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COAL SUPPLY AND STRIKES.

JUDGING from recent occurrences it would appear that the Crow's Nest Pass coal miners are displaying an ill-advised disposition to go out on strike upon the very slightest provocation, the strike this month at Michel, happily short-lived, being a case in point. The men are creating by their tendency in this regard a prejudice against themselves in the public mind, and selfishly injuring important interests in other localities. The feeling of the great body of the people towards mine labourers and workers is that they merit every reasonable consideration that can be extended towards them. Indeed it may be said with truth that the dangerous and difficult nature of their occupation entitles miners, and coal miners especially, to the hearty sympathy of all classes of the community, and the general disposition is to extend to them every protection and advantage to which they can make any colour of claim. Our statute books furnish evidence of this, and the attitude of the press towards miners on strike is cor-

roborative. But this sympathy may easily be alienated, and there is no surer way of bringing about such a result than the course which apparently commends itself to the judgment of the Crow's Nest Pass Miners' Union leaders.

The relation of the coal miners in the locality mentioned towards the mining industry of Southern British Columbia is very intimate. If coal is not mined, coke cannot be produced, if coke is not produced smelting operations cannot be carried on, and without the operation of smelters near at hand the profitable working of most of the British Columbian mines is impossible. A stage has been reached in this province, when by the production of good coke at a moderate price, the provision of transportation facilities and the erection of smelters, the successful working of our copper mines has been removed from the field of doubt. If labour conditions remain tranquil, there is every reason to look for a considerable investment of capital, and the consequent employment of a very large number of people at good wages, and a consequent increased prosperity of the whole community. This harmonious working of the several interests concerned can be dislocated by a refusal of either one of them to act fairly. But if a smelter owner is unreasonable he can be brought to terms. If a railway company is exorbitant in its charges, there is a remedy at hand. The owners of the Crow's Nest Pass coal mines are tied down by their agreement with the Government as to prices. Even if these things were not so, the several businesses mentioned would be compelled by self-interest to take a reasonable attitude towards each other. Capitalists are not likely to be guilty of the egregious folly of rendering each other's investments unprofitable, if they can avoid doing so. Each may endeavour, and naturally will endeavour, to make the best possible bargain for himself, but none of them is ever likely to adopt the suicidal policy of tying up industry, that is, of rendering invested capital unproductive, simply because he cannot have his own way. It is only among the miners that we find such a course favoured. At the instigation of, generally, irresponsible leaders, who in many cases foment trouble only for the sake of justifying their leadership, coal miners do not hesitate to go on strike and throw the whole industrial machinery out

of gear. Because some grievance, which may be relatively trivial, is not remedied in such a manner as he deems proper, the agitator orders a strike, and the men respond without taking into consideration that their action is almost certain to be far-reaching and affect hundreds of innocent wage-earners in other localities.

It is very clear that, if the mining interests of British Columbia are to be placed upon a sound basis and if the general prosperity of the country is to be promoted, steps must be taken to prevent the dislocation of connections that are absolutely necessary to the successful prosecution of business. No one wishes to deny to coal miners that reasonable measure of protection, to which in common with everyone else they are entitled; but it is insufferable that great industries shall be brought to a standstill arbitrarily for causes, which are inconsiderable and unimportant compared to the consequences resulting from strikes. Without entering into any discussion of the labour question, as it is viewed by the miners' unions, it may be incontrovertibly asserted that the strike should be the last resort of employees who have a grievance, instead of being, as it too often is, the first to be proposed. If the laws of the country are not sufficient to secure this, they should be made sufficient. In a British country the right of an individual to refuse to work until objectionable conditions have been rectified will hardly be denied; but it is a fundamental principle of the common law that combinations may be unlawful even though the act for which they are founded might be lawful in the case of an individual. An effort on the part of one portion of the community to coerce another portion of it to a certain line of action ever was hateful to the common law, and we are drifting away from those principles, which are the foundation of our liberty, when we permit the continuance of combinations, either of labour or capital, which attempt to bring about by coercion what cannot be secured by the regular operation of the laws. The establishment of an *imperium in imperio* in Canada would be intolerable, even if it is regarded with complaisance in the United States. It is said that a prominent public man in the latter country on being ushered into the presence of President Roosevelt and Mr. Mitchell, president of the Mine Workers, grasped each of them by the hand exclaiming: "I have the honour to greet two great presidents." This sort of thing may suit the hysterical and spectacular politics of the United States, but it is certain to lead to disaster in the end. The Government of all the people must be supreme, and it is a wrong principle which puts a voluntary associa-

tion, no matter for what purposes it may be established, upon anything like an equal plane with the government of the State. Unless all men are equally subordinate to the general government; unless there is only one legislative body in the State whose mandates all the people must obey; unless there is only one tribunal recognized, either avowedly or tacitly, for the settlement of disputed questions between citizens, confusion is bound to ensue, property rights are sure to be jeopardized and individual liberty will cease to exist. The government, the legislature and the tribunal for the administration of the law may be subdued to whatever degree experience may show to be necessary, but they must all have their origin and sanction in the consent of the governed. To this fundamental principle, without which liberty is a dream and permanent prosperity an impossibility, the right assumed by labour organizations to dictate strikes, when and upon such provocation as suits the sweet will of irresponsible leaders, is absolutely antagonistic, and the safety of the State, and not less the safety of miners and other wage-earners, than of any one else, demands that the best judgment of the community shall be devoted to the discovery of a means by which the constantly recurring strikes can be prevented without doing an injustice to the wage-earning class. Than a strike there can be no more injurious course, whether the result is regarded as it affects wage-earners, employers or the community generally. The great anthracite strike in the United States proved this, and it also proved that the men, who suffered least from it, were those against whom it was directed. The miners and the wage-earning classes in the great cities and elsewhere were those upon whom the force of the blow came. Therefore in pleading for legislation that shall render strikes not only needless but impossible, we feel that we are consulting the interests not only of miners and mine owners, but of the community at large.

THE PROPOSED NORTHERN RAILWAY.

IF there is anything in indications, British Columbia is on the eve of a period of very active railway construction. Mr. James Hill, president of the Great Northern Railway, avows his intention, so it is said, of extending that system through the southern portion of the province, and the Grand Trunk contemplate the important undertaking of constructing a transcontinental line to the Coast within five years. But the project, which at the present time is attracting more attention than any other is the Canadian Northern Ry.—a line of which there is already

no less than 1,500 miles in operation and which is doing a large and highly profitable business. This system is to be extended through British Columbia to the western terminus, and apparently the people of this province will soon be called upon to consider what assistance they will afford the company. By the Act of the session of 1902 the Province offered the company a cash bonus of \$5,000 a mile for 480 miles on the mainland of the Province, that is between Yellow Head Pass and Bute Inlet, and a like sum per mile for 150 miles between Seymour Narrows, Vancouver Island, and Victoria. It was generally understood at the time that this amount of aid would not be regarded by the company as sufficient, and it is currently reported that the Legislature will be asked to supplement it by a land grant.

It is not intended in this article to discuss the desirability of acceding to the wishes of the company in this regard, but only to present some suggestions which present themselves in connection therewith. A very important consideration, and one that will naturally have great influence with the Legislature, is the question of route. It would probably be found impossible to carry a subsidy bill through the present House unless provision were made that the main line of the railway shall be extended to Vancouver Island and Victoria is made a terminus. There is little use in discussing the advisability of adopting such a route or of attempting to show that another one would be more in the interests of the Province. The members for the Island constituencies, with an eye to future elections, will make the Island section of the line and the Victoria connection a *sine qua non* of their support. There are reasons why the company might prefer such a route. Naturally they will be desirous of having the western terminus of their system at a point where there is already obtainable business and the possibilities of Vancouver Island are of themselves sufficient to lead any new transcontinental line to desire to participate in the business certain to be developed there. So important from a traffic point of view is a Vancouver Island connection likely to prove in the by no means distant future, that it is easy to understand that a company, even if it contemplates ultimately making its chief ocean terminus at Kitimaat or some other northern harbour, would be not only willing, but quite desirous, of making this connection an integral and essential part of its undertaking, provided sufficient inducement in the way of subsidy is forthcoming. Therefore it is not likely that the attitude of the Island members will at all interfere with the plans

of the company, or that insistence upon the Island connection will in the least delay the undertaking.

How the proposal will commend itself to the members from the Southern Mainland constituencies is not at this time very clear. The vote on the subsidy bill of last session does not afford any reliable criterion as to how the House will deal with a new proposal. From a strictly local point of view, it may be said that Yale-Kootenay and the Lower Fraser Valley have no great interest in the Canadian Northern, if it is to be constructed through Cariboo and down by way of the Howathec Valley, Bute Inlet and Vancouver Island to Victoria. But it is likely that the people of those localities will not be influenced by such a narrow view. They will, we think, be inclined to regard the question broadly from the Provincial standpoint, and enquire as to what extent such a railway will open up new regions for exploitation.

Existing transportation facilities affect only a comparatively small part of this Province, approximately only one-fourth of its entire area, leaving three-fourths, or say 250,000 square miles practically in a state of nature in this respect. Some highways have been built and trails have been cut, and on some of the rivers steamers ply more or less regularly, but speaking generally it may be said that this vast area, which is twice as great as that of the British Isles and far greater than any European country except Russia, is practically without modern means of transportation, and it is to the interests of the country that these should be afforded at any reasonable price. Those familiar with the history of British Columbia are aware that it was to the development of the territory through which it is now proposed to build the railway that the early settlers looked for the future importance of the Province. At a time when Kootenay was an unknown and unexplored region, Cariboo was considered the most important section of British Columbia. Even before the discovery of gold attracted attention to this field, explorers had reported favourably upon the resources of what was then called New Caledonia. North of Cariboo is a great extent of country of which much may be reasonably expected. Northern British Columbia is of less average altitude than the Central and Southern parts of the Province, and this difference in elevation compensates to a very considerable degree for the difference in latitude. There is not the least doubt that the area along the Northern portion of the Province is quite as well adapted for settlement and the prosecution of various industries as is the Central portion.

At the present time the only concrete proposal be-

fore the people of British Columbia in regard to railway construction north of the Canadian Pacific is that of the Canadian Northern Railway Company, although the officials of the Grand Trunk system have made public the intentions of that company to construct a transcontinental line to a point in this Province. There is abundant room for both systems, not only in the prairie region but West of the Rocky Mountains: From the most northerly point on the line of the Canadian Pacific Railway to the Northern boundary of the Province the distance is 640 miles, and for more than a hundred miles further north a country worthy of development is to be found. That is to say, there is in all a region approximately 800 miles wide lying north of the C. P. R. that will probably be found to repay any well considered plan for its exploitation. But meanwhile, as we have said, only the Canadian Northern, so far as is known has officially placed its plans before the Government of the Province. What those plans are can only be surmised at present and until they are definitely stated, any discussion of them would be premature. It is not too soon, however, to express the hope that a favourable consideration will be given to any reasonable proposal that may be made; that is, that the company's request for assistance will be regarded as being on behalf of an enterprise, which will be of incalculable value to the Province.

THE OLALLA SWINDLE.

TO publicly express the opinion that an undertaking is a swindle is libellous. If the Olalla Copper Mining and Smelting Company is not a swindle, it is a very fair imitation of one; and if the promoters of the undertaking are not knaves they are very dangerous lunatics with any amount of method in their madness. In any case they should be put under restraint. We had hoped that the exposure of the company's methods in the *Engineering and Mining Journal*, of New York, would have been sufficient to check the ardour of Mr. William J. Brewer and his confederates, but that individual evidently was not at one time a Salvationist to no purpose. Also the *Engineering and Mining Journal*, one should have remembered, is not read by the class reached by the *New York World*, nor is the *MINING RECORD* for that matter; and herein lies one's powerlessness. If the Eastern daily and financial newspapers sought or were on the lookout for expressions of opinion from local authorities as to the *bona fides* of such concerns as the Olalla swindle, it would be dif-

ferent, but with the representative "yellow journal" press sensationalism or a possibility of an advertisement are much more powerful considerations, and a sensational fiction is generally to be preferred to a sensational fact. Still it is something to have entered a protest in the hope that it will be productive of some good. The method by which the promoters of the Olalla Company are endeavouring to obtain money under false pretences is ingenious in the extreme. Their use of both the *suppressio veri* and of the *suggestio falsi* is really admirably skilful and it is reasonably certain that a hook so cleverly baited will catch many fish of the variety well, though not very elegantly, termed "suckers." As we have already in a previous issue given an illustration of the method adopted by the Olalla Company of advertising in the New York daily press, it is hardly worth while to refer especially to the full page announcements which have been appearing the past few weeks in the ponderous Sunday editions of the *World*, except to say that if possible the language is even more grotesquely exaggerated, the statements even more glaringly misleading. The concern has acquired some 63 very partially developed prospects, some not developed at all. It may be confidently asserted that no qualified engineer has estimated or would estimate that in all these claims there is even a few thousand tons of ore in sight, yet the promoters of the concern have the bare-faced effrontery to suggest, and suggest in such a manner that it becomes a statement, that the profits on one year's operations will be \$900,000, that the earnings of a fictitious smelter will be \$900,000, and that the profits of a problematical railway will be \$1,500,000. The "mines" are incidentally compared with, as having "a greater copper value than the ores of the famous dividend paying mines, the Calumet and Hecla, the Anaconda, the United Verde, whose stocks are selling at many times their par value," and Mr. Brewer, a most villainous looking person judging from his published portrait, is, by an alleged interviewer in the same newspaper, described as being in temperament much like Mr. Roosevelt, and like Moses, Christ and Lincoln in that he developed his "tremendous powers in the solitude and peace of the country." It is astonishing that a metropolitan newspaper, however debased, should publish such inconceivable twaddle; it is still more astonishing that sane men should be impressed by it. The State Mineralogist of California has, of late, done much to discourage and expose "wild-cat" operations in that territory. Our own Department of Mines might well, in such extreme cases as this, adopt somewhat similar measures.

The silver-lead mine operators of the Slocan and other producing districts appear now to be unanimous upon the lines on which a recommendation should be made to the Federal Government with a view to the affording of relief and protection to the industry, and at a meeting held for the purpose the following resolutions were passed:—

"This meeting of silver-lead miners is of the opinion that a protective tariff on imported lead in ores, pig lead and its products is desirable subject to the conditions that it be clearly shown and assurance given that such tariff will be of direct benefit to the silver-lead miner rather than the smelters and refineries only.

"We would further recommend that lead bullion, smelted and refined and otherwise, treated in bond in foreign countries, be re-admitted to the Dominion of Canada upon the payment of an ad valorem duty of 15 per cent. of the cost of smelting and refining, corroding or other process of manufacturing."

The question is full of difficulties, for which the comparatively sparse population of the Dominion and the consequent limited consumption of lead and lead products by the country itself, but nevertheless a greater measure of relief and a general betterment of conditions is much more likely to be brought about by an adjustment of the tariff than by the alternative suggestion of inducing the Government to grant a bounty on lead ores. It is meanwhile satisfactory to remark that so eminent an authority as Mr. J. R. Wilson, vice-president and general manager of the Thomas Robertson & Co., Ltd., metal merchants of Montreal, after testifying to the excellent quality of British Columbian lead, has expressed the opinion that there is no reason why, by tariff adjustment, the corroding of pig lead should not become an active industry in Canada, and that all the white lead used, amounting to about 9,000 tons annually, should not be manufactured in our own country from our own raw material.

The work of constructing a branch line of the Great Northern railway into the Crow's Nest is now approaching completion, and by the opening of this road another important market for the product of the East Kootenay collieries will be afforded. It is stated semi-officially that the charge for haulage on coal from the Morrisey mines to Spokane will be two dollars per ton, and consequently dealers can be supplied at \$3.75. The retail price should not therefore exceed \$5.00 a ton, or a dollar per ton less than consumers at present are required to pay for the local

Washington coal. The opening of this railway means also a great deal to the Le Roi Company, whose smelter at Northport will thus be supplied with coke at a cheaper rate. Meanwhile in the Flathead Valley, to the south of the Crow's Nest, large coal areas are reported to have been discovered this year, over 200 applications having been made to the Government during the past few months for permission to prospect for coal and petroleum in South East Kootenay. The Canadian Pacific Railway Company also sent this last summer a party of surveyors and explorers into the Flathead Valley and discoveries of an important nature are reported to have been made. The area prospected this year embraces a territory of nearly 200 square miles, throughout which the indications are said to be extraordinarily promising. It is thought that the Canadian Pacific Railway contemplate building branch lines from Crow's Nest into this country in the near future and preliminary surveys have been made from the Morrisey coal fields in a south-easterly direction down a tributary of Lodge Pole Creek, and thence east to the headwaters of the Flathead River. Another survey for a railway has also been made from a point on the Crow's Nest branch road, near Elko, southward down the Wigwam River, and thence north and east to the Flathead.

Looking to the future, no mining developments this year have, perhaps, been so important as those which have taken place in the historic district of Cariboo. Until next season the result of the work will not be definitely known, but if as is expected, the ancient river-bed systems can be successfully tapped, and the gravels yield anything like the six dollars to the cubic yard, as estimated by local men, it is impossible to exaggerate the future possibilities of this class of mining. This month, rather sensational returns are reported to have been obtained from placer mining on a small scale in the working of a long abandoned claim in the vicinity of Lightning Creek—once a famous productive centre. Thus in two days eighty-five ounces were taken out from one set of timbers, eight-foot cap, and previous to that 206 ounces were recovered as a result of seven days' working. Later again a telegraph message to the *Ashcroft Journal* announced that from one spot a pan of gravel was taken and found to contain 56½ ounces of gold, valued at nearly a thousand dollars. The extent of this ground, however, has not as yet been determined. If it runs into Lightning Creek the area will be necessarily limited, but if, as is quite possible.

the pay-gravel follows another direction, the discovery will be a most important one.

A Rossland explanation of the seemingly conflicting statements contained in the cablegram sent by the late manager of the Le Roi No. 2 to the London Board, the one to the effect that the ore since October the 15th averaged \$18 per ton, and another immediately following advising a suspension of shipping operations on the grounds that copper values predominated and that better terms might be obtained from the smelters by such means, is, that the very fact that copper constituted the principle values in the ores, which are reasonably high-grade, justified Mr. Thompson's recommendation; for a high-grade copper ore is naturally less costly to smelt than a refractory ore of the same character containing little copper, and a relatively large gold value. To our minds the two cablegrams are quite reconcilable, but there seems to be room for explanation to account for the heavy selling of the shares just previous to the publication of the telegram which was responsible for the considerable fall in the stock market quotations. It is not unreasonable to suppose, as the *London Mining Journal* suggests, that some holders were in advance of others with their information. If, however, the mine is in the same condition as it was reported to be by Mr. MacDonald some few weeks ago, and if the only reason for suspending shipments is that attributed, the decline in the value of the shares on the strength of the telegram alone was causeless enough.

At the annual general meeting of the Centre Star Company, held the other day in Toronto, a financial statement was submitted to the shareholders showing that the undertaking's indebtedness was now being reduced at the rate of \$30,000 a month. The total present indebtedness is \$160,028, and consequently in less than six months' time the company will be entirely free from debt. In other words, the Centre Star Company is earning profits sufficient to pay a dividend of nearly seven per cent. per annum on its somewhat excessive nominal capital of three and a half millions, or over twenty per cent. on the selling price of the shares to-day. This notwithstanding the low price of copper, and the fact that as yet no method of successfully treating the lower grade products of the mine has been introduced—a problem that ere long will certainly be successfully solved. The showing of the Le Roi is even more satisfactory, and next year it may be confidently ex-

pected that both of these important mines will commence and be able to regularly maintain the distribution of substantial dividends.

The fact that the Lenora mine is in difficulties will not surprise those who feared and anticipated that somewhat injudicious contracts made with the Tacoma and Crofton smelters would thus culminate. Nevertheless nothing but sympathy is felt for Mr. Henry Croft, and it is sincerely hoped by all that his present troubles will be but of a temporary nature and that he will ultimately achieve the success to which his energy and enterprise entitle him. There are few men who have done more for mining on Vancouver Island than Mr. Croft, and it is perhaps largely because he has attempted more than could be expected from one man not in the enjoyment of robust health, that he has failed as yet to accomplish his purpose. Meanwhile the courts have granted a winding-up order, but an appeal has been taken from this, and before the case is settled it is probable that either a purchaser will be found for the mine, or arrangements will be satisfactorily made for the re-construction of the company and the raising of the additional capital required by a debenture issue, most of the creditors, we understand, being agreeable that such a course should be pursued.

In an interview the other day, Mr. Brownlee, a Dominion Land Surveyor, spoke very encouragingly of the future of the Atlin district, which, he stated, had produced more gold, per capita, this year than ever previously, individual miners having earned on an average from four and a half to five dollars a day, while, of course, instances of much higher results are recorded. Many of the more successful miners are remaining in the camp this winter to engage in drifting operations. Thus on Gold Run, a half-dry tributary of Pine Creek, nine steam hoists and pumps are in operation, and on the north benches of Pine Creek extensive work is in progress. Mr. Brownlee has resided in the Atlin district since the announcement of the first discoveries and is therefore well qualified to express an opinion on the subject of gold mining there.

The exceedingly welcome intelligence has been received that the Customs Department at Washington has decided that Canadian zinc ores may be admitted into the United States free of duty. The decision, of course, is an all-important one so far as the profitable mining of this class of ore in the Slo-

can is concerned, and very considerable developments in that district may be now expected in consequence. There are also valuable deposits of zinciferous ores in certain sections of East Kootenay, but through lack of adequate facilities for transport these will hardly be available for exploitation for some time to come.

The London *Critic* thus comments on the writings of one "H. F. S.," who is "doing" Canada for Sir George Newnes' evening paper, and is rather quaint in his comments on British Columbia. "Even an expert," he says, "would have found it difficult to write a report on the mineral resources of the Kootenay, viewed, so to speak, from the top of a coach, or in the light of roseate after-dinner speeches." Which shows, our contemporary aptly remarks, "how little some people know of 'experts.' Why, 'experts' have written reports on B. C. properties from the top floor of Winchester House; and as for not doing it after dinner, that is just the very time they prefer." And if that is true, that is what the poor man is paid for. As has been remarked, your London promoter does not buy mines; he buys reports.

CHEAP LABOUR.

(By Clive Phillips-Wolley.)

THE scarcity of labour appears to be the difficulty which confronts those who would develop South Africa. It has long been the principal obstacle to progress in British Columbia. Given cheaper labour and plenty of it, nothing could prevent an enormous provincial development in the immediate future, a development not only of mining but of agriculture and the result of this latter development would more than compensate the greatest number of our citizens for the diminution of the wage earned by a number of individuals.

It is manifest that the actual number of dollars received by each man matters nothing. It is not the dollar itself, but the purchasing power of the dollar which tells, and if by the development of agriculture, food supplies could be so cheapened that one dollar would buy then what it takes two dollars to buy now, the man earning two dollars a day would be better off than he now is with his three dollars a day. But this is obvious. The question here and in South Africa is how to obtain an ample supply of really cheap labour, and here we lay all the stress upon those words "really cheap," for just as a dollar which will buy a sack of flour is worth more than two dollars in a country where flour is two and a half dollars a sack, so labour at three dollars a day which will accomplish as much as labour at two dollars a day will accomplish in twice that time, is the real cheap labour. It seems that two leading articles

have appeared in the reviews this month upon the subject of cheap labour for South Africa. In one of these it is contended that "white labour is the economy of the wealthy, black labour the extravagance of the poor." If you substitute for black the word "Mongolian" we endorse this sentiment most heartily. But we know nothing of black labour and admit at once that there are strong arguments in favour of black labour in South Africa which do not apply to Chinese labour in British Columbia. South Africa is the black man's country; he is by nature specially adapted to the climatic conditions of that country; the white man is not. The black men constitute the principal population of that country and if unemployed, may and probably would, give so much trouble as to interfere with the peaceful prosecution of the mining industry, and the black man appears to be content with seven and a half dollars a month. Besides all this, he is reported to be a big, strong fellow, able to do a day's work with anyone.

None of these arguments apply to the Chinaman in British Columbia. This is not his country; it is not even a country as well adapted to his constitution as it is to a white man's. He does not become a citizen of the country he works in, and he wants almost as much for his day's work as the white man wants for working the same number of hours at twice the pace.

It seems to us that the first question from a common sense standpoint is, what do we get for our money from the Chinaman, and the white man. All other questions of national utility and sentiment may, in such a journal as this, be considered later on. It would be easy, of course, to quote *ex parte* statements made by Western Canadian politicians seeking votes, or of labour men seeking to secure a monopoly of such labour as there is in the country at the best possible rate for them, but we are in a position to quote the public statement of a witness who should be well informed and who, above all things, is a leader in the pro-Chinese camp. The one argument of any weight used by the pro-Chinese in this country is that British Columbia needs *cheap* labour, and that the Chinese labour is the only cheap labour available.

But Mr. Ho Yon, the Chinese consul general in San Francisco, in an article which he recently contributed to the *North American Review*, says: "Unfortunately Chinese labour is not cheap. Compared with the cost of American labour, it is dear indeed." In another place he says: "When they (the Chinese) do equal work they are paid as much as the white labourers." He admits that which we contend for, that a white man does so much more in the day than the Chinaman that it is cheaper to pay the white man three dollars a day than to pay the Chinaman two dollars. If that is not what he means, his words have no meaning, but to our mind they are plain and true. There are, of course, far wider points of view than this one. The rapid development of our mines is not everything. If the country is ever to be great, she must have a population able to attain a greatness. She must breed white men for sailors to control that

great carrying trade of the Pacific which geography and her deposits of mineral and coal and her seaboard forests of ship-building timber have put within her reach, and you cannot breed white men if you fill the country with rice-eating bachelor Chinamen.

But it is not necessary to suffer even in pocket for a little while for the sake of the Empire we belong to. If proper efforts are made to induce white men to come here: if better transportation and cheaper freight rates can be procured; if we stop the advertisement of this country in official pamphlets as the only spot in Canada where white men are not wanted because Mongolians fill their places, we may hope for such an immigration of white men that the cost of farm produce and all other necessaries will so fall that wages will fall with them without injury to the wage earners. If we don't do this there is only one other consistent course which we can pursue: a deplorable one from our point of view, but still reasonable from the point of view of the man who only cares for his own pocket and does not care a curse for his country, and that is to let in unemployed, nay, even to assist, the immigration of Mongolians, so that coming in swarms they may compete with one another and so reduce Chinese wages to the level of wages in China.

In this way we might develop all our low-grade properties: we might even find better paid employment for all the white men now in the country as "bosses" of Chinese gangs, but we should lower the standard of that civilization which is the prize for which our nation has been working for centuries and our future would not be that of a great Western sea power enriched by the very trade which enriched our ancestors. We should not become the carriers of the Pacific Ocean as they were, and are, of the Atlantic.

THE MEETING OF SILVER-LEAD MINE OWNERS AT SANDON.

(By a Special Correspondent.)

A MEETING of those directly interested in the production of the silver-lead ores of the Slokan and East Kootenay was held here on November 20th and 21st on the invitation of Messrs. A. C. Garde, G. W. Hughes and J. M. Harris, of this camp.

The meeting adjourned its first session at midnight without having accomplished anything of a definite nature, but by noon of the following day three resolutions were agreed to before a final adjournment was reached. A further meeting will be called early in December. The resolutions handed out for publication are as follows:—

1st.—"This meeting of silver-lead miners is of the opinion that a protective tariff on imported lead in ores, pig lead and its products is desirable subject to the conditions that it be clearly shown and assurance given that such tariff will be of direct benefit to the silver-lead miner rather than the smelters and refiners only."

2nd.—"We would further recommend that lead bullion, smelted and refined and otherwise, treated in bond in foreign countries, be re-admitted to the Dominion of Canada upon the payment of an ad valorem duty of 15 per cent. of the cost of smelting and refining, corroding or other process of manufacturing."

3rd.—"It is hereby resolved that a committee of four, with power to add to this number, be appointed to wait upon the smelters and present to them the recommendations embodied in the resolutions presented by Mr. John L. Retallack at last night's meeting as amended if possible, to obtain from them a satisfactory guarantee that in the endorsement of said resolution by an adjourned meeting of this convention, the smelters will equitably divide with the shippers any and all benefits accruing to them in consequence of passing of legislation on the lines of our recommendation."

The following gentlemen were appointed a committee to interview the smelter companies on the lines laid down in the resolution: Messrs. B. N. White, chairman; George Alexander, Geo. W. Hughes and G. D. Potter.

NELSON.

The silver-lead situation came up before the special meeting of the Nelson Board of Trade called for that purpose on the 24th of November.

G. O. Buchanan, of Kaslo, occupied the chair and made the most important address. Two sessions were held, in the afternoon and evening.

John Houston, M.L.A., moved, seconded by W. J. Wilson: "Whereas it is desirable in the interest of the silver-lead industry of British Columbia that the duties on pig lead and the products thereof imposed by the Dominion should be increased so as to be on a parity with the duties on other raw materials and their manufactures which are the products of Canada:

"And, whereas, it is desirable, in the interests of the mining industry generally that all machinery and supplies used in mines and smelters not manufactured in Canada be admitted duty free;

"Therefore be it resolved that we request the member in the Dominion House of Commons for Yale-Cariboo, W. A. Galliher, Esq., to press upon the Government the necessity for the legislation outlined above, and that he ask all the members from British Columbia to unite with him so that any representations he may make will be backed up by a united delegation."

Messrs. Buchanan and Galliher will place the above resolution before the Sandon mine owners at their meeting next month and endeavour to obtain joint unanimous action on it.

A committee of four, one each from the lead mine owners, the smelters, the boards of trade, and the Copper-Gold Mining Association, will go to Ottawa with Mr. Galliher, shortly and present the case of the mining industry of B. C. to the Dominion Government.

THE GRANBY MINES AT PHOENIX, B.C.

(Continued from last month.)

KNOB HILL SURFACE WORKS.

THE main surface building in connection with this mine contains a ten-drill Canadian Rand air compressor, boiler plant consisting of a battery of two 80 horse-power boilers and a dry room.

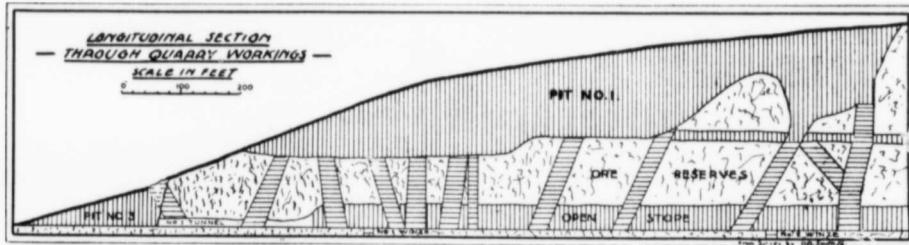
At the head of the quarry a small blacksmith shop is located. Two men are kept here to sharpen tools.

The Knob Hill bins are almost identical with those

for bull-dozing and clearing chutes when needed. When more is wanted recourse is had to powder house No. 3. All powder houses are lighted by electricity; Nos. 2 and 3 are heated by steam. Reference to the photo of the interior of the thawing house shows the steam coils in the centre of the room. Thermometers indicate the temperature, while the floor and shelves are covered with sawdust to deaden vibration. A powder man looks after all three magazines. In the neighbourhood of a ton is used per day.

ORE CRUSHER.

This crusher is being installed at present. It will



already described. They will hold about 1,500 tons.

POWDER HOUSES.

There are three powder houses. Two of these, No. 1 and No. 2, are located beside a side track of the railroad at a reasonably safe distance from any working. No. 1 is a store house, while No. 2 is the thawing house. No. 3 powder house is situated near No. 1 shaft and usually contains from one-half to a ton of

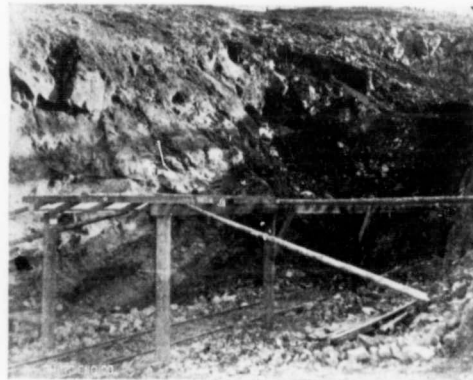
crush the ore from the Knob Hill and quarry workings. In this way a large amount of bull-dozing will be saved and the operations at the smelter will be simplified, as the crusher will operate on a rock 42 inches by 30 inches.

It is the intention to build, at some future date, a similar crusher at a lower level to treat the Ironsides ore.



Shaft House, Knob Hill Mine.

powder together with fuses of different length on which the caps have already been crimped. This magazine is drawn on during the day time when small amounts are wanted at different parts of the workings. A slate is left here on which the men register the amount of powder, number of caps and length of fuse taken also the working in which it is to be used. About 50 lbs. with some fuses is kept in a blind drift on the 200-foot level by No. 1 shaft, and this is used



Railroad Cut in Pit No. 2.

TRAMWAY.

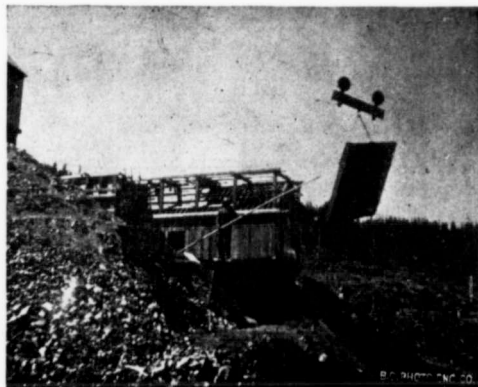
A three-track gravity tram 1,500 feet long, is now under construction. It will take the ore from the upper workings of the quarry to the crusher by means of two five-ton automatically dumping cars.

AIR COMPRESSOR.

Hitherto the mine has been operated by means of the ten-drill compressor in No. 1 shaft house, the



No. 3 Pit and entrance to No. 1 Tunnel.



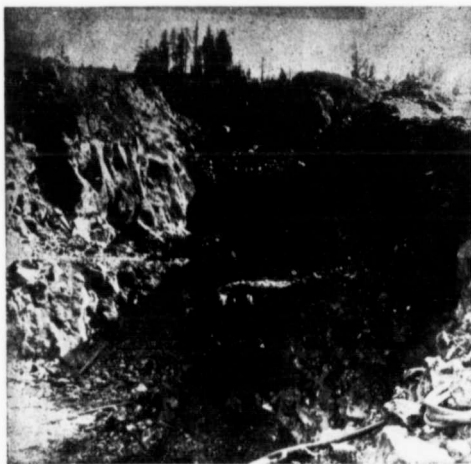
Dumping the Skip, Knob Hill Mine.



Stripping—Loading Skip.



Loading Ore from Bins.

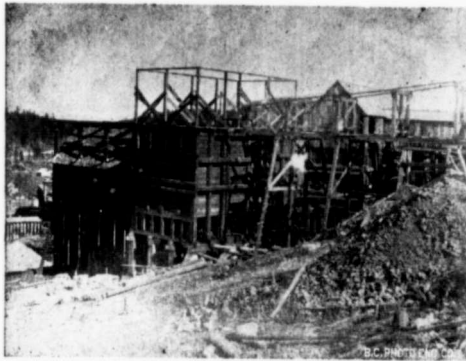


Pit No. 1.



New Air Compressor Building.

KNOB HILL MINE.



Ore Crusher.



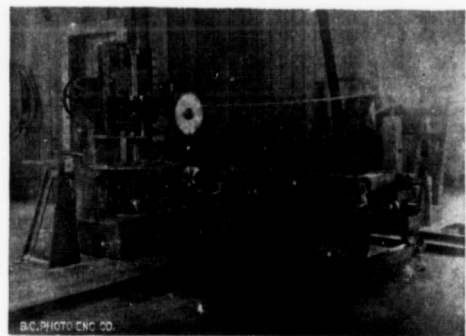
Blacksmith Shop. Machine Shop. Portal, No. 2 Tunnel.



Bird's Eye View of Stripping Operations.



Shaft House No. 2 and Bins.

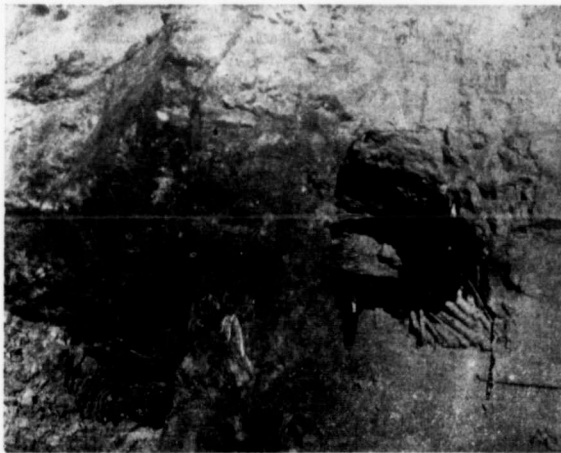


Framing Machines.

KNOB HILL MINE.

ten-drill compressor at the Knob Hill and the five-drill compressor at the neighbouring War Eagle which has been leased from the company owning that mine. With the advent of a large tonnage output in-

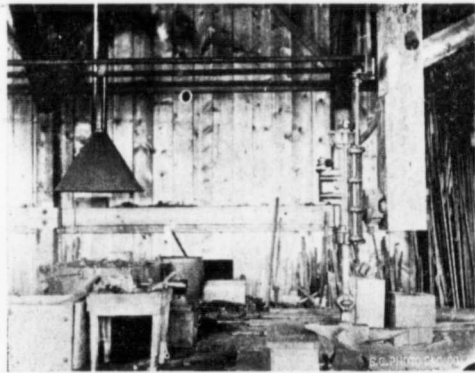
and all the drills have been made by the Canadian Rand Drill Co. The new crusher, the hoisting engines at No. 1 and No. 2 shafts and most of the smaller hoisting engines and all the boilers bear the



Raises from Quarry leading to No. 1 Tunnel, Knob Hill.

creased power is needed. A large building 60 feet by 120 feet has been constructed and in it an up-to-date

name plate of the Jenckes Machine Co. Most of the hardware in the store room has been made by East-

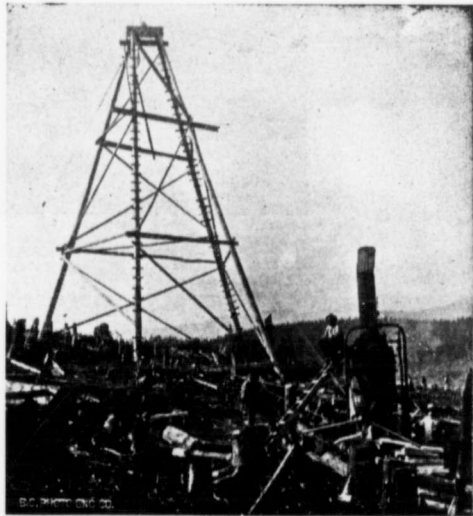


Interior Blacksmith Shop, Knob Hill Mine.

60-drill Canadian Rand machine is now being set up. It will be operated by electricity.

The company's offices are situated in the business part of the town. In different parts of the town the company have erected neat cottages which are rented to married employees. The miners' boarding house known as "The Granby," is a large, well appointed building situated close to the works.

It is a fact worthy of note that the large proportion of the machinery and other materials in use is of Canadian manufacture. All the air compressors



Gallows frame and engine for stripping operations.

ern Canada firms. The Hamilton Powder Co. supply half the powder, the other half being supplied by the Giant Powder Company, whose works are in Victoria. The Rossland Engineering Company make the mine cars, while the motor for the new crusher is from Peterborough.

LABOUR CONDITIONS.

Phoenix has a rather strong miners' union. It is a branch of the Western Federation of Miners. The scale of wages for the leading positions has been:— Shift bosses, \$4.50; machine men, \$3.50; timber men, \$3.50; shovellers and car men, \$3.00; carpenters,



Powder House No. 1.

Powder House No. 2.

\$4.00; machinists, \$4.00; blacksmiths, \$4.00; blacksmith's helper, \$3.00; hoisting engineers, \$3.50 powder man, \$3.50; surface labourers, \$3.00. Eight hours a day is the limit for underground work, while ten constitutes a day's work on the surface.



The Granby Hotel for miners, Phoenix, B. C.

OUTPUT OF THE MINES.

1902 will be the banner year as regards ore production. This is the case notwithstanding the paralyzing effects of the Fernie coal and coke strike and later the lack of water at the smelter. In 1900 the output was 64,333 tons. In 1901 this had increased to 231,763 tons, while this year it will probably aver-

age 1,000 tons per day. With the completion of the new compressor and improved transportation facili-



Interior Thawing House, Knob Hill Mine.



General Offices.



The Granby Dining Room.

ties at the quarry it is estimated that a production of 5,000 tons can be a daily occurrence.

"ORE IN SIGHT."

THE discussion on the paper before the Institution of Mining and Metallurgy read by Mr. J. D. Kendall on the subject of "Ore in Sight" and published in the MINING RECORD, No. 3, Vol. IX, was both lengthy and interesting, and we give below an abstract of the remarks of some of the speakers.

Mr. J. H. Collins thought that the members would agree with nearly everything that Mr. Kendall had said, but not quite everything. In some cases it seemed to him that the author had a little over-done his cautions. In the first page of the paper he said: "On the other hand, if only one side of a mass of ore can be seen, it must be perfectly clear that no one can tell what quantity of ore is in that mass." No doubt that was so, but when he went on to say: "The side visible may show a large area of ore, but quantity of ore involves a third dimension; if this be wanting we cannot possibly know anything about quantity,"—he thought that was a little too strong. Taking the very common case of a drift on a vein which cut through ore for a certain number of fathoms: it had ore in the back and ore in the bottom. According to Mr. Kendall, they would be justified in saying that there was no ore in sight, because the ore seen in the back and in the bottom had each only one surface visible, so that they came to this *reductio ad absurdum*, that when they saw ore above and below them, according to the author, taken strictly, would say that there was no ore in sight! No engineer would say that, not Mr. Kendall himself, though, of course, no one could say how much ore there was. They might adopt a sort of standard for their guidance, and this would of course vary in different districts and with different kinds of ore-bodies. A very convenient standard had been founded in Cornwall, which he thought was seldom seriously wrong. He was not, of course, speaking of exceptionally narrow veins, nor of very wide veins, but in the ordinary veins of Cornwall, if a drift were put through a vein and the ore was seen above and below, the practical miner had come to this conclusion: "I can very safely reckon upon 4 fath. of ground above me and 4 fath. of ground below me," and he would say the same of ore seen in an "end." If it were in a mine where there were distinct ore-chutes, he would be likely to reckon even more than 4 fath. above and 4 below. If, on the other hand, the ore went in long "courses" he might, perhaps, hesitate to take the full 4 fath., though he did not say that that would certainly be so. But practice told them that in such cases as those to which he had referred, they would be a great deal nearer the truth by taking that standard of 4 fath. beyond the visible ore-face, than by saying that there was no ore in sight at all.

Mr. Corder-James could not quite agree with Mr. Collins in respect of the adoption of a rule such as that referred to as obtaining in Cornwall for the estimation of ore stated to be in sight. Numerous in-

stances had come within his knowledge where the adoption of a rule of that kind would be hopelessly wrong; and even having regard to the occurrence of ore in the Cornish mines, he could not agree with the acceptance of a general rule of that nature. It appeared to him to be very difficult, and indeed practically impossible, to make general rules for the estimation of either quantities or values with regard to ore deposits whose limits had not been strictly defined, and which all knew were so irregular and possessed so many varieties and characteristics of their own. The application to other localities of the rule referred to by Mr. Collins as in use in Cornwall, namely, 4 fath. beyond the actual points at which the ore was exposed, might produce very serious results. Taking, for instance, the very rich ore-bodies in the Kalgoolie field, where they had probably a thickness of only 9 ft., and a very low angle of inclination, if a level were to be put through an ore deposit of that kind, having a height of 6 ft., it might be just within the deposit: to then allow 24 ft., above and 24 ft., below for the probable continuation of the deposits, would give a result equally disastrous with those examples referred to in Mr. Kendall's paper. With reference to the two principal suggestions which the author had made, he thought with Mr. Collins that everybody would agree with them. The first was an important one, namely, that the samples should be taken across the width of the deposit when taking a series, in order to determine the average value of the ore exposed. The second suggestion was that information obtained second-hand, as it were, and not being the result of the investigator's own work should be acknowledged. As a rule, he believed that was done, for few mining engineers would care to take a responsibility wider than they were bound to assume. Turning to the practice of the estimation of ore reserves, it frequently happened that before any such estimate could be made, the mining engineer had to define the ore-body, and in many cases that could only be done by a proper method of sampling.

Mr. E. P. Rathbone considered that there were certain conditions which it would be just as well for mining men to be agreed upon, that was to say as to what allowance should be made in the valuation of a mine for ore that could not be strictly measured, but which might reasonably be expected to continue beyond the "end of the miner's pick." He considered that this question largely depended on the character of the ore occurrence, and the extent of the actual mining work which had already been carried out upon it. Thus in very cherty-pocketed gold quartz veins, it would probably be very unsafe to take anything as "ore in sight" which could not be strictly measured; but he would like to ask Mr. Kendall what he would consider could be justly allowed in estimating the future value of a mine, in conditions which came under his notice, in a large mine which had been valued by the vendors at \$5,000,000, all of which was claimed to be strictly "in sight." The ore-body consisted of a well-defined and true fissure,

which had been mined upon to a vertical depth of 900 ft., being all in solid pyritic ore from the "grass roots" downwards, varying in value according to the gold contents from some \$10 to \$50 per ton. Some 40,000 tons had already been extracted and smelted, and the smelting returns showed a steady average of \$30. The average width of the vein, arrived at after taking some 200 separate measurements in the various levels, from the top to the bottom of the mine, showed 15 ft. of practically solid ore. This ore-body had actually been mined on its "strike" for a distance of 5,000 ft. in that and the adjoining property. It was, therefore, only fair to assume that a fissure which had been proved by mining operations to be filled with solid metalliferous contents for a depth of 900 ft., and longitudinally for 5,000 ft., the same vein having also been picked up and worked at various other points over a distance of three and a half miles, was certainly not one which could "pinch out" within even the prescribed distance of 4 fath., which Mr. Collins said was usually taken in Cornwall. In such cases as that, he considered that, as Mr. Kendall point out, a longitudinal section plan of the mine should first be carefully prepared on section paper, and then the valuer should make it quite clear what stoping areas of the mine he considered contained ore strictly "in sight," and what areas might be fairly allowed to contain ore of a similar value, giving all the factors upon which such estimates were made. Naturally such figures and plans could only be of use to other engineers, who might be sent on behalf of say a purchaser; but in any case they would serve to prove to business men that the basis of valuation was not purely guess-work, but estimated on fair reasoning grounds.

Dr. Simon remarked that previous speakers had mentioned cases where one should allow a certain degree of latitude in estimating the ore in sight. He did not agree with that. He thought that as ore in sight one ought only to take that which was absolutely seen by the man who inspected the property. One might assume from the general character of the deposit that there were chances, probabilities, even very great probabilities, of more ore existing, but the estimate of such hypothetical ore ought not to be included in the ore in sight. He could give several instances where mistakes of that kind had been made. Some time ago he was asked to determine the quantity of ore in sight in a large Russian property, which had been stated to be something like 500,000 tons. He, however, could only find 2,700 tons; the previous estimate had been based partially on assumptions. The facts were that that property possessed something like 27 reefs, which were lying more or less parallel through an area measuring about three miles in length and one mile in width. For the whole length of the reefs one could see workings. The reefs were being worked to a depth of some 100 ft., and the company assumed that they would be able to attack the same reefs at a deeper level by putting a general cross-cut through the country about three-quarters of a mile in length, tapping all those veins

which apparently crossed there. As a matter of fact the veins vanished at about 150 ft. in depth, as far as payable gold contents were concerned, and could not be worked profitably. That was one example where one could not, even with a large amount of work being carried out, go one inch beyond what one actually did see. He believed the term "ore in sight" had several different meanings to the people who used it. If one asked a prospector what ore in sight was, it was generally a very big figure. The next man who put a different meaning to the expression, was the engineer who acted for the promoter, and the promoter again tried to translate the engineer's figures in a certain way which would help to make a nice prospectus. But the engineer who came last, and, after some work had been done, had to face the actual facts, and generally none of the others' figures would come out at what they had been stated to be.

The Chairman, Mr. McDermott, thought that a little confusion had arisen in the discussion from the fact that those who had advocated certain "allowances" had been misunderstood as stating those allowances were "ore in sight." As long as the allowance was justified, and as long as it was separate from what was actually "in sight," it was of course perfectly justifiable, and came within the requirements of the author. Mr. Kendall advocated showing clearly what ground was actually taken as "in sight," and using that term only when it was justified; but Mr. Collins said one must not limit one's estimate of the value to that. They would all agree there was no chance of buying mines if they did. As Mr. Rathbone had pointed out—and it was the experience of every engineer—he would allow the mine credit for more than was in sight, although he would not thereby intend to maintain that ground exposed only on one face was technically in sight. When separately stated thus as an "allowance," which the circumstances warranted the engineer in making, if any readers of his report questioned his judgment they could modify his calculations accordingly.

Mr. William Frecheville said it appeared to him that one must take into account the kind of mine one was dealing with. For instance, if one had a chute of ore which was 800 ft. long, one would be justified in giving it credit for more in the bottom than if it were only 100 ft. long. When a vein was looking strong and healthy at the bottom one would surely be justified on a commercial basis in assuming that it would go down a certain distance. For instance, if one were dealing with a mine where there was a chute 1,200 ft. long, opened up in the bottom, one would surely not limit the ore in sight to even 24 ft. below the bottom level.

Prof. C. Le Neve Foster proposed that they should agree to use the expression "ore in sight" solely in its common-sense and every-day meaning, and confine it to ore that was actually visible, that could actually be seen; in his opinion, therefore, it would be advisable to give up the expression altogether in the case of ore-bodies, the existence of which was

merely inferred and consequently more or less hypothetical.

Mr. Trewartha-James agreed with Dr. Le Neve Foster that the term "ore in sight" was a very unfortunate one, and should henceforth be abolished entirely from mining engineers' reports. The expression was misleading, as, properly speaking, no part of an ore deposit *in situ* underground could ever be said to be in sight; and what engineers calculated as being ore in sight was not so in any rational definition of the term. An ore-body, even if it could be seen on three or more sides, was certainly not in sight in any sense, unless reasonable continuity and homogeneity had first been ascertained beyond question. How often one saw now-a-days in reports some such statement as this:—"As the ore is not completely blocked out, I give no estimate of the quantity of ore in sight." One could say as much by merely looking at a plan and section, without going near the mine workings.

If they should adopt Prof. Foster's suggestion, and abolish this term, they must use some other, such as "ore in reserve," "ore available for extraction," "ore developed," "ore blocked out," or some similar or kindred expression. Whatever the word used, before one could proceed to consider or attempt to estimate the quantity of "ore reserves," one must define the term "ore," and he thought that the issue depended mainly on that point. To quote Prime, "The idea of the term 'ore' in mining parlance cannot be well expressed in a more precise or scientific manner than by Van Cotta's definition, which, freely translated, is as follows: 'Under the general terms "ores" are comprehended all minerals and mineral aggregates which from their metallic contents attract the attention of the miner.'" After explaining that no particular class of minerals or of rocks necessarily constitute "ores," whilst on the other hand many metalliferous species of the mineral kingdom could not be called "ores" because, either from their nature or the too small percentage of the valuable metal they contained, they could not be utilized commercially, Von Cotta gave the following excellent example: "A rock containing 5 per cent. of oxide of iron could not be classed as an ore of iron, because 5 per cent. could not be made payable by any known process, or in other words 'cannot be commercially utilized.'" It had occurred, and might at any time again occur, that a mineral which for a long time was useless to the miner, and on that account was not considered as an ore, had by means of new discoveries become properly included in that category, as for instance Blende and Cryolite. Therefore any attempt to lay down definite rules for the estimation of the quantity of ore without rules for first delimiting the boundaries of the deposit to be estimated, and for first determining accurately the physical conditions and the commercial value of the ore, must fail, because the rule one would lay down to-day would change to-morrow. He would give a case in point. Some twenty years ago he was connected with a company working an extensive deposit

of copper ore in Venezuela. At that time they had no smelting works, and their instructions from London were to ship no ore of less than a stated contents of copper (probably about 9 per cent.) which would just pay the cost of mining and shipment. Later on, smelting works were set up, and they then raised the grade of the ore to be shipped to say 10 per cent., all ore below that, but not less than 4 per cent., being sent to the smelting works. Thus, in estimating ore reserves in that enormous deposit in 1880, an engineer would only have calculated ore worth over 9 per cent., whilst a few years later when estimating the same bodies he would extend his measurements and define the bodies down to a 4 per cent. basis. In fact, two entirely different estimates would have to be made on the same ore-body, assuming it to be left untouched in the interval; and, moreover, in the late estimates, the quantities of ore between 4 per cent. and 10 per cent. would have to be separately defined and measured, as also the ore-bodies assaying over 10 per cent. Later improvements in processes and methods might perhaps enable them to treat 2 per cent. ore, and once again the basis for measurement would be changed. In 1880, they had left many hundreds of thousands of tons of copper ore, developed and blocked out, which they never estimated as being available for extraction; but in 1882 these would all have to be defined, measured and calculated. He mentioned this case to support the contention that the quantitative estimation of ore could not be considered, much less proceeded with, until they had defined the commercial value and the boundaries of such ore-bodies.

The definitions of other authorities might be cited to show that they were quite agreed on this point that ore did not mean merely a metalliferous or mineralized body, but a metalliferous or mineral mass that might reasonably be calculated or expected to be commercially valuable. He did not know whether he was right in so interpreting it, but he thought that the author in his paper had attempted to consider and to elaborate the quantitative estimation of "ore in sight" without relation to the value of the particular body, and without first determining the factors dependent upon a qualitative investigation of it. It was quite true that, in the latter part of his paper, he dealt with the necessity for defining "ore-shoots" and taking samples, and even stated that the more samples they could take, the more likely they were to arrive at the average quality of the bulk of it. The speaker maintained that not only was this thorough sampling desirable, but it was absolutely necessary, and before attempting to estimate quantity he wished it to be laid down that they must establish value, physical character, and working cost. With regard to the many mistakes which Mr. Kendall had very properly placed before the Institution, arising perhaps from an incorrect conception of what was meant by ore blocked out—he abandoned the term "ore in sight"—the speaker wished to lay down that by far the greater number and degree of mistakes were made in assigning an average value to ore-bodies,

rather than in making mere quantitative estimates of them. He thought it was a fair argument to adduce that very often some of the estimates which had been condemned were strictly correct as to the "quantity" of ore developed. But when the engineer come to assign a certain value to that quantity of ore, errors were disclosed. Generally speaking it was impossible to approach the question of the estimation of an ore-body unless the geological and mineralogical conditions were first ascertained. It might be interesting to the members to mention one's personal procedure and practice in this matter—he always, when practical and necessary, made a double sampling before attempting to estimate the quantity of ore in reserve. He was not considering the case when one was a resident engineer, well acquainted with the local conditions, average values, etc., but referred to his practice as a visiting engineer. He then first took a casual or desultory series of samples in relatively small quantities. If anything attracted his attention in the levels and stopes, from difference in the colour or other physical condition, he took a sample from it. He considered this the only way in which they could hope to arrive at a right conclusion, viz., to build up the structure point by point on absolute facts. From that first series of samples, which was not intended to arrive at a definite result either as to average value or quantity, he got the first data on which he could lay out a safe and sure basis for estimation. This preliminary sampling told him how the valuable ore was distributed, and what proportion of the whole might be considered to be payable. With that in view, and with the plan of the mine before him, he then laid out a second scheme of sampling intended to arrive at definite values for defined ore-bodies. No doubt that same practice was followed by many other engineers, but he had never seen it mentioned or described. That seemed to him to be the only way to attempt to estimate the ore in reserve, viz., to first deal with the values and define them. Thus there were not only three dimensions required—length, height, and breadth—but the fourth dimension of value.

Mr. Hennen Jennings.—In speaking of "ore in sight" it seemed to him that there were two distinct points of view which it could be regarded: first, the amount of ore in sight, in a mine whose future working the engineer is required to forecast; and, secondly, the ore in sight, in a mine upon which the engineer is required to make a valuation with the object of purchase. Theoretically the ore actually blocked out should be the same in both cases, but the discussion of the future ore possibilities would be very much more serious in the second case. In regard to the valuation of an ore deposit, he believed that the district in which it was situated and the past history of the mine were most important factors, and that values obtained by sampling small sections should be modified by these considerations. When there was utterly insufficient data for making any estimate as to ore in sight, the engineer should

clearly state this fact, and demand the continuation of prospecting. Yet he would often be required to make some working hypothesis on slight and insufficient data, in which case he must boldly show his limitations. The sketch system of showing all development work and ore blocked out—recommended by Mr. Kendall—struck him as an excellent suggestion, for nothing would bring more clearly before an engineer what he actually knew, and what he had to surmise, than an accurate carrying out of this system. In writing a report, it was necessary to keep in mind and to show what was absolutely known, what relied upon, what believed, what hoped, what feared, and what the conclusions were, based on the above facts.

Mr. R. T. Bayliss felt that the Institution was under an obligation to Mr. Kendall for bringing the matter forward. It was a question which interested him personally very much, for, during the past four or five years it had been his duty and his misfortune to have to read through upwards of 1,500 reports on various mining properties. He thought he might venture to say that not more than 5 per cent. of them contained estimates on the subject under discussion which would enable him or any other man to form a correct idea as to what the absolute value of the so-called "ore in sight" might be in any one of those mines. He did not think that the term "ore in sight" was quite a happy one to use. Most of the speakers devoted their remarks to the tonnage of the ore in sight, but in suggesting allowances he did not see that they said very much as to the values. He had found in his experience that it was much easier or more safer to discount the future as to the tonnage, than as to the value. In such cases, one must naturally be very largely guided by the circumstances. He had found from his own bitter experience that to estimate much in the way of values below what one could absolutely see was remarkably dangerous. In illustration of that he would like to mention a mine with which the chairman was familiar—the Drum Lummon Mine, in Montana. That mine had been opened for a depth of 400 ft.; on the 400-ft. level it had been developed longitudinally for about 3,000 ft., and in that 3,000 ft. they had ore-chutes aggregating not less than 1,500 ft. They averaged about 10 ft. in width, and from \$40 to \$50 per ton. When that level was opened up, he thought they had the biggest mine in the world, and at that time he would have said that anybody making an examination for purchase might have been justified in assuming a great deal below that depth. When they got to the 500-ft. level, at the point where the cross-cut first reached the lode it sampled about \$20 per ton. They thought that that was merely a little local impoverishment, and paid small attention to it. At the 800-ft. level it was worth nothing, and subsequent developments proved that those big ore-bodies, which had been uniformly rich from the surface, at 25 ft. below the 400-ft. level were practically of no value. With that illustration in his mind, it would probably not be thought unreasonable for him to be extra cautious

in giving a mine credit for anything more than he could see. He noticed in the discussion at the last meeting that some speakers thought it would be quite unreasonable not to estimate something in the way of ore in sight where there was merely one exposure, *i.e.*, where a drift had been advanced under an ore-body. There again he had had another bitter experience. He took a bond upon a mine in Montana, a carbonate of lead mine, and they ran a drift from the bottom of the shaft about 80 ft. deep, advanced it between 500 and 600 ft., and met with several bunches of pay-ore running from a few feet up to 30 or 40 ft. in length. They thought they had a great thing. When they came to break them, they found that they went neither up nor down; they were just little "kidneys" in the vein. For that reason, personally, he would not be disposed to allow very much on a single exposure. Above all things he thought they should be careful that a discussion on this subject should not mislead the students of the Institution. He would not like to think that they might in after years, if they made mistakes by over-estimating, refer back to the *Transactions* and find in this discussion a justification for almost any kind of estimate that they might like to make. For that reason he urged upon the members who had spoken and the members who were about to speak that they should try to lay down a very hard and fast line for the students to follow, *i.e.*, that they should consider as ore in sight only ore which was in sight and not that which was not in sight, and that they should state absolutely, frankly, and with great care, the actual ore in sight, or, as he would prefer to put it, the net profit exposed by the development of that date. They might suggest, if they liked, by way of supplement, how much, in their opinion a purchaser might be justified in adding as the unknown value of the mine; but under all conditions they should put before their employers, and the persons for whom the reports might be made, a plain statement of facts which need not be discounted at all, and which would enable a man of ordinary business sense to form his own opinion as to the value of the property.

Mr. E. H. Davies thought the discussion had already shown that the author might rightly have claimed that his subject embraced one of the most important questions which they were called on to solve. He believed that each one of them had been tripped up by it at some period or other of his professional career. Certainly all possible sources of error should be eliminated, but he feared it was impossible to reduce the question to an exact mathematical formula. In their younger days they would perhaps have lightly gone to work with a tape and a slide rule, and so arrived at a result more or less misleading. But the longer and more extensive their experience became, the more they realized the difficulties of the situation. If deposits of metalliferous minerals were of the same regular nature as coal seams, their task would be easier; but knowing as they did the extremely irregular manner in which the majority of mineral veins occur, he thought they

might properly hesitate before giving a definite opinion as to the amount of ore in reserve, and even make it contingent on various circumstances. Mr. Collins had alluded to the rough-and-ready Cornish method of allowing 6 fath. as the safe limit for estimating extensions, and he knew that some American engineers allowed a margin of 50 ft. under similar conditions. Now the depth of an ore-body below the floor of a level may be no thicker than that of a coat of paint, or it may extend as in the Rand mines, for a mile or more. Evidently, therefore, the question became one of the individual experience and capability of the inspecting engineer..

There was another point to which he thought reference should be made, and that was the disposition of certain boards of directors to urge their engineer to make the most favourable estimates possible. On some future occasion it would, he thought, be profitable to discuss the pernicious influence of market manoeuvres on mining operations. Should the engineer yield in a moment of weakness to the pressure of his directors and his estimate unluckily prove afterwards to be incorrect, then he would find himself in an extremely awkward situation. The system advocated by Mr. Kendall of furnishing a section of the mine with an estimate, showing the ore-bodies which might fairly be said to be "in sight" as well as those which, though not actually in sight, might reasonably be expected to develop into ore in reserve, was certainly good; and if the dimensions of the lode as well as its average assays were given, it would provide a permanent record of the data on which the estimate was made.

Mr. A. G. Charlton thought with Mr. Kendall that a hard and fact line should be drawn by engineers between what might be termed actual facts and what were simply estimates or matters of opinion. There were doubtless instances, for example in a level driven off a vein, in which some allowance might properly be made for ore which was not technically "in sight," but which there was reasonable probability to suppose existed. And though custom might uphold and even justify an arbitrary procedure such as that quoted by Mr. Collins in Cornwall, it did not seem to him a good plan under any circumstances to place a fixed limit on ore which although visible in a bottom or end, had not been blocked out. If such ore was to be included at all in an estimate as "in sight," the allowance made for it ought to be governed by the length of the chute exposed, the average width of the vein, the trend of the ore chutes, and other factors. For instance, if a vein had shown a gradual tendency to narrow down, one might scarcely be able to calculate upon its holding down to any assumed depth; but if it showed a tendency to widen out, and there was little danger of its being faulted horizontally, one might justly reckon on considerable depth. In this connection, however, it was necessary to take into account whether such variations in size had occurred before; in other words, whether it represented merely a temporary feature or indicated that the vein might pinch-out altogether;

whether faulting was a common incident in other mines in the district; the nature and influence of such faults; and whether they had been met with at a certain depth or in certain zones of country. To include visible ore not blocked out in "ore in sight," seemed to him, however, to be, so to speak, forestalling one's future reserves, which might land one in serious difficulties, apart from the risk that must always be involved in making such estimates. In cases of this sort, at any rate, he thought some qualifying expression ought to be employed, such as "probable ore in sight," and it was much better not to attempt to calculate on any actual tonnage of ore as being an available asset until it was blocked out.

Mr. Kendall, in reply to Mr. Rathbone, said: Ore blocked out could be estimated with sufficient exactness for commercial purposes, so that a purchaser might be willing to take it at 10, 12 or 15 per cent., plus redemption according to the character of the deposit and according to the completeness of the blocking out. Moreover, it might be possible for an engineer to ascertain the quantity and the quality, of course, without knowing anything more about the deposit than could be gained from a study of the ore to be actually measured. But when one came to form an opinion as to the quantity of ore outside the ore blocked out, one entered upon a much more difficult problem, perhaps the most difficult with which an engineer had to contend, and one which required a much better training and wider experience than was needed in the estimation of ore in sight. Moreover, it was necessary to take a much wider view. One not only required to examine the whole of the mine with which one was concerned, but to gain as much insight as possible into the behaviour of adjacent deposits, if there were any, and into the geological structure of the ground immediately surrounding the mine under consideration. Even then it required the very greatest caution not to include too much of the unknown; and with all those precautions it might not be wise in some deposits to purchase at less than 30 or 40 per cent. plus redemption, and, in certain instances, then only as a deferred annuity. "Ore in sight," or, preferably, "ore blocked out," being a measurable quantity, should never be included with ore not blocked out, which was not a measurable quantity in any way like the same sense of the word.

MINING IN THE MT. SICKER DISTRICT.

SOME years ago there was little thought of mining on Vancouver Island. A little desultory prospecting work had been carried on since the old Cariboo days, that had left its mark in abandoned drifts and water-filled shafts, principally on the Coast, but of successful mining there was none.

In the year 1895 it was reported that two or three men were prospecting on Mount Sicker, a hill situated some five miles from the little settlement of Duncans, a small town on the Esquimalt & Nanaimo Railway. No excitement was caused by this, and hardly

anyone took the trouble to go and see the claims that these men were working on, or the shallow prospecting shafts that they had sunk. In August, 1896, a forest fire devastated the western slope of Mount Sicker. So fierce was this fire that the smoke clouds veiled the sun for days and the ashes were carried by the wind for miles over the surrounding country. The men working on the hill had to fly for their lives, and their cabin and effects were consumed by the flames. Not the most vivid imagination could have pictured that the results of this fire, was to be the development of a great industry, the establishment of two smelters and to wake Vancouver Island from lethargy to active work.

In the early spring of the year following the fire, Harry Smith, who was one of the three pioneers who

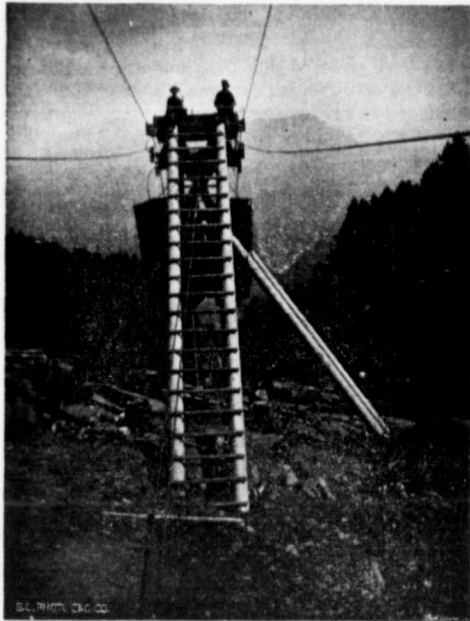


Recently installed aerial tramway, Tye Mine.

had been prospecting on the mountain, found a large body of copper ore that had been uncovered by this fire. This was on the Lenora claim, from which has since been mined to the shallow depth of some 200 feet, 100,000 tons of rich ore. Shortly after this time, a London syndicate secured by purchase, the Tye claim, which was situated above the Lenora.

The Tye Development Company started work in a modest way, in the early spring of 1899. The nominal capital at the start, was only fifteen thousand pounds, divided into 15,000 shares of one pound each, the working capital being five thousand pounds. Solid ore had been uncovered by trenching near the western line of the property and on this a Colorado horse whim was installed and a shaft sunk to the

depth of 200 feet. In August of that year the ore body was struck at a depth of 160 feet 20 feet to the north of the shaft, and in November it was again intersected at 200 feet from the surface. In 1900, notwithstanding the great financial difficulties created by the South African war, a further sum of twenty



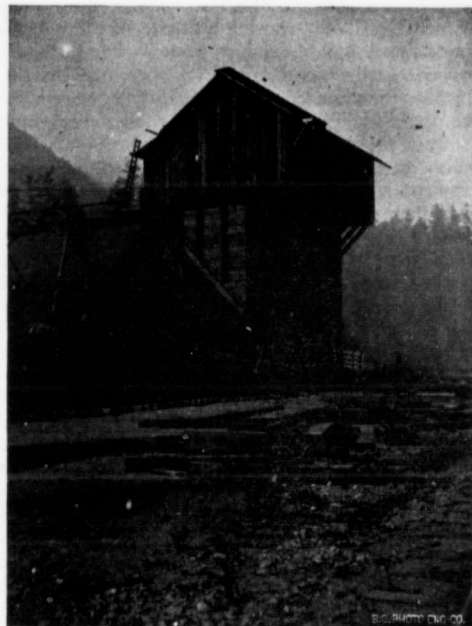
Tension Station, Tyee Mine.

thousand pounds was subscribed and the share capital increased to 100,000 shares of one pound each.

Steam hoisting machinery and machine drills were now installed and a main working shaft in three compartments was sunk upon the lode. This shaft was further to the east than the old one, being 300 ft. from the western boundary of the claim. At a depth of 200 feet the shaft bottomed on the ore, dipping in from the south, it having been put down to intersect the ore body on the dip. The first crosscut from the main shaft proved the ore body at that depth to have a width of 24 feet of solid ore. Drives and crosscuts at these levels, proved the ore to be continuous and varying in width from ten to forty feet.

In the autumn of 1901 steady development work having been carried on for two and a half years, the development of the mine justified the directors in considering the most economical method of shipping and treating their ore. A further working capital of fifty thousand pounds was subscribed, the nominal capital of the company being raised to one hundred and eighty thousand pounds in 180,000 shares of one pound each, and four additional mineral claims and five fractions were purchased on the run of the lode. This increased the company's holdings to 250 acres

of mineral land. A contract was entered into with Mr. B. C. Riblet, of Nelson, to construct an automatic aerial tram on the double rope system, to connect the mines with the E. & N. Railway, the length of the tram being three and one-third miles and having a maximum capacity of 400 tons per day. Arrangements were entered into with the E. & N. Railway Company, by which the Tyee Company acquired 30 acres of land on the sea front of the rising town of Ladysmith, upon which to construct a smelter. An up-to-date smelting plant with modern labour-saving devices is now in course of erection and will be running early in December. The Allis-Chalmers Company, of Chicago, are the manufacturers of the machinery which will have capacity of 150 tons per day. From the autumn of 1901 to the present date heavy development work has been pushed on the ore body and large reserves opened out. The ore body has been driven on for a length of 750 feet, proving the ore to be continuous for the whole of that distance



Terminal of Tyee Aerial Tramway on E. & N. R'y.

and the face of the drift is still in solid ore. The 100 and 200-foot levels are now connected by raises and stopes are opened at various points, some of these having a width of 40 feet. The configuration of the ground is such that over 100 feet of additional depth has been gained in the distance run. Down to the shallow depth of 200 feet and with not half of one claim explored, the ore reserves in the mine amount to at least 100,000 tons. The main shaft is still being pushed down to prove the property in depth and a station will soon be cut at the 400 foot level. At the 300-ft. level ore was struck and now on

nearing 400 feet ore is making its appearance in the shaft, although the main ore body is presumed to be some distance to the north. Several hundred assays have shown values of from 3 per cent. to 20 per cent. copper, \$2 to \$15 in gold, and from three to ten ounces in silver.

Shipments aggregating 275 tons have been shipped for test purposes to Tacoma, and they have run 8 per cent. copper, \$5 gold, five ounces silver per ton of 2,000 pounds. The gross value of the ore in sight at the mine is estimated at about \$1,800,000.

Two thousand tons of ore is now on the burning grounds at the Tyee smelter at Ladysmith, and over

these both have done much toward its growth and its perfection. To-day it is just about holding its own in an equal contest; but it needs help to win and to survive.

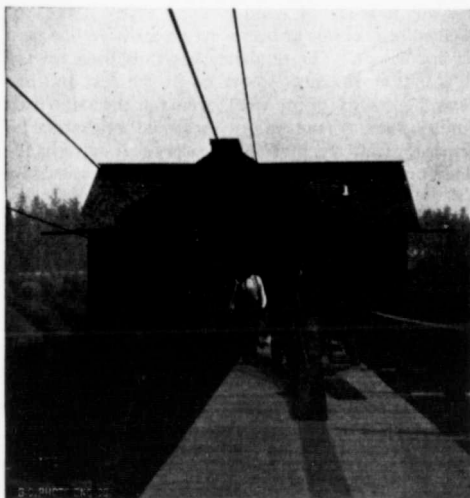
It is not our purpose to discuss the form or extent of assistance necessary, nor yet to enter into many purely technical details of concentration as now followed: it is rather to consider what has been done toward working the deposits economically and thus doing all that is possible locally to bring about the stability of the industry.

Without considering certain evidences of an earlier knowledge of one or two deposits of ore, the "Slocan" first became known in the late autumn of 1891. The grade of the ores in silver was found to be so high that, although the price then was considered low (above 90 cents per oz.), the discoveries caused much excitement and the district was the scene of great activity during the year 1902. The activity was well justified, too, for during the year several shipments of ore were made, and these proved that, generally, wherever galena was found, it was of sufficiently good grade in silver to be marketed profitably, containing as it did, say, 150 ounces or more of silver per ton, and 50 per cent. lead.

As is often the case, the region was a wilderness and "transportation" was far away. Kaslo, on the west shore of Kootenay Lake, was the first town to be created because of the discoveries, and it was not long before the energy of its citizens took form in the building of a waggon road up Kaslo Creek, 20 miles to Bear Lake. Many trails also were reaching out to many claims, and shipments were made on a sufficient scale during 1892 to afford a good knowledge of the resources of the region.

But, discouragement was soon to come, as it did in 1893, in the fall of silver. This, however, was only a shock which served to quicken the senses of the workers in this still new field, and with energy and a realization that expensive mining plant was not an essential, the claim owners kept on with such success in their efforts, that the Canadian Pacific Railway Company had a branch line well under construction during the year for the purpose of entering the field. This was completed in the autumn of 1894 as far as Three Forks, 36.6 miles from Nakusp on the Arrow Lakes. The year of 1894 also saw the formation of a company to build a narrow gauge line from Kaslo to Sandon, 28 miles, and this railway was built to the latter point in 1895. Moreover, as Sandon was several miles nearer to the centre of probable production than Three Forks, the Canadian Pacific line was extended from the latter point to Sandon, thus affording competitive transport facilities, the effect of which has been felt favourably ever since.

It is difficult to get accurate statistics of what the output of silver-lead has been up to the end of 1894, and no comparison can therefore well be made with the output of later years; but the effect of the advent of railways can be imagined. Suffice it to say that not only did the volume of shipments increase, but the



Lower Terminal Aerial Tramway, Tyee Mine.

100 tons are being received there daily. The recent discovery of solid ore in the Richard III., the claim next to the Tyee on the east, proves without doubt what had long been believed, viz., that the ore lives right through the Tyee claim and thus doubling the ore reserves of the Tyee mine, from the surface to the levels now being worked.

DEVELOPMENT OF COARSE CONCENTRATION IN THE SLOCAN DISTRICT.*

By Samuel S. Fowler, S. B., E. M., Nelson, B. C.

THE silver-lead mining industry of the Slocan has now been alive approximately ten years, a time sufficient for it to have taken on a definite form and to have become of definite importance. This form, although we think not yet a perfected one, quite naturally has been attained only by passing through many struggles with nature and with man, and yet

*From the Canadian Mining Institute.

cost of operation decreased, while development work received a decided impetus.

It should be remarked, here, that what had been accomplished at the time of the completion of the railways, and even in large measure since then, had been without any extraordinary effort, and without the aid of any large amount of outside capital; indeed, many of the shipping properties had paid "from the grass-roots." It was, nevertheless, beginning to be felt that sooner or later an important part of the output must be won by mechanical means, the present importance of which will be shown hereinafter.

The geological and physical features of the Slocan ore deposits are not germane to our subject, but in passing it may be well to give a brief statement of these. For our purposes we would describe the Slocan district as a ruggedly mountainous area lying west and north of Kootenay Lake and its west arm, east of Slocan Lake, and south of a line extended east from the north end of the latter. In the northern part of this area we find about 100 square miles of the "Slocan slates,"* from which by far the greater part of the silver lead output has been derived. The ore bodies usually cut across the slates, are from a few inches to many feet in width, are probably genetically related to a series of porphyry (felsite) and other dykes, and, beside the usually occurring gangue minerals, which are chiefly spathic iron and quartz, in the case of the larger deposits contain many inclusions of country slate.†

South of the slates we find a large area of coarse granite, in which are many veins of value. Those which contain any notable amount of lead and zinc minerals are quite narrow when compared to the deposits found in the slates; but because of the hardness of the granite, the fissures are often much more sharply limited as to the walls, and fewer large inclusions of the country rock are found. The ores are harder and tougher, contain a greater proportion of quartz and spathic iron to valuable mineral, a greater variety of other gangue minerals, and important amounts of the richer silver-bearing minerals, finely disseminated. As in the slates, an important part, and indeed frequently the chief part of the values, is highly concentrated, and is extracted and shipped, with little sorting, as "clean ore."

East of the slates and granite, we find along the west shore of Kootenay Lake, a narrow fringe of very old schists and slates, which, in the vicinity of the town of Ainsworth, carry valuable deposits of good size and apparent permanence. But the ores are of low grade in silver (excepting some which lie near the granite area), and although considerable shipments have been made, they cannot under present conditions yield much, if any, profit.

I have stated above that a large part of the Slocan output has been derived from those portions of the

deposits which contained the ore in a concentrated or "clean" state. It will be understood that a vast amount of material has been broken down in this process, which could not be formerly profitably disposed of. This may be somewhat enriched by such small fragments of the clean ore as escaped the miners' vigilance, and was used for filling stopes or placed on dumps, until such time as it could be treated by mechanical means. Such second-class ores, together with the parts of the deposits which contained no clean ore, accumulated to an enormous amount, and of late years have formed the basis of operations very important to the district.

The experience of most of the mines has shown that the process of hand-sorting, even of the so-called solid ore, was at best a very expensive one, and very inefficient. The tendency has thus been toward the adoption of means to cut down the cost and improve the quality of the work, whilst at the same time winning such of the values as would otherwise lie dormant. Latterly, therefore, the proportion of hand-sorted ore to total shipments has declined noticeably.

CHARACTER OF PRODUCT.

The material shipped from the region described, is (a) silicious oxidized ore from near the surface of the deposits which are in slate. This product was formerly of important quantity, was often high grade in silver, and carried about 20 per cent. to 30 per cent. of lead; but it is no longer of much, if any, importance, the superficial portion of the veins having in most cases been worked out. (b) *Galena*.—This forms now the bulk of product, whether as coarse, hand-sorted ore, or as concentrate. The shipments are still high grade in silver, say 80 to 100 ozs. per ton, and probably average about 40 per cent. lead. It is impossible to give any average analysis of this material as a whole, but besides the lead, about 12 per cent. of zinc may be said to be present, and of the balance the chief constituents are quartz and spathic iron, which, by reason of the imperfections of all processes, cannot well be eliminated efficiently, *i.e.*, without the loss of too much value or at too great expense. (c) *Dry Ores*.—Chiefly silicious, silver bearing material, very low in lead. This class is now derived principally from the granite area, and up to the present, is not amenable to efficient concentration. It is therefore shipped direct to smelters, who employ it as a flux, and as a diluent of the heavy lead ores in the furnace "charges." (d) *Silver-bearing Zinc*.—This is found of high grade in several properties, and some has since been shipped either as hand-sorted or as a middle product from some mills, either by itself to European smelters, who allowed payment for the zinc content, or mixed with the galena concentrate after elimination of gangue minerals. The Slocan is affording a gradually increasing amount of this rich zinc, and a satisfactory solution of the problem of realizing on all the values is at present one of our greatest troubles. Not discouraged, however, several of those in charge of plants appear to be approaching a solution, of which it is yet too early to speak.

* So named by the Geological Survey of Canada: See Mr. McConnell's Report for the year 1895.

† This latter characteristic might better in some cases, be expressed as a penetration of the fractured slates by the ores.

PRODUCTION.

It is extremely difficult, if not impossible, at this late day, to get accurate figures of production for the first three years of Slocan output. Those given in the "official reports" are essentially Customs returns, and the metal contents of exports have always been only approximately stated. The figures of output since 1894, however, thanks to the careful work of the Provincial Mineralogist of British Columbia, are dependable.

If we refer to the reports of the Minister of Mines of British Columbia for 1894 and subsequent years, we find the basis of the following table of silver-lead production in the "Ainsworth" and Slocan mining divisions, which embrace the area which we call Slocan.

Year.	Ozs. Silver.	Tons Lead. (2,000 lbs.)	1 Unit of Lead (20 lbs) contains ... ozs. Silver.
1892-94*	1,050,539	4,783	2.20
1895	1,400,070	8,238	1.70
1896	2,328,355	10,686	2.18
1897	4,165,865	17,126	2.43
1898	3,235,795	14,520	2.23
1899	2,159,190	10,125	2.13
1900	2,473,343	11,466	2.16
1901	2,601,172	9,407	2.76
Total	19,414,329	86,351	Av. 2.25

These figures are of much interest to those immediately concerned, and exhibit the effects of certain causes, but for us the main interest centres in the column of ratios of lead to silver. When we explain that in 1895 the ratio is low because the old Bluebell mine was producing a very large amount of lead of low silver tenure, and that in 1901 there was a heavy output of dry silver ores, with concurrent small lead production, the ratio was high, there is a remarkable uniformity in grade of output. A second point of interest is revealed in the average ratio of two and one quarter ounces of silver to each unit of lead. This implies much richer ore than is produced on a large scale in any other district of the Northwest, and the richness is still more evident when we state that the ratio in East Kootenay is only one-half of one ounce per unit, and in the Coeur D'Alene district of Idaho, it is somewhat less yet. It should be remembered, too, that whatever ore was produced near the town of Ainsworth tended to reduce the average ratio, which is there about one to one, and the comparisons above made are, therefore, all the more remarkable.

The figures given above tend to show not only a good reason for the rapid advance of the Slocan, but they indicate the important differences between successful concentration in Slocan and in East Kootenay or the Coeur D'Alene, when commercial results are considered. Putting the difference tersely, and assuming that all the silver is contained in lead, a loss of one per cent. of lead in tailings, means in the Slo-

can four and a half times as much as it does in the other places. The layman will quickly point the moral—"Save your lead"—but just where to stop is the problem for each manager to solve in his own case, and no line or limit can be arbitrarily set, nor can we say that it is not better to save only 70 per cent. in one case than 85 per cent. in another. Millmen throughout the Northwest, confronted by conditions of very high wages and expensive supplies, may and do often find it best to sacrifice high efficiency to the better commercial results attained by rapid operation and large tonnage. In a general way this has been proved desirable in Coeur D'Alene, but in Slocan it is not so much so. Our observations lead us to the statement that in many instances the relations of the commercial and technical factors of concentration have not been sufficiently studied before construction has been started. Indeed, it is within only the last two or three years that there has been any considerable departure from the details of mill design, which have been so long regarded as incapable of improvement. The earlier designs followed the Coeur D'Alene practice very closely, with a rapid running and low costs as the chief aim. Latterly the modifications have been in the direction of possibly greater first cost, and increased efficiency, without increasing the operating cost, especially in the fine end of the mills.

Coming now to an enumeration of the mills which have been built, we believe that even those who are familiar with the Slocan will be surprised at their number. The mills and years of construction are as follows:

1—Almo	1894	11—Ivanhoe	1900
2—Washington	1896	12—Enterprise	1901
3—Slocan Star	1896	13—Payne	1902
4—Noble Five	1897	14—Rambler-Cariboo	1902
5—Whitewater	1898	15—Pilot Bay	1893
6—Montezuma	1898	16—No One	?
7—Comstock	1898	17—Woodbury	?
8—Jackson	1899	18—Highlander	1899
9—Ruth	1899	19—Highland	1900
10—Wakefield	1900		

Of these the last four are in the vicinity of Ainsworth, and have treated the low grade ores of that camp. The Pilot Bay mill, in 1895, treated the ores of Bluebell mine. The Washington mill was dismantled during 1901, and the plant rebuilt at the Rambler-Cariboo.

The combined capacity of these plants is probably about 2,100 tons daily, and their erection has probably involved an outlay of well over \$500,000.00. Of the total number only five happen to be in operation at present, while of the remaining thirteen, six were erected, in our opinion, without sufficient justification as to tonnage in sight. The others are not in operation for various reasons which it is hardly necessary to discuss here.

Among so many plants one easily discovers differences of design and operating scheme, and, as might be expected, the technical results obtained probably vary within wide limits. Of the more prominent mills, however, not less than seven were designed and

* The figures for these three years are for the entire British Columbia output, but as this was essentially all from the region we call Slocan the figures may be regarded, for our purposes, as sufficiently accurate.

erected under the supervision of one man, who, in outward appearance of his structures at least, has quite naturally followed one general plan, eminently adapted to local conditions; and we may also say that no matter how much we may differ from this designer in detail of scheme, he has been very successful in producing mills which are operated at low costs for labour.

By way of brief description of the process, we would say the ores are delivered to mill storage bin. From this they pass over only a small Grizzly to Blake crusher, set so that the maximum size of product will be about one and a half inch. With or without an intervening bin, the ore passes through a belt-driven cam feeder to roughing rolls, belt driven, usually not less than 30 inches in diameter, nor more than 12 inch faces, running at about 110 revolutions. These rolls discharge to an elevator and thence to trommels, whose screen sizes vary from 21 mm. to 2 mm. Sizes over 2 mm. pass to Hartz jigs, and those under 2 mm. to hydraulic separators, from which, sizes about 1 mm. go to fine Hartz jigs, and those below 1 mm. through spitzkasten to some form of vanner, or other table machine, or formerly to revolving single or double-decked buddles. Middling products from coarse jigs are re-crushed by rolls usually duplicates of the roughing rolls, while middlings from finest jigs and the tables are commonly re-crushed in Huntington mills. The concentrate is conveyed by water through launders to a series of bins where it drains, and is put into jute sacks for shipment to the smelter.

The general course of the ore and products through the mill will thus be seen not to differ in any material way from that of other regions where coarse concentration is practised. When we examine into details and results, however, we are forced to the conclusion that better work can be done, and we therefore venture to offer the following comments on the process as now carried on to any who contemplate the erection of concentration plants in the Slocan.

We have remarked above on the high ratio of silver to lead in these ores. This ratio is high not only because the galena, when perfectly clean, is usually high grade in silver, but because of the admixture of gray copper and other rich silver-bearing minerals. These, as well as the galena, are not only soft, but very friable, and what with their tendency to breaking very finely in the crushers and rolls, and the results of attrition on the beds of the jigs, a surprising quantity of rich material soon finds its way out of the mill by illegitimate means, and the vehicle largely responsible is the final overflow of water from concentrate bins and from the spitzkasten, whose settlings feed the vanners or tables. Almost all mills attempt to remedy this evil by means of shallow settling vats placed below the concentrate bins; and in a measure these are useful. Our experience shows, however, that not only is the overflow still valuable, though less in quantity, but that the material saved, on account of the extreme fineness, holds about three times as much water as the normal concentrate, is lower grade in

lead and silver and higher in zinc. The same remark as to quality would apply in greater degree to the overflow from spitzkasten. As to the latter, we may say that in order to reduce losses in this direction, we have returned this overflow in one instance, and concurrently reduced the volume of clean wash water on various machines, with some degree of success; but at best the scheme is only a make-shift, and I believe that we are doctoring this difficulty at the wrong end. We should prevent the evil rather than remedy it, by providing a short sorting belt, above the coarse crusher. This need not be over, say, six feet long, would cost little and could be handled by the crusher tender, whose functions now are chiefly those of a watchman. The sorting belt is practically unknown to the Slocan mill, and without reverting in more than slight degree to the labour-devouring practice of Europe, I know from experience that in some instances a limited introduction would be a paying one. As indicating the result which may be expected, where the mill feed contains an appreciable quantity of galena in pieces of the size of one's fist, or larger, I may cite an instance at one of the mills of which I am in general charge. In the summer of 1900, our crushermen, under instructions, picked out from the ore stream passing over the grizzly such pieces of coarse galena as they could conveniently, and without any special care. The feed was not sprinkled, and much of the galena which was coarse enough to have been easily sorted on a belt, probably escaped into the crusher. During a period of about four months, 120 tons of galena were thus sorted, equivalent to about 8 per cent. of the total concentrate made in the same period. Comparative average assays of the two products are given, viz:—

	Silver.	Lead.	Zinc.	Ratio.
Sorted Galena.....	101.7 ozs.	40.2	15.4	2.53
Concentrate.....	73.0 "	30.0	21.0	2.43

For this galena we received from the smelter about \$670.00, and had it been sent through the mill in the usual way, it is safe to state that fully 10 per cent. would have been lost.

It cost us nothing to save \$670.00. How much more could have been saved by the aid of proper appliances I do not know; but there is no doubt about the accuracy of the data, nor, I think, of what they indicate.

Another notable feature of our mill is the absence of any general attempt at close sizing before jigging. In this respect we follow the common tendency of the Northwest, and more particularly the Coeur D'Alene, unless the practice of that region has changed since I was more familiar with it than I am at present. In many places the low grade of ore demands, or its simplicity permits, good results to be obtained without that close sizing which our German friends formerly thought essential, but about which American authorities have had considerable differences of opinion. There is no doubt in my mind, however, that Slocan mills cannot do efficient separation without close sizing. An extreme instance is

often more likely to impress one than a normal case of difficulty. I therefore give the following:—

At the Whitewater mill the feed consists essentially of slate, "talc," zinc blende, copper and iron pyrites, gray copper, quartz, calcite, spathic iron and galena. At our Enterprise mill the slate is replaced by granite, and we find, beside the Whitewater minerals named, important quantities of complex carbonates of iron, lime manganese and magnesia, some undetermined manganese zinc iron compounds, probably silicates and oxides, to say nothing of the rich silver minerals and native silver.

Now were our gangue minerals all simple and of low specific gravity, we would consider our way easy, and have little difficulty in doing respectable work with a simple screening system. The presence of all of the minerals above named is of course troublesome, but these obstacles to success are not insuperable. When we begin a proper study of conditions at Whitewater, we are stunned by the discovery that "galena" is not galena at all, for it is a mixture, I might say a concrete of comminuted slate, galena and zinc, with acclued particles of several of the gangue minerals named, the whole having a gravity of 4.75 to 5.25. This is so typical of the Whitewater mine that shipments of large quantities of well hand-sorted product, before our mill was built, showed an average content of about 35 per cent. of lead and 16 per cent. of zinc, equivalent to, say, 40 per cent. galena, 24 per cent. zinc blende, and the balance, or 36 per cent. virtually barren gangue. Galena of a gravity of 5.0, and barren pyrites of a gravity of 5.0, mixed with barren blende of a levity of 4.5, form a sort of ore dressing joke whose density is so great that one cannot laugh, with any enjoyment, and hold one's position at the same time. It appears to me that the only satisfactory way of solving such difficulties as are implied above, is through a more extended screen system than we employ. I am not prepared to say that we should go to the extreme limit of some German practice, but I do think that our mills should be designed with what one may call a greater limit of elasticity, one which will permit rapid and convenient alteration or extension of the screening department. The day has gone by when the man who wants a mill should go to a drawer and pull out a stock plan labelled with a specific tonnage capacity. Certain essential features of mill construction must always remain the same, but each new case of installation must have its details considered by themselves. Granting conditions of well sized feed, and a uniform quantity, I think the Slocan jig practice very efficient. The feed above 3 mm. in size usually forms nearly 80 per cent. of our tonnage although more nearly 30 per cent. of our values reach the fine jigs and tables. Indeed, in one instance the jig tailings were all eventually crushed fine enough to reach a row of seven Wilfley tables, I believe, with results which were good. Here, of course, a smaller percentage of product was made on jigs. The usual run of jig tailings seldom contains more than one-third as much silver as the fine end tailings do, and often it happens

that the work of the coarsest jigs is practically perfect. This is due in large measure, in some cases at least to the inclusion of coarse slate, quartz and calcite in the ore, all of these being generally barren of silver.

The fine end of our mills certainly affords room for very great improvement. In the mills which were built from 1896 to 1899, the most common machine used on the finer feed were double-decked revolving buddles, and although some are still in evidence, the majority have been replaced by other types. There are several reasons for this change, especially where the very finest pulp was being treated: 1st, the buddle was handicapped by imperfect classification of feed; 2nd, the wooden surface seemed to accumulate some vegetable slime which permitted the metallic minerals to escape too soon, and 3rd, in cases where volume of water was a consideration, it was found very wasteful. The buddle advocate has accused us of ignorance as to how to cork that machine. This may be just, but the fact remains that, in one mill, an extended comparison, on feed as nearly identical as possible, resulted in a saving of 300 lbs. more of a much better product, in 24 hours, with about one-tenth of the volume of wash used, the table used occupying only one-half the floor space of the buddle.

The unsatisfactory work of classifiers, of course, operates against any concentrating machine, and we still have troubles to overcome in the fine end, which no number of machines of existing types will bring about. Some one will always get a portion of what the preceding one failed to secure, so we are compelled to set a limit to plant which is governed by questions of dollars and cents. Solcan seems to have discovered that, on account of the great cost of machinery and installation, it does not pay to try to save more in the fine end than can at present be recovered by one passage of pulp finer than half a millimetre over well known machines of proved merit. Attention is, however, being paid to slime treatment, and some very careful experimental work conducted, which is so encouraging as to cause us to say that the close of this year will witness our probable ability to make an efficiency of well over 85 per cent. in silver a paying one.

This brings us naturally to what the present efficiencies are, and the subject is a delicate one. Aside from the fact that there are many millmen who, through false reasoning, would not confess to high losses, I believe there are more who do not know their actual losses, because of the general absence of automatic sampling devices for the tailings, and the too frequent use of the fire assay instead of the wet, in determination of lead. There is too much of a tendency among mill men to assume that, because they cannot see galena, for instance in tailings, the best possible work is being done. This assumption is, I think, a commercially justifiable one in many cases, but it affords no good reason for not knowing instead of guessing at losses. Personally I consider an accurate sampling of tails, and wet lead tests, of the

greatest importance, in the Slocan, and especially where much slate is present in the feed.

To illustrate the importance of the wet assay for lead, I may say that a series of important trials of pulps show a loss by fire method of from 70 per cent. to 100 per cent. of the actual lead present, when the wet test shows, say, under 2 per cent. in the sample, and in a recent trial the wet test showed 1.36 per cent. and 1.42 per cent. the fire assay none. The feed from which these tailings were derived contained 4.7 per cent. and 5.2 per cent. lead respectively, and the fire assay therefore perfection in the mill work, while the wet test gave efficiencies of 71 per cent. and 73 per cent. only. These results would be slightly improved, of course, if the tailings losses were worked out per ton of feed, but the figures illustrate our point, viz., not to deceive ourselves through wrong method of determining our efficiency. I do not pretend to know what degree of perfection is attained by others, but our own experience shows an actual recovery of 74 per cent. of silver and 82 per cent. of lead, from a feed of 10 ounces silver and 40 per cent. lead. Those who are not familiar with the shortcomings of existing types of concentrating machinery in use on a large scale, and those who do not care to know how poor a quality of work may be done, will regard these efficiencies as wickedly low. I am confident, however, that thorough investigation would show them to be excellent under the circumstances.

COSTS.

The operating costs in Slocan mills, are, as everywhere, very much dependent on the tonnage treated, but the cheapness of our power is an important factor. The ruggedness of the mountains permits convenient installation of small water power plants, working commonly under heads of three or four hundred feet, and while in some instances sufficient, if any, gauging of flow have not been made before location of plant was decided upon, to determine the dependable volumes, heavy snow-fall and even the presence of the glaciers at the head waters, insure sufficient water throughout the year on lateral creeks, at points very close to many of the mines. It is not necessary to dilate on this phase of the facts; suffice it to say that none of the mills except two on Kootenay Lake have any steam power plants. Most of the plants are designed with a view to saving of labour, and are compactly arranged. Their efficiency in this respect may be seen from the table of costs below, being results attained in operating one of the more prominent mills:—

Period, 557 days of 22 hours.

Tons of feed milled, 100,824 (including 7 per cent. moisture).

Tons milled per day, 181.

Costs.	Per Ton.	Per Day.
Crushermen.....	\$.0364	\$6.59
Foremen, jigmen and tablemen1613	29.19
Miscellaneous labour.....	.0223	4.04
Operating supplies.....	.0248	4.49
Maintenance and repairs of all plant; labour and material.....	.0958	7.34
	<u>\$.3406</u>	<u>\$61.65</u>

These costs do not provide for depreciation or insurance, the amount of which is of course largely a matter of judgment and conditions. The cost of maintaining the flume was 15-100 of one per cent. per ton, and thus practically a negligible account. It will be noted that the above figures make no provision for handling and disposal of product. The cost of this in the table would have added \$.0557 per ton of ore, but as the figure depends upon the richness of the ore, these costs of sacks and sacking are placed by us under another head, or as stated as so much per ton of product, (in this instance 56 cents). In this plant two hours are allowed every day for the common light repairs, and the practice has proved a good one in preventing many annoying shut-downs. We believe that with the tonnage treated, these costs would be difficult to lower, and they are given as an indication of what has been done on a large scale, without fear of serious adverse criticism.

MINING MACHINERY.

(By John R. Gifford, M. E.)

THAT the selection of machinery is a very important factor towards successful mining cannot be denied. As modern methods in mining has resulted in the decreased cost of production by new system of timbering and use of air drills, and other appliances, etc., it will be well to consider what class of machinery, such as hoisting, and stationary engines, pumps, compressors and drills, are best adapted to the successful and most economical working of mines.

It is a fact, as a rule it is considered that any old hoist or compressor will do to develop a property—no doubt caused in a great measure by the fact that the majority of mine superintendents or managers of small prospects, are not too well posted on the mechanical construction of mining machinery. Today are to be found in a large number of mines old and antiquated plants that are only fit for the scrap-heap, notwithstanding that much of this machinery may have been manufactured within the last year or two. As a rule, first cost is a prime factor in purchasing such material regardless of any practical or economical results to be obtained therefrom, so that to-day there can be found in some of the largest mines in America, engines, boilers, etc., that are most extravagant in fuel, and repairs, out of all proportion to what would be required in a better—thought at first cost would be more expensive plant. Especially is this so when comparing the value of different compressors for mine use. To the ordinary mining man all compressors are alike; some are better finished on the outside, and have more fresh paint and brass work than others, and in nine times out of ten, a fine-looking piece of machinery would be chosen regardless of efficiency—especially when added to this is the glib tongue of a smart agent brought into play.

How easy it is for them to guarantee large capacity of free air to such a machine—but above all things, it is the quantity of fresh paint and brass work put on as finishing touches that count.

an old saying that "out of sight, out of mind," and so it is with regards to the interior of a compressor. Who asks or cares to know anything about the piston valve arrangements or clearance space in air cylinder? Such points are rarely considered, but is a great consideration in compressing air. If there is large clearance space between the piston and cylinder heads or valves, then there is a great loss of energy, as in such case all of the air compressed is not discharged into pipes or receivers, but on return stroke expands with reduced pressure and prevent access of free air to entrance valves, and only a certain proportion of that which is compressed is in reality discharged through the valves into the receiver. And about the piston rings: who knows what amount of air is continually passing from one side of the piston to the other, occasioned by having defective rings; and last but not least, is the quality of oil used to lubricate the interior of cylinder and valve. How often does it occur that an agent for a cheap oil comes to the manager and brags about the quality and cheapness of the oil of all kinds that he has for sale, and even guaranteeing that his oil will last longer and give better results than that made by well known manufacturers of same? He usually makes a sale with the result that it is soon discovered that the stuff is not suitable for that class of work, is charred and gums up the valves, entailing no end of trouble to the engineer, and loss of time in the mine, when machinery has to be overhauled.

It is not my intention to advocate in this article the use of any special machine, but to bring before purchasers of machinery a few points for their guidance. For instance, in taking up the question of rock drills, a selling agent for these guarantees to the mine manager that his drill will penetrate so many feet of rock in an eight-hour shift. Whoever knew such guarantee to be fulfilled in actual practice. It is all very well to say that it will do so much work, but how long can that be done? I have tested about every type of rock drill now in use, and each has its weak points. Some drills entail a greater cost per annum in repairs than others, but it is not a question of the cost or renewal of repair parts, but loss of time to operators of such when they get out of order. When a machine is at work, and something goes wrong with it, the miners lose at least a half hour's time trying to find out what is the trouble; finally they take it down, and procure a new one at loss of time—for two men of at least two hours—while the repairs are being made. This was forcibly brought to my notice by testing a machine recently arrived from England. The pawl springs which were very light, and costing only a few cents each, would frequently be found broken and require renewal, entailing a loss to the operators of an average of one hour's time.

In mining, the best machinery which can be procured is none too good; the tendency in these days is to use very large drills. I consider that a 3/4 inch machine large enough for any mining work, irrespective of the character of rock—always supposing that the air pressure is not less than ninety pounds per square inch. Where air is to be conveyed in pipes

a long distance it should be super-heated at the nearest practical point to where same is used, and will result in greater efficiency and economy.

Regarding the selection of a hoisting engine, I would say, never to instal one with a single cylinder, for as it will frequently happen when wanted for instant use, stop on dead centre, requiring with large engines some considerable time to get started again. This would be very dangerous where men were blasting in shaft or winze, and had to depend on the machinery to get them out of danger. I also strongly condemn the use of claw or jaw clutches on hoists. The band friction clutch being much more suitable and safe, for if when lowering bucket or cage the brake should break, the friction clutch could be thrown in instantly and act, as a brake—but this could not be done with a jaw clutch.

There is great diversity of opinions as to the best type of steam boiler for mining work. My choice is for large locomotive or fire box type. The first cost would be slightly in excess of that of the ordinary round tubular boiler, but it would not require any brickwork, and when properly covered with some good non-conductive material will be found to be very economical in the consumption of fuel, and as a large number of mines have to depend on the use of cord-wood for generating steam, it is well adapted for it, as unlike the ordinary tubular boiler there is no internal fire box brickwork to be displaced by using cord-wood, and the cost of bricking in a tubular boiler more than offsets the extra price paid for one of the locomotive type. A boiler of this kind should never have less than three inches of water space between fire box and shell. Of mining pumps there are several in the market, but where dirty, and gritty water has to be contended with whether in shaft, sinking or station work, nothing but an outside packed plunger should be used.

A piston or bucket pump will always give trouble. Brass or gun metal valve with sole leather facing will last longer than any other kind of rubber valves.

Where frequently great mistakes are made is in the selection of a suitable treatment for ores found in a prospect; it generally happens that there is too great a hurry to erect a mill or smelter before having developed the prospect sufficiently to ascertain qualities and quantity of ore. I maintain that rarely is a mining prospect justified in having a mill or smelter erected unless there is sufficient ore in sight to net a profit of at least one hundred thousand dollars over and above all charges for mining and treatment. More failures are made by not having this in view than from any other cause. Very often a mill or smelter will be erected not only before such is justifiable, but a number of instances is of three times the capacity that is warranted by existing conditions of the mine, and again, often it occurs that a mill has been erected to treat ore that was only suitable for a smelter, and vice versa. And another serious mistake is often made in the selection of mills. Too often is it that a new-fangled conglomeration of pulleys, cams, rollers, etc., backed by worthless guarantees, and a smart smooth-

talking machine, been selected, and installed and found utterly worthless—result: failure and blasted hopes.

My advice is to first be sure you have a sufficient quantity of paying ore to justify the erection of same, then ship small quantities of, say five hundred pounds each, to several reduction works, and ascertain by doing so the best method suitable for the extraction of values from the ore. Then select the best machinery to be procured, but by all means, stay clear of new-fangled inventions, and let some other fellow do the experimenting with it; avoid by all means the accumulation of a scrap-iron pile around your works, for it looks bad.

If you do not know what is the best method suitable for treating your ores, get the best practical advice to be procured, and pay for it, for free advice in a question of this kind is very expensive sometimes. Rely on the old motto, which says: "First be sure you are right, then go ahead."

RECENT PATENTS.

WE are indebted to Mr. Rowland Brittain, patent attorney, of Vancouver, for the following report: Patents issued to British Columbia inventors this month are as follows: A. F. Griffiths, Victoria, log raft. In this patent the logs are independently strung on each side of the tow-line, by which means there is less chance of booms becoming broken up in rough weather. S. Fader, Vancouver, on a door handle; R. H. Casswell and W. E. Burns, on an improved milk strainer; Messrs. Johnston & Crofts, Nelson, on an improved briquetting machine; Messrs. McCormick & McPhail, Steveston and Vancouver, respectively, on a bicycle coaster brake; R. McBride, Eburne, on a baling press; O. H. Burden and T. F. Adams, Kaslo, on an amalgamator, the illustration and claims of which are given in the present report; and J. R. Brown, Vancouver, on an improved machine for filling cans of fish.

Manufacture of Aluminum.—No. 77,619. W. Rubel, Germany.

Claims: 1. Process of manufacturing aluminum, consisting of mixing clay with a sulphur containing compound of calcium, and a substance containing carbon, and exposing the mixture to a high temperature, substantially as described and for the purpose set forth.

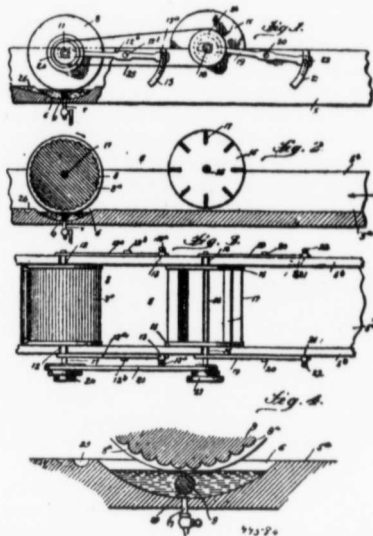
2. Process of manufacturing aluminum, consisting in mixing clay with phosphate of calcium, sulphuric acid and a substance containing carbon, and exposing the mixture to a high temperature, substantially as described and for the purpose set forth.

3. Process of manufacturing aluminum, consisting in mixing clay with phosphate of calcium, sulphuric acid, lime, and a substance containing carbon, and exposing the mixture to a high temperature substantially as described and for the purpose set forth.

Patent No. 77,584.—O. H. Burden and T. F. Adams, both of Kaslo, British Columbia, Canada.

Claims: 1. An amalgamator comprising a sluice way, means for holding mercury therein, and means for attenuating a stream of sand or gravel as it passes adjacent to the mercury container, said attenuated means consisting of a revoluble member adapted to be driven at a rate of speed exceeding the speed of the current.

2. An amalgamator comprising a sluice way having a mercury trough or pocket, and a set of attenuating rolls in co-operative relation to the trough or pocket, one of the said rolls adapted to be positively driven.



3. An amalgamator comprising a sluice way having a mercury pocket or trough, and a set of attenuating rolls, one of which is of larger diameter than the other and adapted to be positively driven.

4. An amalgamator comprising a sluice way having a mercury pocket or trough, and a set of attenuating rolls, one of which is immersed or submerged in a mercury bath within said pocket or trough.

5. An amalgamator comprising a sluice way having a mercury pocket or trough, and a set of attenuating rolls, each having a roughened active surface and disposed in co-operative relation to said trough, one of said rolls being immersed in the trough, and the other of said rolls adapted to be positively driven.

6. An amalgamator comprising a sluice way having a trough, and collecting pockets at one side of the trough, and a set of co-operating rolls adjacent to the trough.

7. An amalgamator comprising a sluice way, a set of attenuating rolls, and a current wheel having operative connection with one of said rolls.

8. An amalgamator comprising a sluice way having a trough, an attenuating wheel adjustable with relation to said trough, and a current wheel also adjustable in the trough and connected operatively with the attenuating wheel.

9. An amalgamator comprising a sluice way having a series of troughs, a current wheel, and sets of attenuating wheels, each disposed in co-operative relation to one trough, and provided with means for positively driving the same from the current wheel.

10. An amalgamator comprising a sluice way having a trough, a current wheel on a plane above said trough, a set of attenuating rolls in co-operative relation to the trough and below the plane of the current wheel, and gearing between said current wheel and one roll of the set.

BOUNDARY DISTRICT.

(From our own Correspondent.)

THE aggregate tonnage of ore shipped by Boundary mines during eleven months of 1902, to November 30th, is about 453,000 tons. More than half of this quantity was the product of the Granby Company's Old Ironsides and Knob Hill group of mines, and a considerable proportion of the remainder of the British Columbia Copper Company's Mother Lode mine. The approximate output of the respective mines of the district that have contributed to this aggregate is as follows:—Granby Company's mines, 280,000 tons; B. C. Copper Company's mine, 125,000 tons; Snowshoe Company's mine, 16,000 tons; B. C. Chartered Company's mine, 11,000 tons; Montreal & Boston Copper Company's mine, 10,000 tons; Dominion Copper Company's Emma mine, 7,000 tons; Jewel Company's mine, 2,000 tons; and several small mines, 2,000 tons. Practically the whole of this ore was treated at Boundary smelters.

The Granby and B. C. Copper Company's smelters are at present running two furnaces each, and the Montreal & Boston Copper Company's works one furnace. The Granby Company has been short of power but has been promised additional electric power to be available by the end of November, so as to enable it to put two more furnaces in blast. The five furnaces now in operation in the district together treat about 1,800 tons a day, so these would, if run without interruption until December 31st next, under ordinary conditions increase the year's aggregate to more than 500,000 tons. With two more furnaces running during December the total should reach at least 530,000 tons. The Montreal & Boston Company is putting in a second furnace, which should be running by December 1st, so may add 10,000 tons more to the year's total. In any case the 500,000 ton mark should be passed this year, whilst the figures may reach to between 540,000 and 550,000 tons. As compared with the output of 97,837 tons in 1900, and 386,675 tons in 1901, together 484,512 tons, the production of the current year exhibits a satisfactory increase and gives evidence of substantial progress. The gross value (with copper at New York prices) of the district's production for 1902 should be between \$2,000,000 and \$2,500,000.

THE ROSSLAND MINES.

(From our own Correspondent.)

THE anticipated amalgamation of the Le Roi and Le Roi No. 2 companies, foreshadowed in the last issue of the MINING RECORD, has not been actually accomplished as yet, but a long move in its favour has already been accomplished in the removal from office of Messrs. Bernard MacDonald and William Thompson, their retirement being officially announced this month.

Mr. Alexander Hill, a son of one of the Le Roi No. 2 directors, accompanied by Mr. Paul S. Couldrey, has meanwhile arrived in Rossland. Mr. Hill, Le Roi No. 2 directors officially announce, comes here to install Mr. Couldrey as manager of the mine under Mr. Hill's direction and the latter gentleman assumes all responsibility for the future management of the property in this country. Mr. Couldrey is said to be an experienced miner, having been connected with copper properties in Spain and with copper properties and lead concerns in Germany. He is a direct appointee of Mr. Hill's and has been one of that gentlemen's assistants in the past. The amalgamation scheme of the two Le Rois has been strenuously denied, and even Mr. Hill expressed ignorance of the matter, but all the same the situation entirely justifies the move, and Mr. Wm. Thompson, the retiring manager, in a recent interview strongly supported the proposal as the one best calculated to place the Le Roi No. 2 on a profitable basis. Just how the matter will work out in detail will largely depend on the report Mr. Hill has sent home to his directors. He has been sent here to fully report on the situation, and his statement on the real condition of the mine, the advisability of continuing shipments, the smelter arrangements, and the many other questions that are at present awaiting some sort of settlement, will go a long way in deciding what is best to be done. It is not improbable that Mr. Mackenzie the Le Roi manager, will be asked to take the post of consulting engineer of the property and of generally overseeing affairs. The Le Roi No. 2 has at present to pay unduly high rates for smelting at the Le Roi works at Northport, and the joint management would mean more favourable terms, a point which would mean a very substantial saving for the shareholders of the mining company.

The Le Roi continues to make a good record in the way of net profits. Those for October are officially placed at \$85,000 and will probably exceed that sum by at least \$5,000 when all the returns are in. Since the 1st of May last until October 31st the net profits of the mine and smelter total the very creditable amount of \$502,686 from 95,298 tons of ore shipped.

The manager of the Le Roi gave out to the local press during the month a very cheery report concerning the present conditions and future prospects of the mine, but, he added, that the mine would not be worked to its full extent until next spring, by

which time, he said the financial affairs of the company would fully warrant a great advance in the methods of mining, and this has been generally taken to mean that the Le Roi will keep up its present output until the spring, when a substantial increase may be looked for with the consequent increased net profits exceeding that already made in the past six months.

In their efforts to obtain control of a portion of the water supply owned by the Corporation of Rossland and in their management of the Rossland *Miner* the Centre Star-War Eagle people have fallen foul of the Le Roi managers and a pretty fight is now in progress in the law courts and out of them between the rival parties. The War Eagle-Centre Star companies have laid great stress upon the amount they are expending in concentration experiments and they appealed to the community to assist them as against the stand taken by the civic authorities on the water question. Mr. Mackenzie, in answer to this, has publicly stated that his company is expending twice as much money, in trying to solve the concentration problem as the War Eagle people are, and he added that the Le Roi company were quite willing that the City Council should act in the water question as trustees for all concerned rather than for any particular mining company. Mr. MacKenzie's open stand on this important question has had a marked effect on the local situation and will probably result in all the miners getting a fair deal. In the meantime the Rossland *Miner's* affairs, in which the Le Roi is interested and which with the shares in the concern now held by Le Roi No. 2, it now can control, if it so desired, are being fought out in the courts, and one phase of the water question is also to be decided by the Full Court at Vancouver.

Mr. Edmund B. Kirby, manager of the War Eagle-Centre Star, originally gave out that the combined output of these mines would average 450 tons per day but he has done very much better already and probably by the end of the year Mr. Blackstock's recent statement that the combined shipments would total from 24,000 to 26,000 tons per month seems likely to be realized, if not exceeded, and this, of course, without reference to what can be accomplished if the concentration plans of the companies being worked out at the silica works, are wholly successful. In this connection it is worthy of note that Mr. Kirby is personally quite satisfied that he has already solved the question so far as his companies' properties are concerned.

There are rumours that in the effort to hold up the stock situation the available ore reserves of the Josie and the No. 1—the mines owned by the Le Roi No. 2—have been greatly if not entirely depleted, but it will be better to wait for Mr. Hill's report on the properties than to trust to current reports.

The Giant has been shipping a few carloads of ore every week, but no official statement, as promised, has yet been made public concerning the results attained in development.

The White Bear and Green Mountain have been working steadily and work has again been resumed on the Homestake.

A decided move has been taken to induce the Dominion Government to reduce the tariff on mining machinery and mining supplies generally, with what result remains to be seen.

Mr. Kirby's attack on the two per cent. tax and on mining taxation generally has excited general comment all over America and Canada, but with one exception of the Rossland papers, one of which Mr. Kirby personally controls, the War Eagle's manager's figures have not been accepted as conclusive, and in many instances caustic but not unkindly criticism, has been indulged in by mining men of high standing.

The long standing sale of the Trail smelter to the Gooderham Syndicate was again to the front this month, but it has been semi-officially denied.

Mr. Bernard MacDonald has already moved to Spokane and Mr. William Thompson has made preparations to follow his chief as soon as he has turned over the affairs in his charge to the new manager of the Le Roi No. 2. It is not known at present who will take charge of the Rossland Great Western and the Kootenay Mines.

SLOCAN CITY MINING DIVISION.

(From a Special Correspondent.)

NOTES FOR NOVEMBER.

PREPARATIONS for winter are being actively made and as the weather generally has been fine the camps are in good shape. The present conditions of the roads—bare ground on the lower levels and heavy snow above—has cut ore shipments down to practically nothing, though some of the higher mines are rawhiding ore down to the waggon road to await sleighing into town.

The ore shipments to date amount to 5,500 tons, from eleven properties, with at least four more shippers to join the list as soon as the roads are passable.

Most of the developing properties propose working through winter, but the Hampton and Legal have suspended operations till spring. The Hampton as usual has yielded rich ore enough to pay expenses and the owners of the Legal have opened a chute of 3-oz. gold ore on two levels.

Probably the greatest improvement is to be found on the Ottawa, on which the rich ore chute exposed in No. 2 tunnel has been cut for some 75 feet by No. 3, exposing ore enough, it is estimated, to pay for the property and all development so far. This has led to the construction of a sleigh road from the mine to the Springer Creek road and the manager counts on steady shipments during the winter and is already driving No. 4 tunnel towards the ore. The Meteor is being opened under lease and the old ore chute is found to extend as deep as the present work exposes the vein. The ore is richer and more of it than in

the upper portion of the vein, so that the lease is bound to be a profitable one and if the ore continues to the lower tunnel which is now almost in to the vein, there should be all kinds of money for the lessors, as the ore is easily sorted and runs \$20 to \$30 in gold and from 200 oz. and upwards in silver.

The lessors on the Graphic, one of the Bondholder group, and those on the Kalispel are taking out shipping ore. The Republic will ship a car from the old workings. It is understood that the Exchange will make at least one shipment from the ore chute cut last September. Mr. Norman will continue a full force developing the Black Prince.

Both the Enterprise and Arlington are continuing experiments as to treatment for their low-grade ores. The Enterprise alone, however, is interested in the zinc situation, as the Arlington has none of that metal to market.

There is a little more interest being taken in the gold properties. Some one, profiting by the mistakes of others, will make a success of these yet, and then how easy it will be to say "I told you so."

PROGRESS IN THE YMIR DISTRICT.

(From a Special Correspondent.)

DURING the past month considerable progress has been made by the various companies operating in this vicinity, and several very encouraging strikes are reported.

At the Wilcox Mine the new stamp mill is now nearly completed, and it is anticipated that the stamps will be falling within a couple of weeks. The type of mill being installed is a new one for this section, and is of what is known technically as the "two-two" variety. It consists of four stamps, two operating in each motor. The stamps are much heavier than the usual type, and the motors have a triple discharge, that is, they discharge on three sides instead of one. It is claimed for this type of mill that its capacity is equal to that of a ten-stamp mill of the ordinary single discharge type. Besides the stamps two six-foot Frue vanners and a Gates crusher with a capacity of fifty tons per day have been installed. In the mine itself ore is now being broken down in the Fourth of July vein.

At the Union Jack mine a fine strike of ore has been made in rather an unexpected manner. In the upper tunnel or the "Queen" vein, which is now in some 450 feet, a fine body of straight galena was passed through averaging about \$40 per ton. A second tunnel was started lower down to get depth on this rich chute, the calculation being that a distance of 200 feet would have to be run before the solid ore was encountered. Instead of that, however, the ore was reached at a distance of 70 feet from the mouth of the lower tunnel only, showing the chute to have considerably larger dimensions at depth than near the surface. The power house and flume have been constructed and are ready for the installation of the electric plant, which is expected to arrive shortly. The Active Gold Mining Company, which operates the Union Jack, is developing the mine in a very en-

terprising manner and the Durkee electric drills which are being installed are the first to be put in operation in this mining division. The company has recently acquired timber rights over 5,000 acres of valuable timber land, comprising nearly the whole of the Porcupine Creek Valley, and will probably put in a sawmill.

On the Foghorn mine the croscut tunnel has reached the vein at a distance of 750 feet, the depth from the surface being about 500 feet perpendicular. A large body of fine concentrating ore has been opened up at this depth interspersed with smaller chutes of richer ore. The Golden Monarch Co., of Spokane, which operates the property, intends to ship out about 500 tons of this richer ore during the winter and to install a concentrator as early as possible next spring.

LEGAL DECISIONS AFFECTING THE MINING INDUSTRY.

(Specially Reported.)

M'NAUGHT v. VAN NORMAN *et al.*

THIS case is a peculiar one. The Sheriff seized, under writ of execution, one-quarter interest belonging to a judgment debtor, in certain mineral claims. The plaintiff McNaught was the recorded owner of three-quarter interest in the claims on May 31, 1901. Before sale of the interest by the Sheriff the judgment debtor allowed his free miner's certificate to lapse, without renewing it. With the purpose of reviving the interest of the judgment debtor the Sheriff, on behalf of the creditors, applied for and obtained the issuance of a special free miner's certificate in the judgment debtor's name, but without his authority. This was issued on June 5, 1901. The plaintiff was the co-owner with the judgment debtor in the mineral claims, and claimed the interest seized, under Sec. 9 of the Mineral Act, which provides that where any co-owner fails to keep up his free miner's certificate, such failure shall not cause a forfeiture of the claim, but the interest of the co-owner so failing to keep up his certificate shall vest in the remaining co-owners.

It was argued that the Sheriff was to be regarded as the judgment debtor's agent, and that it was the Sheriff's duty to protect the execution creditors by obtaining such certificate and holding the interest in the claims, and that no voluntary or involuntary act of the debtor could affect the property under execution. But it was held by Mr. Justice Irving, and subsequently by the Full Court, that the title of the judgment debtor had become the property of the co-owner as soon as the free miner's certificate lapsed, and that the license subsequently issued to the Sheriff could not revive the interest of the judgment debtor. Also that no person could take out a special license in the judgment debtor's name, to revive the lapsed certificate, other than the judgment debtor himself.

COMPANY MEETINGS AND REPORTS.

HALL MINING AND SMELTING.

MR. ROBERT R. HEDLEY, smelter manager, and Mr. J. J. Campbell, agent and business manager, report as follows, their report being dated September 17th and is for the year ending June 30th:

On July 9th, 1901, the smelting of Silver King ore was begun in the small furnace and was continued with very little interruption until December 16th, when the supply of ore was overtaken. The campaign had been somewhat prolonged by the smelting of silicious ore purchased from other mines and of lead copper matte from the lead furnace. As well as providing additional charge for the furnace, the nature of this material tended to retard the action of the furnace and lessen the daily tonnage smelted, which was compensated for by the higher charge for treatment.

On March 10th, a stack of Silver King ore having been accumulated, the furnace was blown in again, and ran until May 2nd, when we ran out of ore again.

During the year the furnace was in blast 202½ days, and 22,936 tons of Silver King and 2,558 tons of purchased ores, etc., were treated, or a daily average of 136.3 tons.

The daily tonnage smelted was affected not only by the addition of the purchased ore mentioned, but by the changed character of the Silver King ore, which contained so much more sulphur than formerly that it was frequently impossible to make matte of shipping grade at the first smelting, requiring therefore the crushing, roasting and re-smelting of a considerable quantity of low-grade matte.

The financial results of the copper campaign were affected as compared with past experience by the following factors:

(1) Cost per ton increased by the reduced daily tonnage owing to the character of the ore, and by the idleness of the furnace for a considerable time owing to the short supply of the Silver King ore.

(2) Cost per ton reduced by the operation of the larger furnace on lead smelting to which a share of fixed expenses was charged; by a reduction in price of coke from \$4.50 to \$4.00 per ton and of freight on coke from \$2.25 to \$2.00 per ton.

(3) Earnings per ton increased by the higher treatment charge earned on purchased silicious ore than on Silver King ore.

(4) Earnings increased per ton by the saving on freight and refining charges on matte produced in March and April and by shipment to the Granby Consolidated Mining, Smelting and Power Company, Limited, at Grand Forks, for treatment at their newly installed converters, instead of shipment to New York or of treatment in our own reverberatory furnaces.

(5) Earnings per ton seriously decreased by the fall in the price of copper and silver, the mining department being paid for the ore at prices on the date of sampling, except for the production in March and April.

On July 1st, 1901—Copper was 16½¢. per lb.; silver, 59½¢.

On June 30th, 1902—Copper was 11½¢. per lb.; silver, 52½¢., and consequently our loss in prices was heavy.

During the year lead smelting was carried on in the larger furnace, which was kept in blast for 306 days, some interruptions having occurred while cleaning out and repairing the furnace on several occasions, and during the rebuilding of the mechanical roaster.

The character of the ore smelted has not been such as to give the best metallurgical results, the average percentage of zinc being high, reducing the capacity of the furnace and the recovery of metals.

This was due to the fact that the serious fall in the prices of silver and lead had led to the discontinuance of shipments from some of the larger producers of the cleaner ores, which as a rule in this country are not so rich in silver. The supply obtainable, while somewhat irregular and uncertain, has been sufficient for our requirements. It would probably not have been so, but that in order to stimulate production and to offset as far as possible the effects upon the mines of the low prices of metals, the various smelters doing business in this country decided to make a sweeping reduction in their charges for freight and treatment, and to operate without profit if necessary until the depression was tided over.

The co-operation of the Canadian Pacific Railway and the Great Northern Railway having been obtained by a reduction of freight rates on lead ores, a reduction of combined freight and treatment rates of \$4.00 on clean ores and \$3.00 on lead ores high in zinc was put into effect, the rate being graded in relation to the price of lead on final settling day, so that as lead recovered in value the treatment rate would advance.

Unfortunately for both miners and smelters no recovery has taken place in the price of either silver or lead, so that we have had to operate during the last half of our financial year at the reduced treatment rate.

During the early part of the year there was anxiety about the supply of dry ore, but ample supplies were secured, and we now expect to have enough of both dry and lead ores for both furnaces, and have therefore been operating both for some time past.

Systematic efforts have been made to bring about improved conditions for lead for the advantage of the miner and smelter, and it was expected that the result of these

efforts would have been felt during the year, but although success has been achieved in some directions, the benefits have not yet been felt, but there is no reason to doubt that the expectations of those interested will be realized before long.

The efforts were directed to securing a Canadian refinery and a protected home market for pig lead, and the manufactures thereof in Canada.

The results to date are that the government have granted a bonus on pig lead refined from bullion in Canada:—

\$5.00 per ton for 1902;
\$4.00 per ton for 1903;
\$3.00 per ton for 1904;
\$2.00 per ton for 1905;
\$1.00 per ton for 1906; not to exceed \$100,000 in any one year.

The Canadian Smelting Works have erected an experimental refinery, using a newly invented electrolytic process for the first time, with a normal capacity of ten tons daily. This has been in operation some time, the initial difficulties are nearly all overcome, and the construction of a larger refinery, with sufficient capacity to handle their own and our output, is planned.

A vigorous agitation for the desired changes in the lead duties has been carried on, and it is understood that at the promised revision of the tariff at the next session of the House of Commons, some readjustment of the lead duties will be made in the desired direction.

With our lead bullion refined in Canada and a protected home market for lead, the production of lead ores will be stimulated, even though the world's market price for lead should not advance, and the position of the Canadian lead mines and smelters be greatly improved.

During the year we effected a considerable reduction in the cost of our fluxing material, and the prospects for the future with regard to this important item are much improved.

There was some serious interruption in our fuel supply, owing to a disastrous explosion in the mines of the Crow's Nest Pass Coal Company, followed soon after by a miners' strike. While our reserve stock, with such small quantities as we could procure, enabled us to keep one furnace in blast, the shortage of supply deterred us from attempting to secure ore for the second furnace for the time being.

We again suffered severely from the fall in the price of silver, which was 59½¢. per ounce at the beginning, and 52½¢. per ounce at the end of the year, and to a less extent from the depreciation in the value of lead from £12 7s. 6d. July 1st, 1901, to £11 2s. 6d. June 30th, 1902.

By a change in our system of purchases, put into effect in January, 1902, as to lead ores, and some months later as to dry ores, by which final settlement is made at prices ruling three months after the date of purchase, much of the risk of the loss has been eliminated from the business, but as there was at that time as usual a considerable stock on hand, and as we had been operating for half a year before any change was made, the loss on this account during the year is heavy.

In April, the installation of electric motors was completed, and soon after the use of steam was dispensed with.

Occasional short interruptions have caused some annoyance, but the convenience is great and the economy is proving equal to the estimate submitted to you at the time when the question of expenditure was under consideration.

The feeling throughout the Kootenay is decidedly more cheerful than it has been for some time past, and, as outlined to you in the estimate furnished you of the current year's costs and earnings, we consider there is every reason to look for a reasonable profit in the future.

Smelter Account.—The following is the smelter account for the year:—

	£	s.	d.
To purchase of customs ore	178,695	12	2
To administration expenses	2,323	10	8
To smelting expenses	44,643	3	5
To outside expenses	1,004	1	10
To balance, being profit on smelting	5,071	19	3
Total	£231,702	7	4
	£	s.	d.
By value of matte and bullion produced	231,563	10	8
By interest	138	16	8
Total	£231,702	7	4

CENTRE STAR.

The annual meeting of the Centre Star Mining Company was held in Toronto on the 25th November, and the various reports presented. The financial statement shows that the indebtedness of the company had been reduced to \$160,028 two months ago, and was being reduced at the rate of \$30,000 a month, which would make it about \$100,000 now. During the year, \$29,836 has been written off for depreciation. The assets include \$3,300,544, the value of the Centre Star mine, \$1,480 cash in bank, \$220,938, mining machinery and buildings, \$16,250 in stocks of other companies, and \$10,629, accounts receivable. Mining and development have cost \$172,552, and diamond drill prospecting, \$8,371.

Manager Kirby, in his report, said: "The condition of the Centre Star mine has been improved during the year. The reserves of pay ore have been increased and the heavy decline in copper has been more than offset by the reduction in smelting rates, and the satisfactory solution of the problem of treating the low grades by milling now makes it certain that large bodies of ore exposed will soon be available.

"Ore sales during the year were 11,087 tons, averaging \$13.31, smelter gross assay value. The development of the mine has from the beginning continued to expose large quantities of ore too low in grade for smelting, but rich enough to promise a handsome profit to successful milling, and now that the difficulties of such treatment have been overcome, these low grade masses will soon be available."

The net proceeds from ore sales were \$89,752. The directors were re-elected.

FONTENOY.

A meeting of the shareholders of the Fontenoy Mining Company was held this month at the offices of Messrs. Pooley, Luxton & Pooley. A majority of the shares were represented and after a lengthened consideration of the affairs of the company, it was resolved to offer the balance of the treasury shares for sale in order to liquidate the claims against the company, it being reported to the meeting that owing to the favourable aspect of affairs on adjoining properties, there would be no difficulty in disposing of sufficient shares in Spokane and elsewhere to put the company's affairs in good condition. Mr. P. J. Hickey, who was present at the meeting, stated that on the Waterloo claim, which adjoins the Fontenoy ground, a vein three feet wide had been encountered in the face of a drift not more than 30 feet from the Fontenoy boundary line, and that he had been informed by Mr. Clarke, of Spokane, who had now secured control of the Waterloo, that this ore assayed about \$37 per ton. Mr. Hickey also gave a brief outline of the work which had been done on the company's claim at Camp McKinney, and stated that the workings were all in good shape, and ready for a continuation of mining operations. There are three shafts on the property—one at a depth of 140 feet, from which three drifts had been started, at 30, 60 and 140 feet depth respectively. Two veins had been encountered, one of base ore and one free milling ore. Assays as high as \$80 a ton had been obtained from the free milling vein. Mr. H. Mortimer Lamb was appointed to fill a vacancy on the board and Mr. Sargison was appointed secretary of the company.

YMIR GOLD MINES.

At an extraordinary general meeting of the Ymir Gold Mines, Ltd., held in London, the 29th inst., resolutions were passed authorizing the voluntary winding up of the company with a view to reconstruction, additional funds being needed for the further development of the mine and to pay certain liabilities. The company is therefore to be reconstructed on the basis of an assessment of 3s. per share on the issued capital of £200,000, payable as to 6d. per share on application, and 1s. per share on allotment, and the balance in calls of 6d. per share at intervals of not less than one month. There is, it is said, at the present time 100,000 tons of ore blocked out in the mine on which a profit can be made. The whole of the required capital has been guaranteed.

ROSSLAND BONANZA.

The annual report of the Secretary-Treasurer was presented by H. W. C. Jackson. As acting manager Mr. Jackson also reported on the year's operations. In noting that ore shipped from the property last winter, and aggregating only 76 tons, had netted the company some \$600 after paying all costs of extraction, transportation and treatment, Mr. Jackson remarked that the results might have been substantially brighter, had good management been displayed in the stopping and sorting of ore. He found on examination that the so-called waste dumps actually contained a

considerable quantity of excellent shipping ore, while careless chuting in the stopes had resulted in waste and fine ore being inextricably mixed, with resulting loss to the company. In view of the fact that the company had developed in the Bonanza mine a chute of ore 200 feet in length and had demonstrated that the strength of that vein and quality of the ore improved as the water level was passed, he was disposed to be optimistic with regard to the future of the property. Both reports were unanimously adopted.

In the second meeting the question of reconstruction was broached in the form of a resolution, under which it was proposed to form the Bonanza Gold Mines of Rossland with a capital of \$1,000,000 in shares of a par value of \$1 each. Each shareholder in the original company was to receive a fully paid-up share in the new corporation, to be delivered at the expiration of 18 months from the date of reconstruction. This resolution was unanimously carried. Directors for the new company were elected as follows: Mayor J. S. Cute, Major W. H. van Buskirk, City Engineer; E. W. Ruff, Sullivan Drill Company; Charles S. Sangster, Jenckes Machine Company; Dr. Campbell, Samuel W. Hall and H. W. C. Jackson.

TRANSPORTATION PROBLEMS.

TO THE EDITOR. Sir: Of the abundance of metalliferous ores in British Columbia there is no doubt. As a rule the deposits are characterized rather by their extent than by their richness. Thus the problem to be solved in this province, before mining takes its proper places industrially, is how to provide the cheapest and best transportation of ores to a smelter, or, perhaps it would be more accurate to say, to provide the best means of assembling at suitable points of ores, fluxes and fuel. A secondary problem, which will be solved by the solution of the other, is how best to furnish transportation for machinery and other supplies to the mines. Many railway proposals are before the people of B. C. All of them have merit, though some more than others. The claims of some are more pressing than those of others. All of them would assist in the mining development of the province, but no argument is needed to show that in the location of trunk lines, such as the Coast-Kootenay, the Canadian Northern and others, the requirements of individual mines can only occupy a very subordinate place. A trunk line will lead to the development of mines within a limited distance of its rails, but the area of the province is so vast that there will always be lying between any trunk lines ever likely to be built, wide areas which will not be accessible from them, in the sense that accessibility means in this connection. In some cases short branch lines will meet the necessities of the case, but in many others the locations are so very difficult of access that some other means than ordinary railways will have to be adopted. There can never be anything like thorough development without transportation being provided to meet such cases, and perhaps there is no more important question, or one likely to lead to better results both to the promoters and the public, if rightly solved, than how to furnish adequate facilities to mines off the trunk railway lines and debarrered from employing water carriage.

In the course of his observations made in Victoria to the Board of Trade on the occasion of his recent visit to Victoria, the Minister of Railways dwelt at some length upon the granting of aid by the federal government to "development-railways." He took the

position that before promoters approached the government seeking aid, they ought to be in a position to show, not by mere general statements, but by evidence which would commend itself to reasonable men, that the district to be traversed by the line will repay railway construction. As one gentleman, after hearing Mr. Blair, said, he thought the government ought to assist but not to promote railways. While Mr. Blair's remarks may not have been quite as full of promise for the future as some of his auditors could have wished, there is little doubt as to the soundness of the principle which he enunciated. The time has passed in Canada when our resources are regarded as so problematical that the government must make an effort to get companies to build railways. Enterprises almost without number are before the public, asking for assistance. The government cannot assist them all, and will naturally choose those that can make the best showing for the benefit of Canada as a whole. Speaking more especially in regard to this province, it is to be expected that the Dominion Government will prefer to extend its aid to what may be called trunk lines, and the amount which these will involve is so great that, if they are taken up, the extent of aid that can be reasonably expected by local lines must necessarily be very small.

The policy of the Provincial Government has hitherto been directed in the same line as suggested above as likely to be followed by the federal authorities. None of the railway aid acts passed during the last six years has contemplated assistance to lines intended to serve one or two mines or a restricted locality. There is good reason why they should not. Public aid in the way of cash bonuses can only be extended to railways located according to a general plan, which by reason of its bearing upon the development of the province on a broad scale can be recommended to the Legislature and be justified to the public. Other considerations than these may have influenced governments and legislatures, but it may be stated as a general proposition that no others will prevail in the long run.

Under these circumstances every one interested in the due development of mining in this province will realize the very large responsibility attaching to private enterprise in the matter of subordinate lines of transportation, and it is at least worthy of discussion whether some means cannot be devised whereby the construction of such lines can be promoted. It also seems as if the subject might well engage the active attention of capitalists and others directly interested in the enlargement of the mining industry.

Victoria, B.C.

C. L.

THE PROVINCE'S MINERAL EXHIBIT IN LONDON.

TO THE EDITOR. Sir: I have been informed that the British Columbia mineral exhibits, which have created such huge interest at Glasgow and later at the Royal Exchange in London, are to be packed up and sent to the Victoria, B.C., museum. I am surprised that the Government could even

conceive such a ridiculous proceeding. The specimens were loaned or given for exhibition purposes *abroad* (in some instances at considerable expense to mine owners); then what good will they do to this country if placed in the Victoria museum? The main object of the exhibits being to show the mineral resources of British Columbia *abroad*, to a public, which up to recently knew nothing or very little about our province and which practically means advertising abroad, then what benefit will the country derive by advertising at home? There are many ways of using the whole exhibit to good purpose. Why not send it to the St. Louis Exposition and if not used for exhibition purposes later, the Imperial Institute or any other prominent situation in London where they would always be before the eyes of the British public would certainly be a better place than the Victoria museum.

Yours truly,

M. GINTZBURGER.

Three Forks, 11th October, 1902.

COMPANY NOTES AND CABLES.

LE ROI.—The following is the manager's report for September, 1902, of the Le Roi Mining Company, Ltd.:—

"The tonnage shipped during the month, together with its contents and gross value, was as follows:

	Dry tons.	Ozs. Au.	Ozs. Ag.	Lbs. Cu.	Value wet. per ton.
1st class	13,667	6,778	12,145	580,005	\$15.26
2d class dump.	1,999	660	933	50,722	\$9.76
	15,666	7,438	13,078	630,727	

"The cost of breaking and delivering the first-class ore on the railroad cars was \$2.65 per ton, while the cost of development was equal to \$1.25 per ton—increases of 25c. and 51c. per ton respectively, as compared with August. The explanation for the relatively higher expenditure is found in the facts that the tonnage stoped during September was smaller, and the exploration work greater than was the case in the previous month.

"Mine Expenditure.—The expenditure for the month on mine account was \$54,054.

"Northport Smelter.—The expenditure for the month was \$157,843. The public ores purchased during the month amounted to 5,740 tons, containing 2,953 ozs. of gold, 6,080 ozs. of silver, 282,825 lbs. copper. The tonnage treated during the month was 23,681 wet tons, segregated as follows:—

Roasted ores	15,234
Raw ores Le Roi	198
Raw ores Le Roi second class.	2,537
Raw ores public	5,712

Estimated Profit for the Month:—

The gross value of the first class ore shipped from the mine was \$15.26 per ton, equal to \$208,558

From this deduct smelter losses, refiners' settlement rates, and interest on gold and silver values for 90 days and copper 60 days, at 6 per cent., equal to \$2.61 per ton 35,671

Deduct cost of mining and smelting at \$8.18 per ton 172,887

Net estimated profit on first class ore \$ 61,001

The gross value of the second-class dump ore shipped from the mine was \$9.76, equal to 19,519

From this deduct smelter losses, refiners' settlement rates, and interest on gold and silver values for 90 days and copper 60 days, at 6 per cent., equal to \$1.56 per ton 3,118

Deduct cost of loading and smelting at \$4.44 \$ 16,391

Net estimated profit on second-class ore . . . \$ 8,875

Net estimated profit on second-class ore . . \$ 7,516

The total estimated profit as above amounts to \$68,607.51, being greater by nearly \$6,000 than estimated in the cabled returns of 6th inst., owing to the fact that the smelting costs proved to be lower than anticipated. Since the last monthly report the main shaft has been completed to a depth of 147 feet below the 1,200-foot level. A station is being cut at 1,350 feet, and drifting east and west will be commenced at this depth by the 20th October. Nothing of importance has been encountered in the crosscuts and drives on the 1,050 and 1,200 levels during the month. The limits of the high grade ore on the intermediate slope between the 9th and 1,050 levels have been ascertained, and measurements show that it still contains 16,000 tons of shipping ore. The upper stopes which are being drawn upon are producing the usual tonnage and grade of ore. At the western end of the 800 main stope, we are putting up a raise to the 700-foot level, which is in ore that average assays show to be of a value of about \$10 per ton, but I anticipate an improvement in its grade as we near the 7th level. On the surface from a small cross vein directly north of the main shaft, we are mining some very high grade ore. The vein averages about 1 foot in width, has a north and south strike, and dips to the east. One car (30 tons) of ore from this point has been shipped to Northport, which averaged \$70 per ton. Two more cars are on the dump ready for shipment."

The returns for the month of October as cabled are as follows: "Shipped from the mine to Northport, 15,200 tons of ore, containing 8,676 ozs. of gold, 12,500 ozs of silver, 585,302 lbs of copper. Shipped from the dump to Northport 1,809 tons, containing 394 ozs. of gold, 640 ozs. of silver, 32,610 lbs. copper. Estimated profit for the month, \$85,000."

The net profits as officially reported by the manager since May last are as follows:—

	Tonnage.	Net Profits.
May.....	13,047	\$ 66,932
June.....	14,828	94,302
July.....	16,170	108,348
August.....	18,578	79,487
September.....	15,666	68,617
October.....	17,699	35,000
Totals.....	95,898	\$502,686

LE ROI No. 2.—The following is the manager's report of the Le Roi No. 2, Ltd., for the month ended 30th September:—

"Output—There were approximately 6,070 tons of ore shipped to the smelter during the month.

"Approximate contents and values in the 6,070 tons of ore: 2,646 ozs. gold at \$20.00 equals \$52,911, or \$8.72 per ton; 6,031 ozs. silver at 53 cents equals \$3,196 or 52 cents per ton; 252,036 lbs. copper at 12 cents equals \$30,244 or \$4.98 per ton. Making the total gross value \$86,351; or the average per ton \$14.22.

MONITOR AND AJAX FRACTION.—Report for September: Ore in transit—Crude galena, 60 tons, estimated net value \$2,400; carbonates, 30 tons, estimated net value, \$1,200—\$3,600. Sept. 30. Ore in hand—Crude galena and carbonates, 79 tons, estimated value, \$1,200; carbonates, 10 tons, estimated net value, \$400—\$1,600. Ore mined during the month—Crude galena and carbonates, 79 tons, estimated net value, \$3,200. Cost of mining per ton, 8.70; cost of mining per ton, 8.68 previous month. Development, 217 feet. Cost of development per foot, 6.85; cost of development per foot, 6.86 previous month. Mr. Maurice Gintzburger, the company's manager, reports that the mine is in excellent shape, and that every available man is being engaged in opening stopes. He estimates the October shipments at 100 tons, and anticipates that from November he will double this output. In No. 5 level the drift south has been pushed forward 40 feet, and a stope is being opened up. Drifting to the north through the fault has been commenced. Ledge matter in the fault contains ore, and there are good indications of intersecting the true ledge at an early date. The ordinary general meeting of this company has been fixed for the 9th December. News has been received that, after drifting 40 feet through the fault, the true ledge has been struck, of full width and high values.

ARLINGTON MINE, ERIE.—The following are the returns for the month of October:

Shipments for October, 106 tons, producing net smelter returns of.....	\$4,705 72
Shipments by lease-holders, 63 tons, producing a royalty of.....	463 21
Total receipts.....	\$5 168 93

Total expenses in British Columbia..... 3,317 41

Profit for the month.....\$1,851 52

LE ROI No. 2.—Under date Rossland, 9th November the company's manager telegraphs as follows:—"Shipments last month amounted to 2,413 tons; contents, 1,042 ozs. of gold, 3,350 ozs. of silver, 66 tons copper. The returns from ore amount to \$19,390. Have located with diamond drill on 300 foot level to the west of tramway dyke upward continuation of ore body. Over footwall stope above 500-foot level diamond drill core shows the ore is 10 feet thick; average of three assays is—gold \$96 per ton, copper 2½ per cent. Will probably require to crosscut to the south 95 feet to open chute; have started to crosscut for ore body." (September: 6,070 tons, value \$86,351.)

VELVET ROSSLAND.—The manager cables:—"Have received the following returns from smelter: 126½ tons yielded 98 ozs. gold, 103 ozs. silver, 15,808 lbs. copper; net proceeds from smelter, \$2,215, or an average of £3 12s. 6d. per ton net."

YMIR.—Cablegram from the company's manager at Nelson British Columbia:—"During last month 50 stamps ran 671 hours (28 days). Estimated profit on operating, \$8,000 (£1,650). This is after deducting development, \$3,000 (£618)." (September profit, £618.)

MINING RETURNS AND STATISTICS.

EAST KOOTENAY.

THE North Star mine continues to maintain average daily shipments of 40 tons. The Fort Steele Prospector estimates the value of the output from the Wild Horse Creek placers at \$20,000.

THE YUKON.

It is stated that revised figures of Klondike output for the season just closed show the value of the aggregate yield to be twelve and a half million dollars.

ROSSLAND.

Shipments to date aggregate approximately 310,000 tons. To November 21st the returns are:—

	Tons.
Le Roi.....	201,250
Le Roi No. 2.....	52,475
Centre Star.....	27,532
War Eagle.....	15,886
Giant.....	2,779
Great Western.....	2,315
Velvet.....	1,460
Cascade.....	300
Bonanza.....	60
Kootenay.....	50
Spitzee.....	20
White Bear.....	25
Total.....	303,912

BOUNDARY DISTRICT.

Shipments for the year to November 21st are made up as follows:—

	Tons
Granby Mines, Phoenix.....	268,255
Snowshoe, ".....	14,068
Mother Lode, Deadwood.....	119,532
Sunset, ".....	9,590
B. C. Mine, Summit.....	10,160
Emma, ".....	6,268
Winnipeg, Wellington.....	785
Golden Crown, ".....	625
No. 7 Mine, Central.....	482
Jewel, Long Lake.....	2,175
Providence, Providence.....	43
Total, tons.....	433,343
Granby Smelter treatment, tons.....	255,462

ROSSLAND.

Our correspondent telegraphs: Shipments to November 29th aggregate 310,680 tons, or increase of 31,747 tons over last year's yield.

SLOCAN.

Since January 1st to November 22nd, 1902, the shipments have been as follows:—

NAME.	Tons.
Payne	1558
Ivanhoe	532
Sunset (Jackson Basin)	827
Reco	407
American Boy	1008
Arlington	3340
Hewett	785
Bosun	1090
Last Chance	108
Wonderful	181
Enterprise	1960
Lavina	85
Bismark	62
Queen Bess	180
Silver Glance	223
Whitewater	2962
Ottawa	8
Capella	40
Florence	1
Trade Dollar	20
Slocan Boy	115
Neepawa	123
Hartney	25
Marion	80
May	5
Paystreak	7
Surprise	22
Monitor	1055
Slocan Star	598
Duplex	7
Emily Edith	20
Wakefield	220
Prescott	4
Rambler	4037
Molly Gibson	2100
Washington	187
Folliott	2
C. O. D.	2
London Hill	115
Ruth	825
Antoine	165
R. E. Lee	144
Spectator	4
Red Fox	40
Hampton	4
Mercury	21
Dardanelles	2
Porcupine	2
Charleston	11
Pinto	13
Noble Five	21
Soho	64
Total tons	25,390

COPPER STATISTICS.

THE monthly copper statistics, prepared by John Stanton, show that the production in October of United States reporting mines was 24,152 tons, and production from outside sources (estimated) 2,100 tons, a total of 26,252 tons, or 464 tons in excess of the September production. The production of foreign reporting mines in October was 9,707 tons, or 552 tons more than in September. United States exports in October were 12,515 tons, a decrease of 668 tons from September. The production in the United States mines compares as follows (in tons of 2,240 pounds):—

	1902-01.	1901-00.
October	26,252	24,098
September	25,788	21,580
August	25,206	22,667
July	26,749	21,985
June	26,740	22,401
May	25,763	22,392
April	24,624	8,810

March	24,035	23,384
February	20,331	21,100
January	18,955	22,679
December	19,803	22,124
November	21,728	23,276

Foreign production figures (in tons of 2,240 pounds):—

	1902-01.	1901-00.
October	9,707	8,960
September	9,155	9,477
August	9,504	8,180
July	9,210	9,254
June	8,202	8,522
May	9,354	8,456
April	10,169	8,810
March	8,979	7,817
February	8,475	7,332
January	7,367	5,910
December	8,677	8,483
November	8,864	7,752

Exports from United States (in tons of 2,240 pounds):

	1902-01.	1901-00.
October	12,515	8,016
September	13,183	6,419
August	12,429	6,840
July	11,733	6,824
June	14,027	6,842
May	16,283	10,062
April	16,424	4,849
March	20,097	6,818
February	16,108	8,453
January	15,021	10,003
December	10,171	11,223
November	6,367	9,508

MINING AT ROSSLAND.

(Circular Report.)

M R. GEORGE A. OHREN, United States consular agent at Rossland, B.C., sends us a copy of his November report as follows:—

Nine mines are now shipping to the smelters in Washington and British Columbia. A few months ago, only two of these were shipping, and that in small quantities. The labour troubles have now been adjusted, and the mines are all working. The following table shows the average shipment for one week:

Mine.	Tons.	Value.
Le Roi	4,022	\$52,286
Le Roi No. 2	420	5,460
Centre Star	1,350	17,550
War Eagle	900	11,700
Giant	155	2,015
Velvet	150	1,950

Total 6,997 \$90,961

A few years ago, the mines around Rossland could not afford to ship ore valued at less than \$16 per ton. The charges for freight and smelter treatment amounted to \$14. Later, these charges were decreased to \$11 per ton, and about a year ago the smelters reduced the rate for freight and smelting to \$6.50 per ton. A recent contract made by the War Eagle and Centre Star mines with the smelter enables them to ship ore valued at \$5 per ton, although they ship a quantity of high-grade ore with the low grade. The terms of contract between these mines and the smelter are \$4.50 per ton for freight and treatment. This is most important for the future prosperity of Rossland, the majority of the ore mined around the city being of low grade. With these cheap rates for freight and smelting there are hundreds of mines in the immediate vicinity of Rossland which will become shippers almost immediately.

Every effort is being made by the managers of the mines to reduce the cost of concentration and refining of the ores. The Elmore process is being introduced, and great hopes are entertained of the ultimate success of this system. It is understood that the owners of the Elmore patents have expressed their willingness to erect a plant, or to sell one of their plants to the mine owners.

There is a large demand for all skilled miners. Almost any man who is a thoroughly practical miner, can obtain employment in Rossland or vicinity, and it seems probable that the demand for such labour will constantly increase.

A new smelter is being erected near Grand Forks, which is expected to handle 1,000 tons of ore per day. It is said that it will be in operation within the next six months, and that several improvements in smelting will be introduced.

It will pay dealers in mining machinery in the United States to send representatives to the Kootenay country to advertise their manufactures. There is now a good opportunity to sell mining machinery at Rossland, in the Trout Lake district, and in other portions of the Kootenay.

Manufacturers of giant powder, dynamite, hardware, sanitary supplies, steel cars, tramways, and all productions connected with smelters or mines should also be represented.

The food products of the United States find a market in great variety in the Kootenay district. There are a number of wholesalers whose representatives visit the district periodically, but it seems to me that the business could be increased by a little more effort. There is a market for hardware, woodware, crockery, glass, plumbers' supplies, groceries, shoes, clothing, machinery, bar supplies, liquors, pool and billiard tables, printers' goods, stationery, drugs, furniture, leather goods, harness, waggons, carriages, bicycles, automobiles, fur garments, skates, sleighs, and sporting supplies. Freight rates to Rossland and other points in the Kootenay are unusually high, but the scale of wages paid is liberal, and generally the miners desire the best article. It is understood that in most lines the manufactures of the United States are superior to those of Canada, and they command a more ready sale and better prices.

L. EDWIN DUDLEY,
 Consul.

Vancouver, September, 1902.

TRADE NOTICES, CIRCULARS AND CATALOGUES.

THE Caldwell Brothers Co., of Seattle and Tacoma, are making a specialty of mining machinery and represent on the Coast the Hendrie & Bolthoff Co. and other important American houses. They also carry in stock canning machinery, made by the Astoria Iron Works, Astoria; sawmill machinery of various manufactures; waterworks machinery, particularly pumps, hydrants, and water gates and water meters; engines, including the Corliss automatic high speed and balance slide valve; boilers, horizontal, vertical stationary and marine, and large stocks of pipe, fittings, hose, belting, rubber and leather, packing, shafting, pulleys, hangers, etc.

"CAMMELL" STEEL.

We understand that our friend, Mr. Rowland Machin, off then than he is now with his three dollars a who is the Canadian representative of the "Bennett" Fuse, and the "Holman" Patent Rock Drill, during his recent visit to the Old Country, accepted the Canadian agency of Messrs. Chas. Cammell & Co., very extensive steel manufacturers in Sheffield. Since his return, a canvass of the steel situation, from Halifax to Pacific Coast points, shows that there is a market for a really first class steel, and the various tests which have been made in the different mining centres which have been touched by Mr. Machin in his canvass encourage him to believe that in the near future the name of "Cammell" will be as familiar in the mining world as it has hitherto been on the line of the Canadian Pacific Railway Company, whose system is heavily railed in many parts by steel rails from this company.

ALLIS-CHALMERS CO. IN EUROPE.

We have received the following communication from the Chicago office of the Allis-Chalmers Co.:

"We desire to inform you that Mr. J. W. Young, secretary of the Allis-Chalmers Company and manager of the New York office, has retired from these two positions and has been appointed general European sales manager of the Allis-Chalmers Company, with headquarters in London, England.

"This move is only another indication of the progressive ideas that control the vast business of the Allis-Chalmers Company, who are recognized as the largest producers of mining machinery and engines in the world.

"Mr. Young's past eighteen years' connection with Fraser & Chalmers, during which time he represented them in Mexico, Australia, China, Japan, Straits Settlements and other foreign countries, and his undisputed qualification as general mining machinery expert and salesman eminently fit him for his important position.

"While his many American friends will regret his going abroad, he has without question the best wishes of those who have had the good fortune of meeting him and availing themselves of his ability."

ATLAS CARS.

The Atlas Car & Mfg. Co., of Cleveland, Ohio, in Catalogues Nos. 1008 and 1012, describe a partial line of cars manufactured by them for mine, dryer, coal, ore, rolling mills, blast furnaces, smelting works and other purposes.

JEFFREY BELTING & CONVEYING MACHINERY.

The catalogue (No. 72) issued by the Jeffrey Mfg. Co., of Columbus, Ohio, dealing with their well-known make of chain belting, steel cables and elevating and conveying machinery, is a comprehensive volume of upwards of four hundred pages, nearly every page of which is handsomely illustrated from photographs of machinery in actual use.

LARGE ORDER OF COPPER WIRE FOR VANCOUVER.

The Vancouver Power Company, of Vancouver, B.C., has let a contract to the E. F. Phillips Electrical Works Company, of Montreal, Quebec, for the supply of 170 miles of copper wire required for the transmission of power from the North Arm power house to the cities of Vancouver, New Westminster, and other centres. Delivery is to be in three instalments, one-third each in March, May and June, of 1903. The weight of the wire will be, approximately, 150 tons, and the contract price is about \$35,000.

MACHINERY SHIPMENTS TO JAPAN.

A large consignment of mining machinery, made by the Allis-Chalmers Co., of Chicago, and consigned to a mining company operating in Korea, recently reached Vancouver, B.C. It will be taken by the C.P.R. steamer Athenian to Kobe Japan, where it will be transhipped to a local steamer for Korea.

COAL EXPORTATIONS AND TRADE.

COAL exportations from Vancouver Island collieries during the month of October were as follows:—

	Tons.
New Vancouver Coal Co.	33,448
Ladysmith	26,295
Total	59,743

During the month pumping operations were commenced at the New Vancouver Coal Co.'s old workings at the northern end of Newcastle Island, overlooking Departure Bay. This mine was first opened some twenty-five years ago and worked for a considerable time, when it was abandoned while the more important seams in the vicinity of Nanaimo were being developed. It is hoped that this new addition to the New Vancouver Coal Co.'s extensive field of operation will amply reward their enterprise in opening up the old mine. Work will be prosecuted vigorously and the mine placed in working order as quickly as possible.

The Fort Steele Prospector states that the Crow's Nest Company contemplate in the near future, possibly the coming year, a daily production of 6,000 tons. Of this vast product about 40 per cent. of the coal and 50 per cent. of the coke will be exported. The general demand for coal seems to have increased rapidly in recent years in the Northwest, and particularly so in this Province, and one of the most characteristic features of industrial development in this district has been the rise of the coal industry. It has been a constant struggle for the miners of the Crow's Nest Pass to meet the demands made upon them for coal and coke, but this difficulty will be overcome as the development and equipment of the collieries is increased. The Crow's Nest Southern has built a spur to the coal deposits at Morrissey Creek. Five strong seams have been opened here, on all of which work is proceeding rapidly. The output from Morrissey is nearly 1,000 tons daily, and nearly the entire output is exported into the United States.

The coal mining industry of Southeast Kootenav has as yet been but partially developed. The area of coal fields now under development is about 300 square miles. To the south, in the Flathead Valley, is an area of 300 square miles of a coal and oil producing country, which when thrown open by the Provincial Government for exploration, will give to this district a coal deposit of vast extent, second to none on the American continent.

THE LOCAL STOCK MARKET.

IF conditions do not shortly improve it would seem that it is only a question of time before local mining stocks cease to have any speculative value whatever. With hardly any exception all listed stocks have further declined this month, and in several instances quotations are absurdly inadequate. It meanwhile is affirmed with certainty that those who judiciously select and purchase standard stocks at present prices with a determination to hold, will make very handsome profits on their transactions. The question, of course, is how long will it be necessary to hold before it will be possible to realize? While it would be unwise to give a definite reply to such a question, it may nevertheless be stated that signs are not wanting of an early revival of speculative interest and activity. Next year the Rossland mines, provided conditions remain normal, should begin to earn regular dividends. Dividends will also be expected from the Boundary, and mining for zinc in the Slocan will certainly assume quite considerable proportions. Once the mines show that they are capable of earning profits, the shares will naturally possess an intrinsic, instead of as now, a purely speculative value, and the market generally will become an active one. During the month Cariboo-McKinney has been greatly dealt in, transactions amounting to 58,400 shares being reported at 19 to 20½. It is reported that a dividend of 2½ cents per share will become payable on the 15th of December. The transfer books close December 1st. The October clean-up is said to have been \$18,000. With this distribution the mine will have paid \$509,000 in dividends to shareholders. Sales of 38,000 Centre Star shares are reported to have been made on the Rossland exchange. The price, however, considering the position of the mine, is very low. Other principal sales are: Payne 12,500 shares; Giant, 18,000 shares; Republic, 15,500 shares; White Bear, 7,500 shares; War Eagle, 13,500 shares; American Boy, 14,000 shares; Mountain Lion, 10,000 shares; Homestake, 8,667 shares; Black Tail, 5,000 shares; North Star, 2,500 shares; Rambler, 3,500 shares; Fisher Maiden, 6,500 shares. Granby Smelter has advanced during the month from \$3 to \$3.75. Waterloo is firmer, and the shares are in good demand. Fairview has slumped badly, from 8½ to 4½, probably in consequence of the non-materialization of the plan to sell the mine to a London syndicate. The property itself is promising enough, but it is unfortunate that premature reports concerning it are so frequently published broadcast. Rambler in the last few months has declined from 80 to 30. There are many rumours concerning the mine, amongst others that it will be necessary to suspend dividends for at least a period. The concentrator is not in operation as water-power is not sufficient and the steam boilers ordered have not yet arrived. Payne, for no apparent cause, has fallen to 11-8½. War Eagle is firm at 19.

THE METAL MARKET.

SILVER continues to decline at an alarming rate, and no immediate improvement is anticipated. There has been heavy selling of Mexican dollars in London of late and Indian demand is light, to which facts the recent market weakness are chiefly attributed. Demands from the Orient are very inconsiderable, while there have been no special orders for coinage purposes. The price this month is the lowest on record, New York quotations being a fraction over 40 cents.

Copper has been quiet, very few transactions having taken place. Foundationless reports have been again circulated of increased stocks and over supply, but the disturbed condition of the securities' market is said to have been largely responsible for this slackness. Quotations are somewhat nominal, though showing a decline. The latest New York prices are: Lake copper 11½@11¾; electrolytic in cakes, wirebars and ingots, 11¼@11¾; cathodes, 11@11¾; casting copper, 11¼@11¾. The average price during October was 11.449.

The American lead market has remained steady. There have been no change in prices since last month. St. Louis quotes, 3.97½@4.05; New York 4.05@4.10. European demand is somewhat better, and slight advances in prices are reported. Spelter has been rather irregular, and the market is less buoyant. The ruling quotations are 5.10, St. Louis; 5.25, New York. The average price last month was 5.38.



PROVINCIAL SECRETARY'S OFFICE.

HIS HONOUR the Lieutenant-Governor in Council has been pleased to make the following appointments:—

7th November, 1902.

WALTER WOOLLACOTT, of Alert Bay, Esquire, Provincial Police Constable, to be Deputy Mining Recorder for the Nanaimo Mining Division, with sub-recording office at Alert Bay.

12th November, 1902.

GRANVILLE VERNON CUPPAGE, of the City of Victoria, Esquire, to be Mining Recorder in and for the Victoria Mining Division.



EXAMINATION FOR ASSAYERS FOR LICENCE TO PRACTICE IN BRITISH COLUMBIA.

IN ACCORDANCE with section 12 of the Bureau of Mines Act, examinations for efficiency in the practice of assaying will be held at Victoria, B.C., on 8th December, 1902, and on such following days as may be found necessary.

ENTRANCE FOR EXAMINATION.

Entrance for any examination must be made in writing to the Secretary of the Board of Examiners, at least seven days before the date set for beginning of examination, and must be accompanied by the prescribed fee (\$10).

The examination will consist chiefly of the practical assaying of samples and while the Department of Mines will provide all the apparatus and chemicals usually necessary, it will not undertake to provide any special or unusual appliances or chemicals which might be called for, and if a candidate should require such he will have to provide them at his own expense.

Candidates must provide themselves with such platinum ware and sets of weights as they may require.

The Department of Mines will make no charge for the use of chemicals or apparatus, but a candidate will be charged for all breakages or unnecessary loss caused by him.

Any additional information desired may be obtained from H. Carmichael, Secretary, Board of Examiners, Victoria.

E. G. PRIOR,
Minister of Mines.

Department of Mines,

Victoria, B.C., 10th November, 1902.

POGSON, PELOUBET & CO.

Public Accountants

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