicer.

An Executive Committee, comprising Messrs. C. M. Riddell, W. C. Spicer and C. D. Atkins, was appointed to manage the ordinary business affairs of the company. It is the intention to raise the necessary funds for the opening of the Superior group of claims which border on the Comstock, the property which is now being operated. It was pointed out that the Superior group, while somewhat more inaccessible than the Comstock, had always been considered the richer, and when once opened up, was expected to give better returns. An aerial tramway will be put in and the property put on a shipping basis as soon as possible.

##### THE PAYNE.

At the annual general meeting of the shareholders of the Payne Mining Company, held in Montreal, the president Lieutenant-Colonel F. C. Henshaw, said:—

"This year your Directors are pleased to be able to state at last, tunnel No. 8 has reached the ore body.

"With the discovery of the ore in tunnel No. 8, and the opening of a market for our zinc, your Directors consider that the prospects of the mine are bright.

"No time will be lost in proceeding with the development of the mine below tunnel No. 8, and it is the intention of Mr. Mathys, one of your Directors, to visit the mine shortly to discuss this matter with the manager, Mr. Garde."

The financial statement for the year ending March 31st, 1903, was presented as follows:

ASSETS.	
Mines, mineral claims and assets . . . . .	\$2,610,744 32
Permanent equipment, buildings, machinery etc. . . . .	54,846 72
Office furniture . . . . .	450 97
Mine supplies & stores on hand as per inventory . . . . .	3,330 06
Accounts receivable . . . . .	17,301 08
Cash on hand . . . . .	\$ 54 98
Traders' Bank, Spokane . . . . .	495 00
	549 98
	\$2,687,223 13
LIABILITIES.	
Capital stock . . . . .	\$3,000,000 00
Less in treasury . . . . .	400,000 00
	\$2,600,000 00
Accounts payable . . . . .	10,566 15
Bank of Montreal . . . . .	4,863 72
Profit and loss . . . . .	71,793 26
	\$2,687,223 13
PROFIT AND LOSS.	
To Cost of mining and developing . . . . .	\$76,793 43
" Freight and Treatment . . . . .	31,621 34
" Concentrator expenses . . . . .	17,808 78
" Ore tax . . . . .	1,804 71

" Repairs to machinery, buildings, tramway, etc. . . . .	16,496 45
" Tools and appliances, etc . . . . .	1,325 49
" Written off permanent equipment . . . . .	5,917 64
" Montreal office expenses . . . . .	2,139 93
" Interest and exchange . . . . .	558 23
" Directors' compensation . . . . .	2,000 00
	\$156,466 00
" Balance . . . . .	71,793 26
	\$228,259 26
By Balance brought forward . . . . .	\$ 98,382 17
" Proceeds ore sales . . . . .	127,236 97
" Miscellaneous receipts . . . . .	2,640 12
	\$228,259 26

##### MINE REPORT.

Mr. A. C. Garde, the mine manager, submitted the following report:—

Development work during the past year has exclusively been carried on in the three lower levels, No. 6, 7 and 8, all of which are accessible through tunnels No. 5 and 3 compartment shaft, formerly described.

The new hoist, air compressor, and power plant installed last year, rendered in every respect valuable services.

The total number of feet advanced during twelve months, amounted to 1,263, of which 958 feet comprised tunnelling and drifting, 148 feet comprised sinking of winzes and 157 feet comprised upraising. Total, 1,263 feet.

**Level No. 6.**—This level has been driven 245½ feet ahead, and now measures 543½ feet from station No. 6 to the face. By referring to last year's report and maps, it will be observed that this level came into ore during the early part of 1902, at a point marked "b" 75 feet from station, and that the ore was followed for 160 feet, where an upraise was started at "a" for the purpose of connecting with winze No. 2, which had previously been sunk on the vein to a depth of 60 feet from the floor of tunnel No. 5.

Since this work was mentioned the above upraise has been finished and connected with winze No. 2. The ore shoot was proved all the way, thus blocking out on three sides, that section of ground designated on maps as "Block D" with boundaries at a, b, c, d and e. While timbers and chutes were put in for stopping purposes, the face of No. 6 level was driven 215 feet ahead, proving the ore to continue for additional 90 feet. The total length of ore-body exposed in level No. 6, is, therefore, 250 feet, showing an average width of two feet and representing the base of "Block D." The height of this block when measured on the dip, through winze No. 2, is 115 feet, with approximately the same average thickness of vein, while the top measurement along the footwall of tunnel No. 5, between winze No. 2 and the shaft, represents 180 feet, but here the showing of pay-ore is mainly in patches and not nearly as good as in No. 6.

After driving through the above mentioned ore body in No. 6, development work was continued for 1235 feet, proving the vein, but not the values. A very hard quartz dike made its appearance, and it was decided to discontinue driving ahead for a while, and undertake sinking on the vein. This was done by starting a prospect winze, No. 1, at a point 120 feet from station No. 6, directly below "Block D," where the showing of ore was better than anywhere else on the level. Sinking here proved very satisfactory and the ore shoot was followed to a depth of 50 feet. By that time it was considered a better plan to put an upraise through from level No. 7 and make connection. This plan was carried out as described further on, under "Level No. 7."

In reference to the quality of ore met with in level No. 6 and winze No. 1, I found it to be galena, disseminated with spathic iron (siderite) and zinc blende considerably above the 10 per cent. zinc limit allowed by the smelters. Although of high grade, this ore, under present conditions, must be regarded as a concentrating ore, in which lenses of clean shipping ore are found.

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**Level No. 7.**—This level was started in May, 1903, and driven ahead for a distance of 278 feet from station No. 7. The vein was followed nearly from the start, showing a good width, but at the same time, low values, consisting mainly of siderite and a small percentage of zinc blende.\*

It could reasonably have been expected that the ore body, which had shown up so well in level No. 6, and in winze No. 1, would have reached down to level No. 7, but when it did not do so, I concluded to start an upraise at a point directly under winze No. 1, 140 feet from station, for the purpose of connecting and at the same time exploring the intermediate ground. This proved a good plan, for within a few feet of the level two feet of good ore was struck, and followed all the way until winze No. 1 was reached and connection made. This distance represents 110 feet on the dip of vein. Two short raises have since been put through from No. 7, meeting the ore shoot as shown on maps, whereby a triangular section of ground has been blocked out and designated as "Block E."

**Tunnel No. 8.**—The length of tunnel No. 8 from portal to present working faces, including all cross-cuts and drifts, is now 1,754½ feet. Of this distance 435 feet have been driven during the past year. Shortly after the freshet season in August, development work was resumed in the main tunnel in search of the vein. One hundred and thirty-six feet were driven towards southwest, through a hard silicious slate formation, until a point directly under No. 7 level was reached. No features of encouragement showed up until at this place a fault-fissure with an approximate strike of northwest and southeast, or nearly right angles to the main tunnel was intersected. This fissure, which afterwards led to the discovery of the vein, consisted of a single perpendicular wall, showing traces of severe movements. On this wall was bedded two inches of talc, followed by a considerable amount of water, flowing out of a narrow gash, which in some respects, reminded me of fault-fissures observed in upper levels, and caused me to believe that by following same in a south-easterly direction the vein would be recovered. A sharp turn was therefore made, as shown on maps, and for two months a cross-cut driven straight ahead alongside of the above mentioned faulting wall, until the main vein on February 1st, this year, was suddenly encountered laterally within a distance of 98½ feet from the turning point.

As soon as the heavy flow of water, which was struck at the same time, had run out, drifting on the vein in both directions was started, and at the present time of writing, the east drift is 60, and the west drift 61 feet, from discovery point. In both drifts the vein has been followed all the way, for a total distance of 121 feet, without showing any sign of particular disturbance in the formation. I may add that it was rather unexpected to find the vein extending both ways, inasmuch as the main fault in all upper levels heretofore had been cutting the vein off towards the northeast, and therefore limited the ore within the ore zone towards southwest.

I beg to call your special attention to this point, which I regard as an important feature.

In reference to the vein I can say that it has the appearance of a strong and well defined ledge with a strike of north 67 degrees east. It shows two distinct walls dipping 76 degrees from the vertical towards south, and has approximately the same dip as the vein in levels No. 6 and No. 7. It is an extension of the main vein, and proves the Payne mine to a depth of 900 feet below the apex. My impression is that we have entered the top of a new important ore shoot. The vein is wider and shows a higher grade of ore in the floor than in the roof of the drifts. In the drifts the vein is principally composed of concentrating ore of good grade and of similar physical character as in the ground above. Its average width is 2½ feet, showing in several places swellings of the vein.

The above particulars will furnish a general idea of the discovery.

Until more work is done I could hardly predict the tonnage or the grade of ore that in time will be produced from the vein above or below No. 8 tunnel, and have, therefore, not included it under Ore Reserves further on, but it bids fair to say that the discovery of pay ore in the vein, after a three years'

search, is highly gratifying and of special importance as to future ore reserves and possibilities of the Payne mine.

**Proposed Development Work.**—With the encouraging prospects of finding ore in lower levels it would be extremely desirable to consider the question of exploring the mine below tunnel No. 8. One commendable plan would be to continue tunnel No. 8 for about 300 feet towards west, until directly under the crest of Payne Mountain, and at this point to sink a central shaft, approximately 350 feet deep, from where three new levels, Nos. 9, 10 and 11, could be driven as indicated on map in dotted lines. The result would undoubtedly be the opening of new ore reserves within two years, at which time the present ore reserves probably would be exhausted. To accomplish this it would be necessary to install an electric hoist over the shaft, together with an adequate pumping plant, also driven by electric power. If this plan was adopted it would be necessary to increase the present power plant by installing a sub-power station at Carpenter Creek, where the company now holds water rights to the extent of 500 miner's inches. A plant of this kind could be conveniently operated in conjunction with the present power plant and pole line to the mine, as this feature was taken into consideration last year, when installing the present plant.

**Ore in Sight, Slope Fillings, Dumps, Etc.**—From last year's report it will be observed that the estimated total tonnage of back fillings contained in old stopes at the mine, together with all dumps, etc., amounted to approximately 100,000 tons, which may be accepted as a correct figure. Of this tonnage one-third, or 33,000 tons, has been successfully concentrated in the mill during the past year, thereby leaving a reserve of 67,000 tons on hand. With the increased concentrating capacity, this can all be milled within the next twelve months, and will at the same ratio of concentration produce about 2,000 tons of high-grade silver-lead concentrates, and 4,000 tons of 60 per cent. zinc blende. To this reserve can be added the estimated quantity of concentrating ore found in other parts of mine amounting to about 20,000 tons, which on account of being of a higher grade than the fillings will require about six months to concentrate.

From the above it will be seen that a total reserve of 87,000 tons of concentrating material is available, also that under favourable conditions this can be concentrated during eighteen months of continuous operation. It is, however, more likely to cover a period of two years, especially if there should be more material on hand in old stopes and dumps than estimated.

**Recapitulation of Ore Reserves.**—During the past two months the London lead market has advanced approximately 25 per cent. over quotations for the balance of the year, and you are now getting \$60.00 per ton, net smelter returns, for silver-lead concentrates, with present prices of silver 49c. per oz., and lead \$2.00 per cwt. (smelter settlement.) This valuation is, therefore, figured in the following estimate of total ore reserves. Improvements in the concentrator and the benefits that will be derived from the new magnetic zinc separating plant has also been considered in the same estimate. Furthermore it would seem that the Dominion Government necessarily will have to decide on placing an adequate import duty on lead for the protection of the Canadian lead industry. The Government can hardly disregard the united petitions from a section of the Dominion that under favourable conditions, is able to add more than any part of Canada, to its general wealth.

In the United States the lead producer is now receiving \$3.00 per cwt. against \$2.00 (or less) in Canada. With your 60 per cent. lead ore, equal to 1,200 lbs. of lead, this price brings \$24.00 per ton, less 10 per cent. loss in smelting or a total of \$21.60. From this amount a \$15.00 freight and smelting charge, besides all cost of mining and general expenses, has to be deducted. It will therefore readily be seen that there would be little or no profits in lead mining, were it not for the high values of silver in the ores.

**Concentrator Report.**—It is with considerable gratification that I am able to state to you that the concentrating plant, completed on the 1st of May, 1902, has been an unqualified success from the start, even with the extremely low prices that have governed the metal markets during the entire year.

Referring to my special report and estimate on concentrator plant, of November 3rd, 1901, submitted for your approval prior to erection, you will find by comparison with the actual work performed:—

First—That the ratio of concentrating fillings has been 32 tons into 1, which is better than estimated, and that the tonnage of concentrates produced has consequently been increased in the same proportion.

Second—The estimated mill capacity of 125 tons per 24 hours, has been exceeded by 35 tons.

Third—In regard to the value of concentrates. These were based on silver at 57½c. per ounce, but during the year this price depreciated to 49c., nevertheless the smelter returns show the average price received from smelter to be \$49.11 or equal to the estimated price, which is due to the higher grade of concentrates produced in the mill. In place of averaging 94.8-10 ozs. of silver and 54 per cent. lead to the ton, the average has been 103.8 ozs. of silver, and 60 per cent. in lead, thus making up for the lower metal quotations. The net earnings of concentrator were \$35,706.06, plus \$3,000.00 for value of zinc on hand, equal to \$38,706.06. If prices had remained stable in place of going down, \$58.21 or \$9.10 more would have been received per ton of concentrates, and the net profits increased by \$11,365.00 equal to a net total earning of \$50,000.00.

Fourth—In regard to the zinc blende by-product, it will be observed that 1,391 tons have been produced in the mill during the year, representing \$11,329.87. This amount compensates in a measure for the lower prices of metals.

Fifth—Regarding the tonnage and class of material put through the concentrator, approximately one-third was taken from the dumps, and two-thirds from old and new stopes. The net tonnage of silver-lead concentrates produced was 1,247. The gross tonnage put through the mill was 40,028 tons.

The estimated tonnage in reserve is approximately 87,000 tons, thus the concentrator will have a supply on hand for not less than eighteen months and more probably two years.

One difficulty experienced in operating was shortage of water during two months of the dry season, which held the capacity and efficiency of the mill back to some extent, and for a short time the mill could only be run on one shift. This feature will be overcome before the dry season sets in this year. Fifty miner's inches of water have recently been granted us, made up partly from an adjacent stream, and partly from mine water running out of tunnel No. 8. The intention is, at an expense of about \$2,000.00 to flume the water from the north side of the mountain to the south side, thereby making it available for power and wash water purposes. With this increase of water I do not anticipate any difficulties in keeping the mill up to its full capacity all year round, especially as the past year proved one of the driest on record in the Slocan.

The plant was put in during "hard times" when the prices of metals went lower than ever, and if it could prove a success under such adverse conditions there seems hardly any doubt that previous records can be surpassed, providing prices come up again, as the tendency appears now.

*Magnetic Zinc Separating Plant (Now Under Construction)*—Until recently all zinc ores in the Slocan, whether associated with galena or found otherwise, had been entirely disregarded and neglected as a mineral of any value.

In the upper ore zones only a small quantity of zinc blende is generally associated with the galena, on which the smelters in the earlier days, placed no penalties. Different conditions existed in a number of the mines located at lower altitudes, where the galena was highly disseminated with a zinc blende that carried good silver values, but nevertheless could not be sold to advantage and was therefore avoided.

An attempt was made a few years ago to ship 1,500 tons of zinc to Swansea, England, but stranded on account of the sudden death of the promoter. After this unsuccessful effort the zinc ores were left on the dumps, or went through the tailraces as so much waste.

In the meantime the percentage of zinc kept increasing in the galena in nearly all the mines, and necessitated the smelters placing a 10 per cent. limit on zinc, with a penalty of 50c. per unit above same. In a number of instances the penalty was severely felt, as only a few mines were in a position to keep

within the limit, and a number of properties with 25 and 30 per cent. zinc in the galena could not, for this reason, be operated to advantage.

During 1902 the zinc limit was changed from 10 per cent. to 8 per cent. and it became evident, more so than ever, that something had to be done to overcome the continually increasing penalties. Encouragement was therefore offered by myself and some of my *confreres*, which soon resulted in making satisfactory progress towards solving the zinc question, at least as far as your properties are concerned.

While constructing your concentrator in the fall of 1901, provisions were made to save zinc values, and an accumulation of several hundred tons of 43 to 45 per cent. zinc concentrates were made between June, 1902 and January, 1903, with the hopes of securing a market. This lot has now been disposed of in Kansas, and netted over \$8,300.00. You will readily appreciate that this first attempt in the zinc business was fairly good for a starter, when remembered that the zinc was produced as a mere by-product.

In the meantime I found by careful experiments and tests that a far higher grade of zinc blende can be made by giving the ores a slight roast, whereby the (spathic) iron is partly converted into an oxide of iron, in which form it becomes an artificial magnetite, and can be eliminated from the blende in magnetic separating machines with fields of intensified magnetic force.

As soon as this important feature has been fully demonstrated, my proposition to erect a plant for treating 40 tons of zinc ores per 24 hours in this manner was presented to you, and upon receipt of your prompt decision, ground was broken on the 1st of February, and the necessary machinery ordered at once.

The above plant is expected to be completed in June, providing all of the machinery can be obtained within the stipulated time. The machinery comprising roasting furnace, magnetic separators, screens, elevators, fine rolls, etc., will be placed in a building 40 feet wide by 60 feet long. This building is a west end extension of the present concentrator.

The finished product which will run approximately 60 per cent. in zinc, and 16 to 20 ozs. in silver, will contain only a small percentage of iron, and less than 2 per cent. in lead.

With the prospects of being able to produce 6,000 tons or more of zinc from present ore reserves in the mine, during the next eighteen or twenty-four months, I am able to predict a bright future for zinc, and it will be readily seen that the revenues from this by-product from now on will be an important factor to contend with.

*Review of Past Year.*—In regard to the future of the Payne mine I shall forbear from making promises that necessarily will have to depend on future developments, as well as fair prices for silver, lead and spelter. At the same time I beg to call your attention to certain features that compare favourably with conditions three years ago. At that time tunnel No. 5 had little or no ore exposed in the floor, while to-day the main vein with pay ore has been proved to a depth of 360 feet below No. 5, and 900 feet below the apex.

I have stated in my last year's report and I desire to repeat that the true fissure nature of the Payne's vein with its banded arrangement of minerals, is both characteristic and favourable for deeper prospecting. Lean strata such as found in all mines, and of which No. 5 tunnel is an example, must be expected, also a hard formation, which will have to be counteracted by the exclusive use of power drills. Subterranean water, will no doubt, make its appearance further down, but can be overcome.

Zinc blende is now disseminated with the galena to a far greater extent than heretofore, and one of the most important features of the past year has, therefore, been the happy solution of concentration and separation of zinc blende from the galena, whereby a valuable by-product is added. I have mentioned elsewhere that the constantly increasing percentage of zinc seriously threatened to increase penalties imposed by the smelters, but with the present system of milling it will readily be seen that this feature has been entirely overcome. An ores of a complex nature can now be concentrated into a silver-lead product of an even higher grade than the former clean shipping ore, while the zinc blende is yielding a by-pro-



duct of high commercial value. By having the present complete and successful concentrating plant installed and paid for, together with the magnetic zinc separating plant, now under construction, you will be in an excellent position to handle all concentrating ore bodies that in depth may possibly replace the former lenses of clean galena, and inasmuch as the zinc blende must necessarily be separated from the galena when the 10 per cent. zinc limit is reached, the feature of concentration, not alone overcome smelter penalties, but improves the silver-lead product, and adds the zinc blende as a valuable by-product.

I can furthermore assure you that the extra cost of concentration—including a legitimate loss of values in milling—is readily offset by the lesser cost of mining, and expensive hand-sorting in the stopes.

All concentrating ore will hereafter be extracted from wall to wall, regardless of high or low values, and no material that pays to concentrate will be permitted to remain in the mine or go to the dumps. Hand-sorting of clean ore will not be done in the mine as heretofore, but in broad daylight at the concentrator, before entering the mill. This constitutes a part of the crusher-man's duties. Prior to sorting, all fine material is screened out through a special trommel while large pieces of ore and waste are sorted out by the crusher-tender, thereby accomplishing a material saving. I am quite convinced that the ensuing year, by the above method of mining and concentrating, together with the introduction of additional machine drills will show a material reduction of all operating expenses.

In presenting my report for the fiscal year 1902-3, I desire to state that it has been my earnest effort to submit an unbiased and thorough representation of existing conditions.

On behalf of the B. C. management I beg to tender my respects to the President and Board of Directors for their ardent support, which under local difficulties always proved a source of rare gratification.

I also wish to extend my thanks to Mr. Sam F. Parrish, E.M., for his professional visits to the mine, and coinciding expressions, as well as my appreciation of the able assistance rendered by Mr. George F. Ransom, accountant; Mr. Joseph J. Streit, mine foreman, and Mr. B. P. Little, mill foreman.

## LE ROI NO. 2.

The report of this company, whose property adjoins the well-known Le Roi mine, in the Rossland District of British Columbia, covers the year ending September 30, 1902. The accounts, as stated in sterling from the London office, show receipts from ore £117,188; interest, etc., £706; total, £117,894. Expenses at the mine were £64,347; London office, £3,086; miscellaneous, £5,434; total £72,907, leaving a net balance of £44,987.

Exploration work included 2,904 feet, of which 180 feet were shaft sinking. The total cost of this work was \$80,878. The ore taken out was 63,262 dry tons, the metal contents being as follows:

	Quantity.	Value.	Per ton.
Gold, ozs. . . . .	32,435	\$648,698	\$10 25
Silver, ozs. . . . .	82,548	44,563	0 70
Copper, lb. . . . .	3,001,027	375,955	5 94
Total. . . . .		\$1,068,916	\$16.89

The average costs per ton of mining and working are given as follows:

Mining labour . . . . .	\$2.020
Supplies, power, tramming, etc. . . . .	1.195
Depreciation of buildings and equipment . . . . .	0.956
Reserve, accidents, etc. . . . .	0.363
General expenses. . . . .	0.487
Total cost of mining. . . . .	\$5.021
Direct smelting charge . . . . .	\$6.000
Indirect charges . . . . .	1.870
Total cost of smelting . . . . .	\$7.870
Total cost per ton of realization . . . . .	\$12.891

The Directors' report says: "The heavy fall in the price of copper and silver during the last nine months of the financial year decreased by \$121,182 what would otherwise have been the net earnings of the company had the price of the previous year been maintained.

"The smelting charges to which the company was bound for two years by an agreement made by Mr. MacDonald with the Northport smelter, on August 16, 1901, amounted approximately to \$8 per ton. The Directors took counsel's opinion as to the possibility of nullifying this agreement on the ground that it was signed by Mr. MacDonald for both sides, under a very limited power of attorney, but were advised that there were small chances of success.

"The largest profit was shown in the month of April, after which there was a steady decrease in the value of output and a corresponding decrease in profit. On September 21 the manager cabled recommending the reduction of the output to 3,500 tons per month, which, in view of the smelting position, the board thoroughly approved of, expressing at the same time a hope that the grade of ore would be correspondingly increased. During the months of September and October it would appear that the mine was actually being worked at a loss. As soon as the board ascertained this, they prohibited the output of any ore under \$17, as it was evident that the mine was simply being denuded of ore, which, it is believed, under improved methods of treatment, can be made to yield a material profit. According to Mr. MacDonald's statement of high-grade ore in sight, dated June 21, and circulated among the shareholders, there should have been no difficulty in continuing the output of \$17 ore. On October 28 the manager recommended the cessation of shipments till better rates for treatment could be secured, to which the Directors assented. At the expiry of the agreement with Messrs. MacDonald and Thompson, the board handed over the management of the mine to Mr. Alexander Hill, who himself installed his representative, Mr. Couldrey, in office. In taking this step the board feel that they have placed the mine under the most capable control procurable, and have also insured that information received by the board will be in accordance with fact. The new manager will not at present commit himself to any figures as to tonnage and values in sight in the mine, as it is impossible to estimate these with any degree of certainty where ore bodies are so irregular. There is, however, beyond question a very large body of low-grade ore which it is anticipated can be profitably worked by concentration, and, interspersed with it, an appreciable quantity of high-grade ore. It will no doubt be found best to ship ore above a certain grade direct to the smelter, even when the concentration plant is in operation.

"In connection with concentration a number of experiments have been recently made in London as to the suitability of the Elmore oil process to Le Roi No. 2 low-grade ores, and the result has been such as to warrant the Directors in giving instructions for the erection of an experimental plant of two units, capable of dealing with 50 tons a day, in the neighbourhood of the mine. Should this prove successful the intention is to increase the plant to such a capacity as can deal with the entire output of the mine. The effect of the process, roughly speaking, is to concentrate the mineral contents of ores which are of too low a grade to show a profit on smelting charges. Thus on six tons of crude ore producing, say, one ton of concentrates, the smelting charge (according to the present rates) would be \$8 instead of \$48. There is no doubt, however, that better terms than the present can be made for the smelting of concentrates, as these are a desirable acquisition to any smelter. By the new process, too, the cost of mining will be considerably reduced, as the necessity for hand-picking and sorting will no longer exist, all ore going through just as it comes out of the mine.

"A certain amount of high-grade ore is at present being shipped to the Northport smelter, but till, by the new arrangement, the straightforward stoping of all ore (high and low-grade) becomes practicable, much of the high-grade ore in the mine would be too expensive to handle."

## LONDON &amp; B. C. GOLDFIELDS.

The report of the London & British Columbia Goldfields,

Limited, for the year 1902 states that the very serious fall in the price of lead and silver has had a disastrous effect on the company's large share holding in the Whitewater, Ruth, and Enterprise companies, and the assessment on the shares of the Ymir Company through its reconstruction involved a heavy liability to preserve this interest. The effect of this, and the delay in completing the Kettle River Power Company's works, makes it now necessary to provide additional capital to satisfy immediate liabilities, and to enable the directors to preserve the company's valuable assets. After most careful consideration it has been decided to recommend that the company be reconstructed with a liability of 4s. per share, the payment of which will be spread over as long a period as possible. The directors having subscribed largely to the last issue of shares are themselves very large shareholders, and as such regret the necessity for the scheme now proposed, but they are prepared to provide their proportion of the assessment.

#### COMPANY NOTES AND CABLES.

**GRANBY CON.**—The Granby Consolidated Mining, Smelting & Power Company has issued a condensed balance sheet, dated January 31st, 1903, as follows:

ASSETS.	
338 acres mineral claims . . . . .	\$12,674,506
Plant and equipment . . . . .	914,488
Real estate and lands . . . . .	123,447
Accounts and bills receivable . . . . .	24,126
Ores on hand at cost . . . . .	731,723
Inventory supplies . . . . .	114,347
Miscellaneous . . . . .	4,909
Total . . . . .	\$14,587,549
LIABILITIES.	
Capital stock . . . . .	\$13,363,030
Accounts and bills payable . . . . .	660,584
Surplus . . . . .	563,934
Total . . . . .	\$14,587,549

The company has 1,500,000 shares, \$10 par value, of which 1,300,000 are outstanding. Ore reserves are estimated by an official of the company in excess of 20,000,000 tons. The average of the ore is 1.76 per cent. copper and \$2 to \$2.25 gold and silver.

**SULLIVAN.**—This company has now authorized the issued of bonds to the value of \$250,000, to provide for the completion of Marysville Smelting Works and for the liquidation of outstanding liabilities. It is stated that an expenditure of \$60,000 is required to complete the construction and equipment of the smelter which, it is expected, will be in operation in the autumn.

**LE ROI No. 2.**—The following report for the month ending March 31st has been issued:

"Output—Shipments for the month:—2,506 dry tons; value per ton, less smelting charges, \$14.69; total value, less smelting charges, \$36,841; less copper adjustment, \$29; total, \$36,812, from which mining charges have to be deducted."

**ROSSLAND-KOOTENAY.**—The following circular, dated April 27, has been sent to the shareholders:—

In December last the chairman visited British Columbia, and thoroughly investigated the affairs of the company at Rossland. Before returning, he appointed Mr. Wm. Thompson, formerly superintendent of the mines, as general manager for the company in British Columbia, in succession of Mr. Bernard MacDonald, resigned.

In February Mr. Thompson came to London and discussed the future policy of the company with the board. The general manager is now actively engaged in carrying out the work of development decided upon by the board after consultation with Mr. Bedford MacNeill, who has been appointed consulting engineer in London to the company.

In a recent communication, Mr. Thompson advises that the first trial shipment of ore in bulk, from the upper levels of the Kootenay mine to the Trail smelter, has proved satisfactory, the value of the ore averaging over \$8 per ton. Ore is now

being broken down in several of the upper levels, and as soon as the snow has disappeared and the condition of the roads will permit it (probably in May), bulk shipments will be made to the smelter from each level. Should the values equal those of the first shipment, the Directors expect to be in a position to make contracts with the smelter on terms which will leave a fair margin of profit on every ton shipped.

For the present the board have deemed it prudent to suspend operations at the Nickel Plate mine, and concentrate the attention of the staff in Rossland on the Kootenay mine. So soon as the Kootenay has become productive, which should be during the autumn, it is intended that operations will be resumed at the Nickel Plate, and also that the Great Western mine will be unwatered and prospected.

The results of the shipments from the third, fourth and fifth levels of the Kootenay mine should be learned in July, and the Directors will lose no time in communicating these to the shareholders.

The Directors have received an exhaustive report from Mr. Thompson on the Pohle-Croasdale process for the treatment of low grade ores, regarding which a proposal had been submitted to the company by the Metals Volatilization Company of Denver, U.S.A., but in view of the heavy initial expenditure involved and the difficulty of ascertaining the actual cost of treatment on a large scale, the Directors have decided not to adopt the process for the reduction of the company's ores.

**ATHABASCA-VEINS.**—Important discoveries of ore are said to have been made on the Athabasca-Veins group at Nelson. The manager states that the strike was made at the end of No. 1 tunnel which was being driven in along the lead. About three hundred feet from the surface a new vein of very rich ore was struck. It was not thought at first that this would prove of any size, hence his hesitancy about mentioning it, but subsequent development tends to prove that the vein is continuous. None of the ore from this new vein has been shipped to the mill, but trial assays made have shown that it is very rich.

**VELVET ROSSLAND MINE.**—The manager cables: "South drift of level No. 2 have drifted 50 feet; the ore is 5 feet thick entire distance. Drift is looking exceedingly well. Will be able to ship 20 tons of ore daily, if able to obtain teams; 350 tons are now ready for shipment. South drift of level No. 3, the ore is coming in. Mine promises exceedingly well for the future."

**BOSTON.**—Telegram from the manager reports:—"Twenty tons galena and 80 tons zinc shipped during April."

**LE ROI.**—Cabled returns for April: "Shipped from the mine to the smelter during the past month 12,026 tons, containing 4,487 ozs. gold, 6,280 ozs. silver, 305,100 lbs. copper. Cannot form any reliable estimate as to profits. Cost per ton for treatment cannot be determined at present."

Manager's report of the Le Roi Mining Company, Ltd., for March:—"The ore shipped during the month amounted to 17,008 dry tons, containing 5,417 ozs. gold, 10,511 ozs. silver, 480,319 lbs. copper. Average value per ton, \$10.91. The cost of breaking and delivering the ore on the railroad cars was \$2.42 per ton, while the cost of development was equal to 58c. per ton."

"Mining.—The stopes produced the usual quantity and grade of ore during the month. About the middle of March a small 'streak' of ore was met with in the east drift south cross-cut No. 2, on the 500-foot level. It was about to inches wide, and samples from it assayed \$18. It is possible that the streak will widen to some extent. About 100 tons of ore was taken from the body on the 1,050 level which formed the subject of a cable towards the end of the month, and averaged over \$18 per ton. A drift has been commenced on the 800 intermediate level for the purpose of ascertaining if the ore shoot known as the 'Miller' continued to this depth. At the end of the month the shoot had not been encountered. Cross-cutting was started on the 900-foot level in an endeavour to locate the 'Black Bear' ore shoot. Although ground has been passed through which is well mineralized, nothing of value has been met with. It is expected that the Black Bear shoot will be reached about the 1st of May. For the present, the ordinary development work on the 1,350 level has been stopped, and the diamond

drill only has been used. This cut through a body of ore five feet wide, which assayed \$6.76 per ton. The fact that the ground is mineralized at depth is an encouraging circumstance, leads to the belief that 'pay ore' may eventually be met with on this level. The expenditure for the month on mine account was \$50,941.

"Northport Smelter.—The expenditure for the month was \$86,473. The public ores purchased during the month amounted to 3,226 dry tons, containing 2,059 ozs. of gold, 4,952 ozs. of silver, 209,840 lbs. copper. The tonnage treated during the month was 3,471, segregated as follows: Roasted ores, 2,152,500; public raw ores, 1,318,385. Smelting operations were not resumed until 23rd March, as until that date sufficient coke was not on hand to justify doing so. It is possible, now that the strike at the Crow's Nest collieries has been settled, that three furnaces can be kept in continuous operation, and this number can be added to immediately the new coke ovens are completed at Morrissey. The Crow's Nest Coal Company has taken advantage of the monopoly of production which it enjoys, to impose 50 cents additional per ton on the Michel coke, and 25 cents per ton additional upon the Fernie product. It is doing this on the pretext that the arrangement it has just made with its employees involves an increased cost of production. Smelting costs will be directly affected by this decision. The coal company is unable, by virtue of its agreement with the Provincial Government, to increase the price of its coal to British Columbia consumers, but no limitations have been placed upon it so far as the price of coke is concerned. The smelting costs for March, if based upon the *pro rata* of expenses for the nine days during which the furnaces were in operation, would amount to \$4.32 per ton. If the entire expenses of the month are embraced in the reckoning, the costs were, approximately, \$7.20 for each ton of ore treated. A new steam locomotive is being used for transporting the ore from the roast heaps to the furnace bins. It is doing very effective work. As to March profits, these cannot be properly estimated, for the reason that smelting operations do not keep pace with production at the mine. It is probable, however, that the enforced 'shut down' at the smelter during February and March will have served to wipe out the bulk of the profits, which would otherwise have accrued during the months in question."

GOLD FINCH (Camborne).—The Camborne *Miner* reports an extraordinary rich find of ore on the Gold Finch, the property of the Northwestern Development Syndicate on Mennick Creek in the Lardeau. The mine foreman states that: "He has 100 pounds of this rich stuff now in sight, the estimated value of which is close to \$7,000."

ARLINGTON (Slocan)—A splendid body of sulphide ore, one foot in width, was tapped in a A tunnel, about 2,600 feet from the mouth of the drift and at 370 feet depth. It was cut on May 1, just at the time when Messrs. Williamson, of San Francisco, and Burns, of Portland, were visiting the property, so coming at a most opportune time. Though smaller zones have been encountered in A, this strike is the first permanent shoot cut, and it proves beyond question that the immensely rich and important bodies of ore opened up in B tunnel are carrying well with depth.

TYEE.—The Secretary lately sent to London the following circular: "Smelter—A cable received to-day gives results of thirty days' smelting during the month of April, as follows: Ore smelted, 4,550 tons; matte produced, 418 tons; gross value of contents (copper, silver and gold), less costs of refining, \$60,313. (March, twenty-five days' smelting, \$52,336.) Mine—The following figures are taken from the Mine Superintendent's monthly reports of work done from September last to end of March, inclusive: Main shaft, 35 feet; No. 4 shaft, 21 feet; cross-cut south from No. 4 shaft, 45 feet, widening cross-cut north No. 1 (100-foot level), 25 feet; east drift No. 1 (100-foot level), 30 feet; cross-cut north No. 5 (100-foot level), 59 feet; upraise No. 3 (100-foot level), 60 feet; upraise No. 4 (100-foot level), 12 feet; east drift No. 1 (165-foot level), 60 feet; upraise No. 2 (165-foot level), 40 feet; north and south stations (400-foot level), 85 feet; cross-cut north, No. 1 (400-foot level), 85 feet; cross-cut south No. 1 (400-foot level), 42 feet—1,054 feet. Tons of ore shipped from stopes Nos. 1 and 2 (100-foot level),

stope No. 3 (165-foot level), stope No. 4 (100-foot level), and dump, equal to 17,499 tons. Water—A pumping station to be placed at Chemainus River on Muriel claim will supply sufficient water for all purposes. Aerial tramway—This continues to run with satisfaction, transporting during March 127 tons average per day. New ore bodies—The general manager reports a new ore body struck in north cross-cut No. 5 (100-foot level), which has a width of 20 feet of solid ore where struck, and assaying copper 4.93 per cent, silver 3.9 ozs. and gold 0.13 oz. Another ore body has also been struck near the end of the east drift (100-foot level), but is not yet sufficiently developed to give size or assays."

YMER.—Returns for March:—"Battery—Number of tons crushed, 4,550; 60 heads of stamps running 20 days yielded 1,235 ozs. bullion; gross estimated value, \$13,900 (£2,866). Have shipped 218 tons of concentrates, gross estimated value, \$5,750 (£1,185). Cyanide—3,050 tons tailings treated; gross estimated value, \$2,750 (£567). Total working expenses, \$18,685 (£3,852). Expenditure on capital account, including development, \$3,200 (£650). Sundry receipts, \$945 (£194). Net profit, \$1,460 (£301). (Office note.—The manager advises that a further considerable reduction will be made in the total cost per ton by the use of water power, commencing this month.)

A recent cablegram to London from the manager at the mine says: "Level No. 10—Have discontinued drive owing to a breakdown in the air compressor. Level No. 6—The east drift has been advanced 27 feet; assays average \$11 per ton gold and silver in width eight feet."

BOSUN.—A telegram to London from the manager reports: "Twenty tons galena and 80 tons zinc shipped during April."

#### RECENT PUBLICATIONS.

REPORTS of mining cases. Decided by the Courts of British Columbia and the Courts of Appeal therefrom to the 1st of October, 1902; with an Appendix of Mining Statistics, from 1853 to 1902; and a Glossary of Mining Terms, by the Honourable Mr. Justice Martin: The Carswell Company, Limited, Toronto: 1903.

We desire to express our appreciation of this very important and valuable work, and to extend to the learned author very hearty and respectful congratulations. The mere labour of compiling a work of such magnitude, comprising as it does upwards of nine hundred pages must have been necessarily enormous, but the work is much more than a compilation, for it gives evidence throughout of the author's eminent legal knowledge and scholarly attainments. After a preface, briefly outlining the history of the mining industry in British Columbia, Mr. Justice Martin refers to the fact that a short treatise on the Mining Laws was published so long ago as 1864 by Mr. Joseph Park, a barrister-at-law. In 1897, the author of the present volume, compiled for the "Directory of Mines," published by the *MINING RECORD*, an "Annotated Synopsis of the Mining Law"—"the first attempt to collect and classify all the legal decisions on the Mineral Act to then as far as known." The volume before us, meanwhile, is the beginning of a series and contains all the mining cases of permanent interest, with notes by the author decided by the Courts of the Province from 1867 to February, 1903. There is in addition much useful special information and data, contained in the appendix, such, for example, as a table of proclamations, regulations, etc., relating to mining, the Mining Statistics from 1853 to 1902, and an exceedingly full and concise glossary of mining terms mainly in use in British Columbia. The volume is dedicated to the memory of Richard Martin, Esq., M.P., of Ballinahinch Castle, Galway, Ireland, author of the "Act to Prevent the Cruel and Improper Treatment of Cattle." Before concluding this brief notice it is proper that reference should be made to typographical excellencies, for which the publishers are deserving of the greatest possible credit. The volume is approximately bound in flexible leather, and, in short, the production is most tasteful.

The Copper Handbook.—A Manual of the Copper Industry of the World, Vol. III, for the year 1902. Compiled and published by Horace J. Sevens, Houghton, Michigan, 1903. \$5.

The present issue of this manual, the third in point of publication, assumes a much more important appearance than the preceding volumes, and it is evident that much thought and careful work has been brought to bear in its production. The chapters devoted to the history of copper mining, the geology, chemistry and mineralogy of copper have been revised and rewritten, the statistical tables have been added to and rendered more comprehensive, while the list of copper mines and prospects described has been increased to the number of over two thousand. We are also glad to note that the information in respect to British Columbia copper mines is more correctly stated, although with the exception of the first two and the last two mentioned properties, the other mines in this list are owned and operated by other companies or individuals, and the jewel and No. 7 are not copper mines. Again several glaring inaccuracies still appear. Thus it is presented that the Montreal and Boston Copper Co. own the Sunset, Crown Silver, Jewel, Morrison, No. 7, Ruby, King Solomon, C. O. D., and Florence Fraction in the Boundary district, whereas the Giant Mining Company, of Rossland, is described as operating in the Yale and Cariboo district; the Yreka Copper Company, it is stated, has a "new smelter"; the Centre Star mine, Rossland, is described as producing a limited amount of copper as a by-product from silver-lead ores," and so on. We readily understand, however, the difficulties in the way of the total elimination of error in the compilation of information concerning so vast a territory; but so far as British Columbia is concerned at least, there is little excuse for mistakes in making reference to the more important mines, as official reports in such cases are readily obtainable.

Contributions to Economic Geology, 1902, by S. F. Emmans and C. W. Hayes, geologists in charge; United States Geological Survey, Washington, 1903.

This is one of the many admirable bulletins issued at regular intervals by the United States Geological Survey. The report contains sixty-one contributions from thirty-three members of the staff who have been engaged during the year in economic work. There is also a brief statement by geologists in charge of the section of metalliferous ores and the section of non-metalliferous economic minerals, of the extent and character of the economic work being carried on in the survey. The department, recognizing the need of prompt publication of intelligence obtained in the field, has issued this bulletin in advance of the regular and more comprehensive reports of the survey, the matter included being such only as have a direct economic bearing, all questions of purely scientific interest being excluded.

#### MACHINERY NOTES.

##### AERIAL TRAMWAYS IN THE LARDEAU.

**M**R. B. C. RIBLET, the well-known mechanical engineer of Nelson, is now installing aerial tramways at the Silver Cup and at one of the Poole mines in the Lardeau. The former, which is three miles long, is being constructed to connect the mine workings with the new concentrator. It is also stated that a tramway is shortly to be installed at the Nettie L. mine.

##### ZINC ORE CONCENTRATION IN THE SLOCAN.

It is reported that a plant for the concentration, roasting and magnetization of the ores containing large zinc percentages is shortly to be set up at the Slocan Star mine near Sandon. It is proposed to obtain power from Sandon Creek, and application has been already made for the right to do so.

##### NEW MACHINERY AT THE NANAIMO COLLIERIES.

A considerable installation of machinery and other improvements is to be shortly made by the Western Fuel Company, of Nanaimo, in connection with the operation of No. 1 shaft. Four Wilcox-Babcock boilers of 500-h.p. are now *in situ* and a new washer, elevators, etc., have been ordered. When the new washer is put in the screenings will be drawn out by a conveyor and dropped into a pocket, technically known as a boot-leg, from which they will be hoisted by elevators and deposited in a bunker, nut coal in one division and the finer screenings in another. A spiral conveyor takes the screenings from the bottom of the bunker and deposits them in the washer, the

cone already referred to, and which is inverted and in which arms revolve keeping the mass in motion. A powerful stream of water is forced up through the cone carrying with it all the coal and allowing all the rock to accumulate at the bottom of a chamber furnished with valves at top and bottom. When this is full the valve above is closed and that below opened allowing the rock to drop into a car which will convey it to the rock dump. The coal finds its way out at the top of the cone on to a perforated screen which allows the smaller coal and water to fall through to another screen through which nothing but the water and the sludge can escape. This latter is deposited in a receptacle and some time in the future may be conveyed to a briquette works. At present it is the by-product for which no use has been found. The nut coal and pea coal on the screens pass into conveyors and by the action of a butterfly valve are either carried on to dumps situated near the water or deposited directly in cars. The capacity of the washer is 400 tons in ten hours. When the day men quit work it is possible by a simple contrivance to stop that part of the machinery which carries the coal to the washer and operates that apparatus while allowing the filling of the bunker with screenings to go on.

##### THE DEMAND FOR MINE MACHINERY AT ROSSLAND.

The Rossland *Miner* remarks that the recent increased demand for mining machinery on the part of mining companies operating in that district is a significant indication of the important developments now taking place in the direction of deep-level mining. Meanwhile the White Bear Company is securing quotations on a twenty-drill compressor and a 125-h.p. hoist; the Spitzee Company has just ordered a five-drill compressor, and contemplates also the immediate installation of powerful hoisting machinery; the Green Mountain-St. Louis Consolidated intend installing at once an additional boiler and a hoist suitable for operating to a depth of a thousand feet; and two concentrators, one for the Le Roi No. 2, and the other for the White Bear, will shortly be set up. The Jumbo is also arranging for the installation of a tramway.

##### THE YREKA COMPANY'S NEW TRAMWAY.

The Yreka Copper Company is installing an aerial tramway over a distance of five and a-half miles from the June group of claims to salt water, on Quatsino Sound.

##### THE EVA STAMP MILL.

Preliminary work is now well under way for the installation of a stamp mill and other machinery at the Eva mine. The company has the right to 700 miner's inches of water from Poole Creek. A flume 4,000 feet long will convey water along the bank of the creek to a point having an elevation of 400 feet above the millsite; thence it will be brought in steel pipe to the mill. The tramway will be 4,200 feet in length and have a carrying capacity of 100 tons of ore per day. The contract demands the completion of the tramway by July 31st.

##### ELECTRICAL POWER AT THE SPITZEE.

The new compressor and winding plant to be installed by the Spitzee company at the headworks now almost completed will be operated by electricity. The company will consume about fifty electrical horse-power for its compressor and about thirty for the hoist. The foundations for the machinery are now being laid.

##### INSTALLATIONS AT MORRISSEY.

The following equipment has been ordered for the Morrissey coal mines: A tail rope haulage engine to be installed at the head of incline, above tippie, for hauling empty and loaded cars. New track scales to be placed at the head of incline for weighing cars of coal as they come out from the mine to determine the number of tons on which miners are to be paid. The old scale in tippie will not be used after the new one is installed. Two hundred additional mine cars. Part of this order has already been shipped from Toronto. A large exhaust fan, 18 feet in diameter, for the ventilation of No. 2 and No. 3 tunnels. The engine to run this big fan is already on the ground.

##### THE GRANBY COMPRESSOR.

The installation of the two 30-drill compressors and two 700-h.p. motors at the Granby mines is now complete and the

air pipe lines are being laid from the new building to the different workings. One ten-inch pipe has been laid to the Aetna shaft, a distance of some 1,000 feet, from which the main workings of the Old Ironsides and Victoria mines will be supplied with compressed air. Pipes are also being laid to the Knob Hill, so that air can be had both above and below ground at that property.

ELECTRIC PLANT AT HEDLEY.

Mr. Rogers, the manager of the Nickel Plate mine at Camp Hedley, has effected arrangements for the installation of an electric plant for lighting the town of Hedley, the concentrating mill and the underground workings. The cost of this plant is said to be \$100,000.

THE METAL MARKET.

**N**EW YORK metal market conditions at the end of May are thus summed up by the *Engineering and Mining Journal*:

"The metal markets generally have been rather quiet. While business has not been heavy for early deliveries, consumption continues large in all directions, and there are signs of greater activity in the near future.

"Transactions in copper have not been heavy, but consumers are showing more interest in the market and it is beyond question that they will be soon looking for supplies. At any rate, metal is not being pressed for sale, producers generally holding back in the expectation that higher prices will prevail. Most producers are sold up to July at least, and, as we have recently shown, there are no considerable stocks available. In the meantime, the market is practically made by sales of moderate quantities which are needed for immediate consumption. It should be, of course, understood that the market is necessarily made, not by what producers ask for futures, but by the prices actually paid on such sales as make up the daily business.

"Tin has been less active and somewhat weaker. The large spot stocks which have been pressed on the market are being gradually worked off, and buyers have shown some disposition to speculate a little for the future.

"Lead continues quiet and unchanged, with the usual large consumption. The prices of this material are now so regulated that consumers have no special motive in buying ahead of their requirements, and there is nothing beyond the regular daily business.

"Spelter continues strong with but little change in prices. Consumption is on a very good basis, and producers have no stocks ahead. Zinc ore continues high. Prices this week range from \$35 to \$37 per ton of 60 per cent. ore. Some extra quality ore in the Joplin market sold at \$40 per ton. Production is somewhat lighter than last year.

"Silver continues to show a fairly high range of values under the influence of coinage purchases here and abroad. Demand for the East continues rather light. The discussion of the proposed changes in the monetary system of Mexico continues, and it is the general belief that the country will in time adopt the gold standard, but progress in that direction is necessarily slow."

The latest quotations are: Lake copper, 14½ to 14¾; electrolytic in cakes, wirebars and ingots, 14¾ to 14½; cathodes, 14¾ to 14¼; casting copper, 14.

Lead, 4.17½ to 4.27½, St. Louis; 4.30 to 4.35, New York.

Silver, 54¾ to 54¾.

Spelter, 5.50, St. Louis; 5.65, New York.

COAL EXPORTATIONS AND TRADE.

**T**HE production of the Crow's Nest Pass Coal Company was divided as follows:—

	Tons.
Morrissey . . . . .	12,000
Coal Creek . . . . .	16,000
Michel . . . . .	20,037
<b>Total . . . . .</b>	<b>48,037</b>

This monthly output has been exceeded only once in the history of the company, the highest record being in January, 1903, when 54,600 tons were mined.

The *Fernie Free Press* gives the following account of recent improvements at the Morrissey mine:—

At Morrissey mines extensive improvements are in progress. A large steam double compound air compressor is being installed which will supply motive power to all the mines for drilling and hoist purposes, where it is unsafe to use other power. The air is conveyed to each of the mines in six-inch pipes at a pressure of 100 lbs. to the inch. The engine is a very powerful one with a capacity of 17,000 cubic feet per minute and it weighs 37,000 pounds.

No. 2 tunnel is being rapidly developed and made ready for a double track. It is estimated that the remaining 240 feet of development will be completed by August 1st, when the mine will be in a position to ship coal.

A large double endless rope haulage rope engine is being put in to operate the switching in the yards above the incline at Morrissey mines. The yards here are 800 feet long and contain four tracks. The yard work was formerly done by the locomotive, and the new system will relieve the latter of such work as feeding the coal bins and taking away the empty cars.

A 50,000 gallon tank is being built above the mines as a reserve for boilers or any other urgent necessity in case the regular pipe system should for any reason refuse to work. Important improvements are also contemplated in the water system. The present six-inch main pipes will be replaced by ten-inch or probably with twelve-inch pipes and the present pipes will be used for distributing purposes. The system will be extended to the new town of Morrissey mines at an early date.

A large fan similar to that recently put in at No. 4 has just been installed at No. 1 mine and another will shortly be put in at Nos. 2 and 3 mines. These fans are very large and have a tremendous capacity.

The coke ovens at Morrissey are now under way and they are contracted to be finished by October 1st. Many will be ready for use before that date.

Under the steady improvements going on at Morrissey Mines it is expected that the daily output will reach 1,000 tons by the middle of the month.

On the Coast, a fairly satisfactory output continues to be made from the Nanaimo collieries. But at Extension operations are still suspended and at Cumberland the situation is also unsatisfactory, the work at the mines there being carried on to a limited extent by the employment of chiefly Oriental labour. Meanwhile, fuel is being brought in for the local market from Washington, the C. P. R. Pacific liners are coaling in Japan, and exportations to the San Francisco market have practically ceased.

We extract the following information from the *Fernie Free Press*:—

"The work at the coke ovens at Fernie is now progressing more steadily. The Slav oven-workers who quit the work some time ago have to a large extent been replaced by 80 Chinamen who arrived on Monday morning from Vancouver. The company had for a time taken a body of Italians from important development work to keep the ovens working, until regular men could be supplied. The union had been asked to supply men and it had been powerless to meet the demand, and the only way left to the company was the method adopted. These Chinamen are experienced coke-oven workers. The output of coke is steadily increasing and more ovens are being started at frequent intervals. Many of the Slavs who quit the coke ovens are working on the construction at Frank where high wages are being paid.

"At Morrissey the new compressor was put in operation on Wednesday. This huge engine now supplies all the motive power in the mines for drilling and hoist purposes. The air is conveyed into the mines in five-inch pipes at a pressure of 100 inches to the foot. It is giving splendid satisfaction."

## Industrial Supplement.

### LOCAL INDUSTRIES.

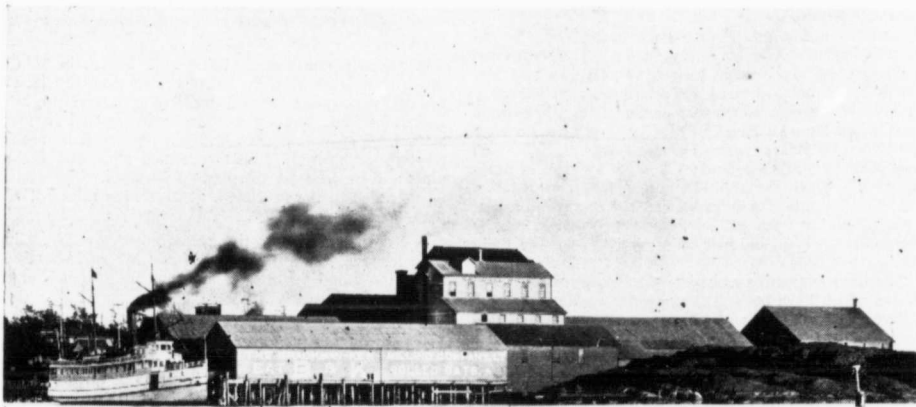
THE BRACKMAN-KER MILLING CO., LTD.

OF Victoria's industries, none are better nor more favourably known than that of the Brackman-Ker Milling Co., Ltd., whose establishments extend from one end of the Province to the other, and even into the territory beyond, for east of the Rockies are also to be found branches of this concern. Nor is it only by their mills and elevators that this concern are known, for the "B. & K." cereal products are a household word all over the West.

the principal of which are the mills and elevators at Strathcona, Alta., while at all principal points along the line of the Calgary & Edmonton Railway are located warehouses and elevators for the handling and storage of grain pending its shipment to the seaboard and interior points.

The mill at Strathcona is of brick construction three stories high with basement, equipped with the latest improved machinery suitable for turning out the very best quality of cereal foods. The mill was erected in 1895 and has met with a steadily increasing trade and supplies the whole of the Northwest, as well as the Kootenay country and as far west as Ashcroft with the well-known brands of this firm.

The works of the Brackman-Ker Milling Co., Ltd., at the outer wharf, Victoria, cover a very large area besides which are the extensive docks and warehouses used in the loading and unloading of the freighters which are always going and coming with grain, hay, etc., from the Fraser River and other farming sections of the Lower Mainland and Island. The mill itself is substantially built on a stone foundation and is practically six stories high—four stories proper and a base-



Brackman & Kerr Mills at Victoria.

The business of the Brackman-Ker Company was established at Saanich by Henry Brackman, the president of the company, in the year 1878. At this place the milling was carried on for five years or more until Mr. D. R. Ker, the vice-president, joined the concern, and after a few years, the plant was materially enlarged and moved to its present site at the outer wharf, where it has continued to grow until it has now reached the very extensive proportions shown in the illustrations herewith produced. Besides the increase which took place in the mills at Victoria, branches in the meantime had been organized at New Westminster and Vancouver, and later at Nelson and Rossland.

In 1891 the Company was incorporated as the Brackman-Ker Milling Company Limited, having a capital of \$500,000. Although a close corporation, among the shareholders are some who give the concern the benefit of almost unlimited capital wherewith to finance large undertakings.

With the growth of the company since its incorporation additional establishments have been provided on the Mainland,

ment and attic. The grinding machinery and every other appliance used is the most modern and in fitting up their mill the company have always made a point that as near absolute perfection as possible must every machine be in order that the resulting output shall be of the highest grade obtainable.

On the dock, which extends out into the deep water of Victoria harbour, are provided two other warehouses, one 250 by 60 feet and a second 150 by 60 feet. Here are stored thousands of tons of grain just landed and others ready for shipment. The storage capacity of the various warehouses is almost 8,000 tons, and it frequently happens that even this generous allowance is found somewhat limited for the quantities of grain, etc., which sometimes accumulate.

The officers of the company are Henry Brackman, president; D. R. Ker, vice-president and general manager; Chas. W. Rhodes, secretary-treasurer; T. A. Ker, mill manager; W. H. Ker, manager Vancouver branch; W. J. Mathers, manager New Westminster branch; Frank Gibbs, manager Nelson

branch; F. Fortin, manager Rossland branch; and T. W. Lines, Strathcona, manager of all the establishments in Alberta.

Agriculture . . . . .	29,163,033	33,351,960
Manufacture . . . . .	14,579,236	16,341,961
Miscellaneous . . . . .	29,872	77,653

Total . . . . . \$158,100,071 \$171,857,918

INCREASE IN CANADIAN TRADE.

THE returns of the Customs Department for the ten months ending April shows an increase in the aggregate trade of Canada of nearly \$32,000,000. There was an increase in the imports of over \$18,000,000, and in the exports of about \$14,000,000.

The year's trade will go over the \$400,000,000 mark, or about twice what it was in 1895. In 1873 the trade of Canada was \$217,000,000, and twenty years later it was \$218,000,000, or

The exports of foreign products totalled \$8,806,140 in ten months of this year, as against \$11,205,602 last year. During April alone this year the imports were \$21,110,545, as against \$17,104,523 last year and the duty collected \$3,224,707 as against \$2,670,661 last year. The exports of Canadian products were \$9,437,175 as against \$13,043,198 in April, 1902, and of foreign products \$304,272 as against \$276,255. The falling off of exports during



One of Brackman & Ker's Elevators in the N. W. T.



Brackman & Ker's Warehouse, Vancouver.

an increase of \$1,000,000; in the eight years since, Canada's trade has about doubled. The details of the trade for the past ten months are as follows:

Imports—	1902.	1903.
Dutiable . . . . .	\$ 95,373,439	\$109,030,545
Free . . . . .	62,406,900	66,954,103
Total . . . . .	\$152,779,309	\$175,984,648

Coin and bullion . . . . .	\$ 4,728,839	\$ 4,234,331
Duty collected . . . . .	26,245,191	29,783,082
Minerals . . . . .	27,775,527	25,715,330
Fish . . . . .	12,076,766	9,343,697
Forest produce . . . . .	24,515,865	28,372,173
Animals and their products . . . . .	50,049,772	58,665,144

April was principally in wheat, but during the ten months the exports of wheat increased by over \$3,000,000, compared with the same period last year. The following figures show the increases for the ten months of this year over last in the ports of the principal products:

Flour, \$412,782; cattle, \$1,008,000; butter, \$1,564,284; cheese, \$2,566,688; bacon, \$3,272,359.

CEMENT IN BRITISH COLUMBIA.

IN a letter to the *Canadian Manufacturer* a correspondent puts forward the suggestion that the opportunities for the establishment of cement works in British Columbia at the present time are most favourable, the market for the commod-

ity being satisfactory and capable of expansion, while, he adds, there is an abundance of raw material to be found in the southern interior. Thus, the writer states, he has discovered in the Meola Basin several important roads of limestones, large deposits of Fuller's earth and other clays, abundance of marl, diatomaceous earth, large deposits, of hematite, and with the coal measures known to exist in the valley, the wonder is, he remarks, why these resources are not developed instead of lying idle and practically unlocated, with only about 100 families in the centre valley.

#### THE LUMBERING INDUSTRY.

THE special correspondent of the *Winnipeg Commercial* states that since the first of the year there have been some 400 licenses applied for. At this rate it has been estimated that all the timber west of the Cascades would be taken up in about twenty years' time, as there are now but 4,500 square miles of timber on Vancouver Island not taken up, and some 16,000 acres on the west coast of British Columbia. These figures are said to be official. North of the 52nd parallel no timber has been taken up, except a small amount near Queen Charlotte Sound. Thus it will be in that far north country that British Columbia will look for her base of supplies in the timber line in the distant future. The timber is not so good, but can certainly be utilized.

The Provincial Government is still considering the amendments to the timber laws. It has been ascertained from one of the prominent members of the Loggers' Association that the concessions asked for by the loggers will all be granted with one exception, and that is that the licenses will be doubled in price. In other words the Government will charge \$200 a year instead of \$100 to cut timber off of a square mile of government land. This price, however, is not to be charged according to the present intentions of the Government to those operating east of the Cascades. The mill men east of the Cascades give us an excuse why they should be treated more leniently than coast lumber men—that the timber was not so plentiful as it was west of the Cascades and was smaller in size. The west coast timber men, however, say that they are nearer the overland markets east of the Cascades. In fact, petitions are going into the Government from mill men and loggers protesting against any discrimination being made and requesting, in the case of loggers, that the license be not increased. The Government have definitely agreed to make the special licenses renewable and transferable.

At a meeting of the shingle manufacturers held last month it was decided that owing to better conditions prevailing that it would not be necessary to close the shingle mills of the province to curtail the output. The scarcity of cars is not so serious and the scarcity of labour was not so serious a handicap as formerly, as labourers were coming in daily from the Sound and the Eastern States, attracted to the province by the accounts in the press of the scarcity of labour and high wages.

The Ontario-Slocan Lumber Company, of Slocan City, commenced the manufacture of shingles in May. The company is now planning the erection of big lumber and planing mills.

Some half a million feet of sawlogs were destroyed by fire at Wardner, East Kootenay, on May 14th, the new sawmill, however, fortunately escaping damage.

The Yale-Columbia Lumber Company has commenced the erection of a new sawmill at Cascade with a daily capacity of 40,000 feet. Dry kilns, planer, trimmers, lath and other machines are to be operated.

British capital is being heavily invested in timber at Trout Lake, extensive limits having been acquired and arrangements effected for the immediate erection of a large mill. The Pingston Creek Lumber Company also propose to build a mill in the same locality.

A good deal of excitement was created by an announcement in the official *Gazette* to the effect that nearly all the timber lands on Vancouver Island, not taken up, had been reserved for a concern known as the Island Power Company. It appears, however, that the boundaries of this reserve were

wrongly set out, the mistake originating in the Lands and Works Department.

#### SEALING REGULATIONS.

INSTRUCTIONS have been prepared by the Treasury Department of the United States Government for the commanders of the revenue cutters constituting the patrolling fleet for the coming season which are based on important information received by the department concerning which certain Canadian sealing vessels are alleged to have made with a view to the violation of the terms of the Paris award, both as to time and manner of taking seals. Arrangements are said to have been made to fit out several Canadian schooners with firearms, ostensibly for the purpose of hunting seals in the Japan seas, but in reality with a view to taking skins in the eastern part of Behring Sea before the beginning of the open season.

The use of nets, firearms and explosives in Behring Sea is forbidden by Article VI. of the Paris award, but it is also provided by that article that "this restriction shall not apply to shotguns when such fishing takes place outside of Behring Sea during the season when it may be lawfully carried on."

In view of the information which has reached the department and which has been confirmed by careful investigation, special instructions have been prepared for the commanders of the patrolling revenue cutters, in which emphasis is placed upon certain features of the regulations promulgated in accordance with the Paris award. The provisions to which attention is especially directed embrace the following reference to the Act of December 29, 1897:

"Under the provisions of the foregoing Act of Congress it is unlawful for any citizen of the United States or any vessel thereof to engage in pelagic sealing at any time or in any manner in the waters of the Pacific Ocean north of the thirty-fifth degree of north latitude, in the Behring Sea and the Sea of Okhotsk, and it shall be the duty of vessels of the revenue cutter service of the United States to seize any United States vessel found violating this law, whether during the open or closed season prescribed in the regulations of the Paris Arbitration Tribunal, and to send or bring such vessel, its officers and crew into the most accessible port of the United States for trial."

Because of the reports concerning the plans of certain Canadian sealers attention is especially called to the following notice promulgated by the Secretary of the Treasury and referring to the Paris award:

"The above regulations of the Paris Tribunal of Arbitration are still in force as applicable to British vessels. The close season for pelagic sealing is therein fixed from the first of May to the thirty-first of July, both inclusive, during which period it is unlawful for British vessels to kill, capture or pursue the fur seals on the high seas in the Pacific Ocean north of the thirty-fifth degree of north latitude, or eastward of the one hundred and eighth degree of longitude. Under said regulations British vessels are permitted to engage in pelagic sealing after the thirty-first of July, but in the performance of said sealing they are forbidden to enter a zone within sixty miles around the Pribilof Islands. It shall be the duty of vessels of the revenue cutter service detailed to patrol the waters above described to seize any British vessel found violating the said regulations of the Paris Arbitration Tribunal, and send or bring the vessels so offending, with all persons on board, together with the proofs and declarations of the officer making the seizure, to Unalaska, and deliver her to the senior British naval officer present, or to the most convenient port in British Columbia, and there deliver her to the proper authorities of Great Britain, or to the commanding officer of any British vessel charged with the enforcement of said regulations."

The patrolling fleet for the coming season will consist of three vessels—*Bear*, Captain Wilde; *Manning*, Captain McClellan, and *Thetis*, Captain Healey—that will cruise throughout the season patrol duty only, and three others—the *Perry*, Captain Failing; *Rush*, Captain Fengar, and *McCulloch*, Captain Coleson—which will co-operate from time to time when not employed on other service. Instructions have been issued



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to the fleet to start from the rendezvous at Dutch Harbour May 15 and to go at once to Behring Sea, patrolling the southern waters of the sea until the beginning of the open season, which extends from August 1 to September 15, when special attention will be paid to the sixty-mile zone surrounding the Pribilofs, within which sealing vessels are forbidden to go.—*Fur Trade Review*.

#### THE YALE-KOOTENAY TELEGRAPH COMPANY.

MEETING was held in Greenwood last month, at which were present the original incorporators of the Yale-Kootenay Telegraph Company, Messrs. D. C. Corbin, J. Dean and Duncan Ross, and representatives of the Great Northern Railway, for the purpose of ratifying the sale of this system to the Great Northern Company. The charter was secured from the Dominion Government in 1891, and Mr. Corbin was enabled thereby to extend his telegraph system to all points in the Boundary. He subsequently sold to the Great Northern, the meeting of last month being called to formally ratify the transfer.

#### MONTHLY FREIGHT AND SHIPPING REPORT.

MESSRS. R. P. RITHET & CO., LTD., issue the following report for the month of April:

There has been no movement of interest in the grain freight market during the month, only two fixtures being reported showing a slight improvement. For new crop loading the rate, although fluctuating, has again reached the opening figures, viz., 21s. 3d. Crop prospects are good but the disengaged list is large.

Lumber freights, without business, remain unchanged.

We quote freights as follows:—

*Grain*.—San Francisco to Cork, 12s. 6d. to 14s. 6d. Portland to Cork, 10s. 21s. Tacoma and Seattle to Cork, 20s.

*Lumber*.—British Columbia or Puget Sound to Sydney, 32s. 6d. to 36s. 3d.; Melbourne or Adelaide, 40s.; Port Pirie, 37s. 6d.; Fremantle, 47s. 6d. to 50s.; Shanghai, 37s. 6d. to 40s.; Taku, 45s.; Vladivostock, 40s.; West Coast, S. A., 32s. 6d. to 35s.; South Africa, 52s. 6d. to 56s. 3d.; U. K. or Continent, 50s.; Kaio-Chaw, 40s.

#### CATALOGUES AND CIRCULARS.

##### CANTON MINING STEEL.

THE Canton Steel Company send us a little booklet containing several useful hints to tool dressers on shaping and tempering steel. There is also included a number of letters from well-known British Columbian mine-operators and others testifying to the excellent quality of the Canton steel, which by the way is warranted, the company agreeing to replace defective steel when used for the purpose for which it is specified.

##### LESCHEN & SONS WIRE ROPE.

A Leschen & Sons, Rope Company, issue an attractive catalogue and price list (illustrated), in which special attention is called to the Hercules Wire Rope as being the strongest and toughest rope made. A full list is also given of all appliances used in connection with aerial tramways, as well as illustrations of Leschen Company's Automatic Wire Rope Tramways.

##### THE MICHIGAN COLLEGE OF MINES.

The Legislature of Michigan has passed a bill appropriating \$171,000 for the Michigan College of Mines at Houghton for the biennium beginning July 1st next.

The most important item of this appropriation is that of \$45,000 for the construction of a metallurgical laboratory. The

College intends to erect a substantial building for this purpose and to thoroughly equip it for experimental work and instruction in the different classes of metallurgical processes.

Cyaniding and other wet methods of concentration will be exemplified in the equipment and electra-metallurgy will receive special attention. It is intended to install furnaces of larger capacity than is usual in college laboratories.

The Board of Control of the College is taking steps to create a separate department of Ore Dressing and Metallurgy. The equipment for this department will be housed in the new metallurgical building and in the ore dressing mill now possessed by the College. A man to fill the new chair has not been selected.

Beside the amount for a metallurgical laboratory the bill referred to carries an appropriation of \$9,000 for extending the equipment of the department of Mining Engineering, which now occupies its new building erected last year, \$4,000 for completing the equipment of the chemistry building also erected last year; \$2,000 for providing additional cases for the mineralogical museum; and \$1,000 for increasing the equipment of the department of Mechanical Engineering.

**MINING RETURNS AND STATISTICS.**

**BOUNDARY DISTRICT.**

**S**HIPMENTS to the end of May are:—

	Tons.
Granby .....	140,056
Mother Lode .....	35,592
Snowshoe .....	15,390
B. C. ....	9,985
Emma .....	8,366
Sunset .....	3,921
Providence .....	451
	213,981

**ROSSLAND.**

Rossland's production for the year ending May 30th is divided as follows:—

	Tons.
Le Roi .....	76,195

Centre Star .....	32,902
War Eagle .....	23,349
Le Roi No. 2 .....	11,155
Velvet .....	3,031
Kootenay .....	1,060
Giant .....	300
White Bear .....	220
Homestake .....	80
O. K. ....	20
	148,415

Total .....

Production from the Slocan and Slocan City divisions to the end of May aggregate approximately 6,100 tons.

**ATLIN.**

Hydraulicng has commenced on Birch and McKee Creeks. The winter dumps are yielding excellent returns, over three hundred ounces having been already taken out of one claim on Pine Creek. By the completion of the supply ditch on Gold Run, big returns will be shown up.

Mr. Paul Johnson, until recently manager of the Greenwood smelter, has been retained by the Brown-Alaska Company to superintend the construction of a smelter at Prince of Wales Island.

The Greenwood Board of Trade have communicated with the Department of Marine and Fisheries urging that fish ladders be built below Boundary Falls and at Cascade. It is also asked that Long Lake and other waters be stocked with black bass.

Sixty-three suits for damages have been entered against the Crow's Nest Pass Coal Company, the total sum asked for amounting to nearly \$550,000. The suits arise out of the explosion at the mines last May, and are brought by relatives of persons who were killed on that occasion. Twenty-nine suits have already been brought in connection with this affair, and the latest batch brings the total to ninety-two. The highest amount of damages asked in any individual suit is \$18,000 and the lowest \$3,000.

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