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TAXATION AND THE MINES.

ELSEWHERE in this issue we print a paper read at the recent meeting of the Canadian Mining Institute at Nelson by Mr. E. B. Kirby on the subject of the "Influence of Government on Mining." This paper has already attracted much attention; but, it may be frankly admitted that we hesitated for some considerable time before deciding upon its publication in the MINING RECORD, and this, not because we do not entirely sympathize with the course Mr. Kirby advocates—the removal or lightening of the burdens of direct and indirect taxation now imposed on the mining industry of the Province—but for the reason that to our mind Mr. Kirby has been carried by his zeal into making statements which are not only unwarranted in point of fact, but are also of a nature likely to deter the further investment of capital in our mines. Some of these statements we cannot allow to pass unchallenged.

As a general principle, it may be admitted that the amount of taxes paid by a community is a burden to that extent upon the industries of the country, although to that rule there are so many exceptions that it is a very unsafe guide to follow in practical legislation. Yet it may be conceded that, other things being equal, a community in which taxes are light is more favourable to the prosecution of industry than a community where taxation is heavy. It may also be true, within limitations, that the burden of taxation ultimately falls upon the producer; and hence, that if the product is food, upon the farmer; if it is timber, upon the lumberman; if it is metal, upon the miner—using the term "miner" in the wide sense to include every one engaged in any way in the mining industry. Theoretically, the amount paid in taxes may be considered as so much in reduction of the profits of production. But these principles are applicable only to theoretical conditions. Practically such a diversity of considerations enter into all transactions that it is impossible to regulate them according to fixed rules of invariable application. Whether or not a tax is an injury to any particular industry can only be ascertained by practical test and cannot be settled by reference to academic principles. Therefore, while one may admit that mining can be more profitably carried on in a lightly taxed community than in one that is heavily taxed, it by no means follows that the taxes in British Columbia are a serious handicap to that industry here. Mr. Kirby confounds revenue with taxation. Not by any means all the revenue of the country is derived from taxation. Perhaps half the revenue of British Columbia is from that source, that is, so far as the Province itself is concerned. The amount paid the Province by the Dominion is derived from taxation, but not from provincial taxation, therefore it follows that this amount, which is nearly a quarter of a million dollars, must be left out of consideration in estimating the provincial taxation, otherwise, as it cannot be severed from the federal taxation, it would be twice counted. Of the remaining revenue of the Province, which may be roughly approximated at $1,350,000, about two-thirds is derived from taxes and one-third from sources that cannot be called taxation. At an outside figure, the taxes paid to the Provincial Government have never exceeded $850,000 in any one year. In these are included the receipts from free miner's certificates, mining receipts, licenses, real property tax, wild land tax, income tax, mineral tax, revenue tax, fines and forfeitures, succession duty and royalty and tax on coal. The items not included are land sales, land revenue, timber royalty and licenses, rents, law stamps, probate fees, registry fees, assay office fees, printing office receipts, sales of Government property and other items of this nature.

What proportion of the provincial taxation falls upon any particular industry must always remain a matter of guesswork, except so far as specific taxes go. It does not follow that because an industry yields a certain percentage of the products of the country, it necessarily pays the same percentage of the taxation. Admitting, for the sake of argument, that the mines of British Columbia produce nearly seventy-five per cent. of the output of all the provincial industries, that is, as Mr. Kirby claims, $20,000,000 out of $27,000,000, it by no means follows that mining pays nearly seventy-five per cent of the provincial taxes. In fact it would not be difficult to demonstrate that this is not the case. Directly it contributes only about thirty-seven and a half per cent. of the whole. Towards several large items, namely, real property tax, wild land tax, income tax and succession duty, mining as such contributes nothing at all, and these with the proportion of the revenue tax, not paid by persons connected directly or indirectly with mining, amount to more than half the provincial taxation. A considerable percentage of the revenue derived from free miners' certificates cannot by any construction be held to be a tax on the mining industry. In short, taking the last official returns as a guide, it may fairly be claimed that coal and metalliferous mining paid about 40 per cent. of the provincial taxation, including therein all receipts from mining, and of this 40 per cent. about three-fourths were paid by the metalliferous mines, or say thirty per cent. of the whole provincial taxation. If Mr. Kirby's estimate is correct and the mining industries yield seventy-five per cent of all the products of the province, may not some pertinently suggest that a levy amounting to thirty per cent. of the total taxation is not an unreasonable impost?

In respect to federal taxation, the same distinction must be observed as in the case of provincial taxation. The whole federal revenue is not derived from taxes. The amount so derived is something under $40,000,000, and of this a considerable portion, that is, some $13,000,000, is from excise on liquors and tobacco. It will hardly be objected that liquor and tobacco are materials used in mining. Doubtless miners and mine owners may in many cases use either or both to some extent, but no one has yet said that the price of these commodities affects the costs of mining. If the price of them were reduced, the cost of producing a ton of ore would certainly not be lessened. The cost of food and clothing may be increased by the tariff or it may not be. The point is a disputed one, but it will hardly be claimed that a reduction of the tariff on these articles would be followed by a reduction of wages. Moreover, in considering this point regard must be had to the conditions existing in the United States. There the cost of living averages as high as it does in Canada, so that Canadian miners are not at any disadvantage in this respect. Such considerations as the foregoing seem to show that no good purpose is likely to be served by an attempt to analyze the effect of the tariff upon miners' wages. There, however, remain certain articles to be considered, the heavy duty upon which, entering largely into use in mining as they do, is a serious burden. These are mining machinery and tools, candles, explosives, fuses, caps and other supplies. The duty on these undoubtedly increase the cost of them, and in that way increases the cost of mining. There is no gainsaying the fact that this form of indirect taxation is the heaviest burden the mining industry is called upon to carry. It is, however, hardly reasonable to urge this as an argument why the industry should not contribute its fair share towards provincial revenue. We are meanwhile in agreement with Mr. Kirby's conclusions to this extent, that conditions of mining in British Columbia to-day are exceptionally difficult and that Government, both Federal and Provincial, might advantageously, as a matter of policy, do much to relieve the situation by the removal, for the time being at least, of restrictions and imposts, which, under unfavourable circumstances such as, for example, the low prices of metals and inadequate market facilities, now appear so disproportionately onerous. If it is true, as reported, that a Department of Mines is to be established under Dominion Government auspices, doubtless one of its first acts will be the investigation of mining conditions in British Columbia with a view to their amelioration.

THE COAL STRIKE IN THE UNITED STATES.

AT this present writing the great anthracite coal miners' strike is still in progress in the United States. Both parties to the dispute anticipate for their side a triumphant issue. The operators assert that it is only a question of time when the places of the strikers will be taken by others; the miners state that they are in a position to hold out indefinitely and that they do not fear results. Meanwhile there are instances of disorder and the military has been called upon to preserve peace. In several instances there has been bloodshed. Winter is coming on. The supply of anthracite coal is getting short, so that high prices must prevail. It is only to be expected that with the approach of cold weather the condition of the strikers and their families will become more serious. It is impossible to regard this state of things with any other feeling than one of apprehension. The number of striking miners is said to be 147,000, and probably more than a quarter of a million workingmen are either directly or indirectly affected, involving more than a million men, women

and children, and the direct and indirect loss to the community must be very great.

The great wealth of the comparatively few individuals who control the coal mines puts them beyond the influence of the inconvenience resulting from a rise in the price of coal, and enables them to contemplate a long cessation of profits with considerable equanimity. The strike does not impair their capital and they can afford the loss of dividends. Conceding to these people all the wisdom which their prominence in the business world implies, and also their due share of appreciation of social conditions, it may be well doubted if they are the best judges of what the welfare of the state demands. They are separated by a wide gulf from the toiling masses, who form the immense majority of the population and who, if they choose to assert themselves unitedly, must in the long run win. The conditions prevailing in the United States to-day are not so greatly dissimilar to those which existed in Imperial Rome, out of which grew slave rebellions with all their attendant horrors. A not unlike condition of things gave rise to the French Revolution. Too close a parallel must not be drawn, because the civilizations of the Third, the Eighteenth and Twentieth Centuries are divergent in many ways; but human nature remains the same in all ages and just as the patrician class in Rome, and the nobility in France failed to appreciate the strength of the movement among the working classes, so it is no reflection upon the intelligence of the great capitalists of the United States to suggest that they may not be able to grasp the consequences of the movements with which they are confronted.

Fortunately there is in the United States what Rome scarcely knew and what France possessed only to a limited extent, a vast body of people who are neither wage earners nor capitalists. If this element of the community chooses to assert itself it can give laws to the others. These are the people whose opinions really constitute public opinion, that tremendous force against which in self-governing countries nothing can stand. It is upon this class that the safety of the nation may depend..

A dangerous feature of the industrial situation in the United States is found in the very large number of people employed in coal mining and other purely manual trades, who are not in close touch with what we call the Anglo-Saxon system of government. They are representatives of the Slavic and other races from Central Europe and they have not been taught either by tradition or experience to trust to the effect of peaceful agitation to secure the recognition of their rights. Of themselves they are not sufficiently numerous to bring about revolutionary conditions, but when the American-born workingman makes common cause with them, they become very formidable indeed. History shows that danger lurks in friction between the extremes of the community. The average American workingman may have very little sympathy with the filthy and ignorant immigrant from, say, Bulgaria; but if he thinks the latter is being imposed upon by his employers, he is hardly to be blamed if he determines to take sides with him. Smaller causes than the oppression of a few foreign workingmen, even though they may smell evilly and live huddled together in cabins hardly fit for animals, have before now ranged society into hostile camps.

Under these circumstances it seems wise to take into the most serious consideration the whole labour question and provide if possible something that will do away with strikes or at least provide for their prompt settlement. The whole community has rights in the premises which must be respected. Capitalists may object to having their business affairs in any way regulated by persons not directly concerned in them, but it is upon such persons that they must rely for the protection of those interests. The owner of a great industrial plant feels that he has a right to the assistance of the courts and the military arm of the state to protect his property at all times and against all influences that might destroy it. This being the case, he ought in a spirit of reciprocity to be willing to permit the state to have a voice in the settlement of disputes with his employees. On the other hand, employees look to the state for their protection, and this being the case, they ought in all fairness to be ready to submit to state control. If neither party is willing to make this submission, then the only course open to the rest of the community is to take the matter in hand and apply such remedies as may to them seem advisable.

An objection made to compulsory arbitration is that, while workingmen would be compelled by public opinion to accept the decision of the court of arbitration, there can be no means devised whereby they can be compelled to comply with such decision in good faith. That is, it is said, that while a workingman might feel compelled to go to work for a smaller wage than he felt he was entitled to, no means can be invented whereby he can be compelled to do as much work for the lower wage than he would for the higher one. No possible means can be devised to meet such a contingency as this, and it is a question if there is really any valid reason for contemplating it. There is no means whereby a man can be compelled to do a good day's work for any wage, no matter how large. Experience does not warrant any fear that loss would ensue by reason of workingmen "loafing on their jobs," because an arbitration court decided against them. The right to discharge incompetent or lazy workmen must always be reserved to the employer. If the labour unions attempt to assert any control in this respect they ought to be given to understand that

the law will not permit it. As far as any one has been as yet able to see, no other plan than compulsory arbitration of preventing the evils likely to result from strikes, and the best judgment of all classes of the community ought to be directed towards the perfection of a system, which will do justice by all parties.

A SCHEME THAT FAILED.

MR. W. A. DIER is a well-known figure in certain financial and mining circles in British Columbia. Had he selected London as a field of operation his name to-day would be a household word. Here he first won notoriety on account of his connection with the old Fairview Corporation. We then had some occasion to "compliment" him. Lately he has added to his laurels. In May of last year the daily papers were full of glowing accounts, under, of course, startling headlines, of a wonderful group of mines in the Mount Sicker district, which had been acquired by Mr. Dier for the enormous sum of $3360,000. Mr. Dier is reported to have confirmed this statement, but—well, if the original owners ever received such an amount they have guarded the secret most carefully ever since. Certainly they have not changed their mode of living. This, however, by the way. After having acquired the property, Mr. Dier being of a generous disposition, good-naturedly gave the general public an opportunity to share with him and his partners the benefits likely to accrue, and curiously enough the claims upon being partially developed, did and still appear promising. A company was incorporated and Mr. Dier became managing director. He also for a relatively small consideration succeeded in buying out his partners, and thus secured full control of the property. For a period matters went well, shares sold freely and a sufficient sum was thus realised to work the mine and put in the necessary machinery, when like a bolt from the blue the following circular was issue at the instance of Mr. Dier:—

An extraordinary general meeting of the shareholders of The Mounts Sicker and Brenton Mines, Limited, Non-Personal Liability, will be held at the registered office of the company, Copper Canyon Claim, Copper Canyon, Chemainus District, B.C., on Wednesday the 24th day of September, A.D. 1902, at the hour of three o'clock in the afternoon, when the resolution hereunder written will be proposed.

Should the resolution be passed by the required majority it will be submitted for confirmation as a special resolution to a second extraordinary meeting which will be subsequently convened.

The resolution above referred to:

Resolved, that the Articles of Association of this company be and the same are hereby amended in the following particulars:

Article 40. By striking out all the words after "1903" in the 17th line and by adding the following words: "At every succeeding annual ordinary general meeting the whole of the directors shall retire from office, and the company at every such general meeting shall fill up the vacated offices by electing a like number of duly qualified members as directors, and whenever the number of such retiring directors is less than the maximum number for the time being prescribed by these articles, may also elect such further number of persons (if any) as the company shall then determine, but so that the total number of directors elected shall not exceed such maximum. The retiring directors shall be eligible for re-election. All directors shall hold office until their successors are appointed."

Article 45. By striking out the words "by a special resolution," in the second line.

Article 53. By striking out the word "Directors" in the fifth line and substituting therefor the words "elected officers."

Article 54. (a) By adding to the second paragraph thereof the words: "or by the company in general meeting by ordinary resolution." (b) By striking out the last paragraph thereof and inserting the following paragraph: "Subject to the directions (if any) which may be given by the company in general meeting the first managing director shall manage the business of the company and be at liberty upon his own responsibility to do, on behalf of the company, any act which the directors may do, except to borrow money or fill a casual vacancy on the Board."

Article 55. By striking out the words "Directors may" in the first line and inserting in lieu thereof the words "Company in general meeting may by ordinary resolution."

Article 57. By striking out the words "Board may" in the first line and inserting in lieu thereof the words "Company may in general meeting by ordinary resolution."

Article 59. By striking out the article and inserting in lieu thereof the following article: "59. In the case of any managing director subject as to the first managing director to the express powers hereinbefore given, the Company in general meeting may by ordinary resolution from time to time vest in such managing director for the time being such of the powers exercisable by the directors as herein mentioned (except such as are expressly stated to be incapable of delegation) as the company may deem advisable and may vest any such powers for any such time and to be exercised for such objects and purposes and upon such terms and conditions as may be considered expedient."

Article 84. By striking out the words "hereinafter mentioned" in the second line and inserting in lieu thereof the words "in manner provided by Article 63 hereof."

Article 85. By striking out the words "Board of Directors" in the last line and inserting in lieu thereof the words "Company in general meeting by ordinary resolution."

Article 89. By striking out the article and inserting in lieu thereof the following article: "89. No contract or agreement entered into by or on behalf of the company for the some of the company's undertaking shall be binding on the company unless ratified by the company in general meeting by ordinary resolution."

By order of the Board of Directors,

R. T. ELLIOTT.
Secretary.

Registered Office of The Mounts Sicker and Brenton Mines, Ltd., Copper Canyon Claim, Copper Canyon, Chemainus, B.C.
12th September, 1902.

Had this meeting been held and the resolution in question passed, which as Mr. Dier held the controlling interest was reasonably certain, it is obvious that Mr. Dier would then have had the company exactly where he wanted it. Here we would call special attention to the proposed change in Article 89. Happily the minority interests were alive to the situation and obtained an injunction order from the Supreme Court as under:—

IN THE SUPREME COURT OF BRITISH COLUMBIA.

Upon motion made unto this Honourable Court by counsel for the plaintiffs and upon reading the writ of summons issued in this action this day and the affidavit of John Samuel Henry Matson, sworn this day, and the exhibits therein referred to, and the plaintiffs by their counsel undertaking to abide by any order which this Court may make as to damages in case this Court should be hereafter of the

opinion that the defendants shall have sustained any by reason of this order which the plaintiffs ought to pay, and also undertaking to accept four days' notice of motion to discharge this order or the injunction hereby granted.

This Court doth order that the defendant company and its directors and officers be restrained from holding the extraordinary general meeting of shareholders at Copper Canyon claim, Copper Canyon, Chemainus district, B.C., at the registered office of the company on Wednesday, the 24th day of September, A.D. 1902. And this Court doth further order that the defendant company and its directors and officers be restrained from holding any meeting of the company in any place other than in the City of Victoria, after said meeting has been duly called, until further order.

BY THE COURT.

"G. H."
C. J.

The effect of this injunction was to bring Mr. Dier very speedily to time with the result that he consented to sign the following agreement:

Arrival of Party of British Journalists at Ymir. *Photo by Widdowson, Ymir.*

Memorandum of agreement made in duplicate this 29th (twentieth) day of September, A.D. 1902. By and between William Alfred Dier, of the City of Victoria, in the Province of British Columbia, and Richard Thomas Elliott, of the City and Province aforesaid, who now hold a controlling interest in the share capital of The Mounts Sicker and Brenton Mines, Limited, the parties of the first part and the said The Mounts Sicker and Brenton Mines, Limited, the parties of the second part—Whereby it is agreed as follows:

1. This agreement may be acted upon and under and enforced by any member of the said company and shall remain in full force and effect so long as the said parties of the first part, or their legal or equitable representatives, hold the said controlling interest:

2. For the purpose of such enforcement this agreement shall be deemed and taken to include and contain all necessary negative stipulations and covenants:

3. That the Victoria minority interest shall be entitled to nominate two (2) directors upon the board:

4. All meetings of the shareholders shall be held in the City of Victoria:

5. No special resolution shall be submitted for the approval of the shareholders unless first approved by Mr. E. V. Bodwell, K.C., and Mr. A. E. McPhillips, K.C.:

6. No sale, or agreement for sale, of the undertaking, or any part of the undertaking of the company, will be binding on the company unless ratified by special resolution.

In witness whereof the said parties have hereunto set their hands and seals the day and year first above written:

Signed, Sealed and Delivered in the presence of

F. J. JONES. W. A. DIER.
R. T. ELLIOTT.

The moral teaches that Mr. Whittaker Wright was wise in selecting London rather than British Columbia as a field of operation. Meanwhile we may have some further disclosures to make later.

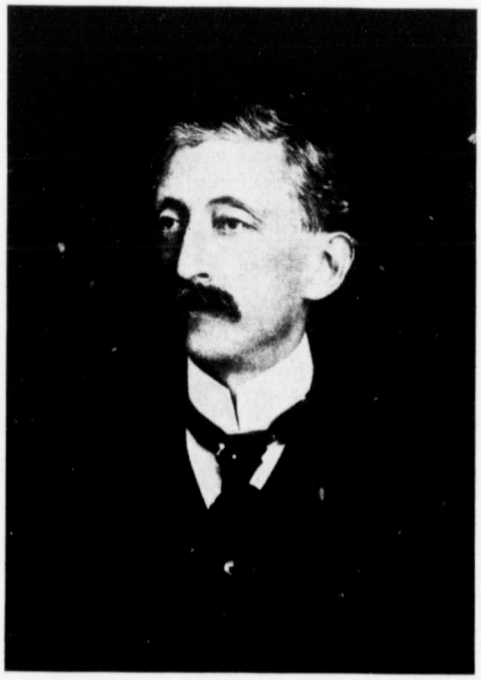
A "British Mining Engineer" writes to protest against certain statements attributed to Mr. B. T. A. Bell, the secretary of the Canadian Mining Institute, by an interviewer at Winnipeg to the effect that "all the paying mines in B. C. were either owned by Canadians or Americans, and that these mines were managed by men of either Canadian or American birth and training." Further, "that English companies made the mistake of sending out young, untrained School of Mines men, who while perhaps having knowledge of coal, iron or tin mining, were quite without experience as regards copper, lead or gold mining." Our correspondent asks Mr. Bell what proof he has in support of these contentions, and adds "I fail to bring to mind an instance in B. C. where the London School of Mines man has yet had an innings." Yet it is worthy of note that the bigger mines owned by American and Canadians are being successfully managed by British engineers, while on the other hand, English companies are employing

American and Canadian engineers. This is shown in the following list: Le Roi, British company, manager, Mr. Mackenzie, a Canadian; Le Roi No. 2, British company, manager, Mr. MacDonald, an American; Centre Star and War Eagle, Canadian company, manager, Mr. Kirby, an American; Knob Hill and Ironsides, Canadian company, manager, Mr. Yolen Williams, a Welshman; B. C. Copper, American company, manager, Mr. Keffer, an American, consulting engineer, Mr. Thomas, a Cornishman; B. C. Mine, Canadian company, manager, Mr. Parrish, an American; Snowshoe Mine, British company, manager Mr. Astley, an Englishman; London and B. C. Goldfields, British company, manager, Mr. Fowler, an American; North Star, Canadian company, manager, Mr. J. L. Parker, a Scotchman; Sullivan, American company, manager, Mr. Finlay, a Scotchman; Lenora Mine, British company, manager, Mr. Croft, an Englishman; Tyee, British company, manager, Mr. Livingston, an Englishman; and so on." As a matter of fact we have at the present time very few paying mines, whether British, American or Canadian owned, that is to say, mines paying regular dividends. There are, however, many properties on—there is fair reason to believe—the eve of becoming regularly profitable and of these probably quite as many are controlled by British as by Canadian or American capital. As to the capabilities of the British mining engineer, every one will concede that given equal advantages, he is as good a man professionally as the members of the same profession in America or in any other country. In fact, some of the most eminent mining authorities in the United States are of British birth. In Pennsylvania a great many of the miners are Welshmen; in the Minnesota iron mines, the Montana copper mines, indeed in all the great mining centres of the States, Cornish miners are very much in evidence; Marcus Daly was an Irishman; Mackay of the Comstock was, we believe, also of this nationality; Parks, one of the most successful of mining men in California, is a Scotchman; and there are hundreds of other instances of eminence attained by British mining men in the United States. It must, however, be reluctantly admitted that the theory and practice of mining is better and more thoroughly taught in the mining schools and colleges of the United States and Canada than it is in any institution of the kind in Great Britain, and other things being equal, an experienced manager in this country would certainly prefer as an assistant a graduate of (say) McGill or Columbia Universities to a graduate of the Royal School of Mines or of Camborne. Not only are American schools better equipped than the British, but their students have the advantage of acquiring practical knowledge in the field and under the conditions where they are first likely to be called upon to apply that knowledge. While we agree with our correspondent that Mr. Bell has no particular ground for charging British companies with appointing inexperienced and untrained graduates direct from British mining schools to the charge of important mines in British Columbia, there can be no doubt that in the past many costly British failures have resulted from the fact that so-called mining engineers directing operations were either incapable or were not familiar with local conditions and requirements.

It is gratifying to remark that preliminary steps have been taken towards the establishment of a British Columbian branch of the Canadian Mining Institute, a committee of representative men having been appointed at the meeting in Nelson the other day to take the matter in hand. In this connection we desire, on behalf of the mining community of British Columbia, to express our cordial appreciation of the part played by Mr. B. T. A. Bell, the secretary of the Institute, to whose efforts the present movement is due. "The Canadian Mining Institute" is in fact, Mr. Bell. It owes its origin and usefulness to him, and it is doubtful whether any other man would or could have managed, with equal success, the organization of a society such as the Institute under conditions and circumstances so, to all appearances, insurmountably difficult. The gift of organization is granted to few. Mr. Bell possesses it in an eminent degree. Since its inception the Mining Institute has been of great service, not only to the industry, but to the country. Its power is increasing, and already it has been able to influence legislation at Ottawa on matters touching the welfare of the mining interests. The necessity for a British Columbian branch has long been felt and the opportunity will now be afforded mining engineers and others of meeting at stated periods and deliberating upon engineering or metallurgical questions and problems of local concern, while much good may also result from the ventilation of grievances, together with suggestions to the Government on the matter of mining legislation. It may safely be assumed that the Government of British Columbia is not only willing but anxious to listen to advice from practical men, and if this is submitted in a proper and business-like manner there can be no doubt but that it will have the best possible effect.

Experimental tests are now being made with the new "Garretson" type of furnace, which has been installed at the Crofton smelter, and an exhibition of the furnace in operation was given by the Northwestern Smelting and Refining Company the other day. No attempt, however, has yet been made by the operators of the Crofton smelter to establish the inventor's claims, and until these have been satisfactorily demonstrated it would be premature to discuss the value of the invention.

Mr. Henry Croft, whose portrait we present this month, has played a very important part in the development of the mineral resources of the East Coast of Vancouver Island, the opening up of the mines of the Mount Sicker district and the large subsequent investment of capital in that neighbourhood being largely due to his enterprise, energy and perseverence. At a time when prospectors found it almost impossible to interest capital even in small amounts to develop their claims on Mount Sicker, Mr. Croft acquired the Lenora mine, and succeeded in proving it to be a very valuable property. There is now no copper mining district in British Columbia of greater promise. Mr. Croft is a member of the American Institute of Mining Engineers; an associate member of the Institute of Civil Engineers; a member of the Institute of Mechanical Engineers; a member of the Federated Institute of Mining Engineers, and a member of the S. Staffordshire and E. Worcestershire Institute of Mining Engineers.



Mining Men of the Province.—Mr. Henry Croft.

American investors who make a regular business of acquiring mineral claims are not often caught "napping," but our Slocan City correspondent sends us the following narrative which would appear to show that even shrewd men of business can at times be very unbusinesslike. He writes: "A number of claims have been acquired in this district by what is locally known as the Detroit Syndicate. As a matter of fact the various properties are owned by separate groups of capitalists with their headquarters in Detroit, Mich. In order to understand the situation one must go back to the winter of 1900-01, when Mr. Chas Dempster, of Rossland, secured an option on the Republic group here and with local assistance sold the property to a syndicate in Detroit. Last summer he in company with the principal members of the syndicate visited the property, and being thoroughly pleased with what they saw, completed the organization of the Slocan Republic Co. and have been actively engaged this summer in opening up their property under the supervision of Mr. R. C. Campbell Johnson. The favourable reports of the district, not only by the original visitors, but by others who were interested in the Republic, made it a comparatively easy matter to dispose of other property and options on a number of promising claims were secured by Mr. Dempster, who soon sold the Sapphire group to some of the most prominent men in Detroit, headed by Mr. N. D. Carpenter, of the U. S. Steel Co., and afterwards two other properties, the May and Exchange groups, were sold to other groups of capitalists. Late this summer Mr. Carpenter, accompanied by a party of interested friends and his consulting engineer, Mr. Choate, of Detroit visited the property with a view to the commencement of work on a large scale. The property did not, however, look as well as they had been lead to expect and after finding out that they had paid $60,000 for what had been sold by the owners here for $10,000, they went East feeling very sore against the camp, the promoters, and no doubt themselves. Mr. Choate remained some time, making a more exhaustive examination, and we now hear that his verdict is that the property is probably worthless. This verdict is, however, somewhat harsh, as there is certainly some good ore on the Sapphire. Now work has been suspended on the Sapphire and Exchange and things are in a bad way both here and in Detroit; everyone blames every body else, and you could not give away Slocan mining properties in Detroit. It would seem that the propositions were 'turned' once, twice or more before reaching the present hands. That the blame in this affair be properly allocated and applied is devoutly to be hoped. Mr. Carpenter says that he is bound to find out how that $50,000 was distributed and a fair amount of whip should fall on the shoulders of those who jumped at the bait without investigation." There may, of course, be more in the affair than at present meets the eye, but we fail to see how the Detroit capitalists can blame anyone but themselves. They seemingly bought a "pig in a poke" and paid half a dozen prices for it. Now they are indignant and astonished to find that the animal is a poor specimen.

According to a correspondent in whom we have every confidence, the properties owned in the Nelson district by the Maple Leaf Mining and Development Company, to which we made reference last month, are far from unpromising and certainly should not be described as "wild-cats." Our correspondent writes:

"While in the White Grouse I found ten men at work on one of this company's claims (the Bullion) developing and taking out some of the finest looking copper ore it was ever my lot to see. For the amount of work done they had a surprising quantity of ore on the dump and there seems to be no end to the lead from which the ore was taken. Shipments, I hear, are to be commenced as soon as a new road is built, and it is now well under way. As a rule I am not very enthusiastic, but it would do a *real* mining man good to see this Bullion claim--the ledge and the dump of ore. This Goat River country has been 'knocked' repeatedly without cause, and it should be stopped. My twelve years in this particular district should count for something. Eh? As regards this Maple Leaf Mining Co., I don't know anything about it one way or another, have no interests in it; never even saw its prospects, but I do know that they have property that they need not be ashamed of."

In addition to the White Grouse claims, the company also owns, our correspondent adds, a good property in the Black Prince, a silver-lead mine in East Kootenay. But what a pity the prospectus should contain such nonsense as, for example, this: "Of the surrounding mines, the Le Roy mine and the Silver King are owned by the Rothschilds, the well-known European bankers, employing more than 3,000 men to work these mines. Another surrounding (*sic*) mine, the Ymir, is paying over $75,000.00 a month in dividends, and stock in all these companies is hardly obtainable at any price." And this, being an extract from a letter signed by F. J. Hartman, a Catholic priest: "I consider the value of this property of enormous possibilities and feel confident that this investment will turn out a great wealth producer." What on earth does he know about it! And again this exaggerated statement inviting the public to subscribe for the stock: "Considering the able and reliable management and the enormous value of the holdings of the Maple Leaf Mining and Development Co., it can be stated that there has never been placed before the public a proposition of such enormous possibilities as there is offered to investors in stock of these mines. Already $20,000 has been spent upon development to find out in what direction the ore bodies lay. Two tunnels sunk (*sic*) in one claim, the Maple Leaf, reveal rich thick veins of gold ore in sight, estimated amounting to over $3,000,000." Any intelligent man would naturally come to the conclusion that a company so adventurous as to sink two tunnels in one claim, was very likely to prove a sink itself—for other people's money. But, if as our correspondent suggests, the undertaking is a *bona fide* one, we would strongly advise the immediate suppression of the prospectus.

The "jumping" of the Cody Fraction, a claim in the Slocan upon which a great deal of money has been spent both in the ground and in the courts, affords us the excuse of again calling the attention of the Government to the faults and injustice of a system which imposes so heavy a penalty as complete forfeiture of valuable property for failure to make a purely conventional declaration of work done and the payment of a fee of $2.50 for so doing. What was remarked in a former issue when this subject was being dealt with applies here. "Were this an isolated instance it might be argued that some extraordinary negligence on the part of the company or owners had taken place and that if people would not pay $2.50 to preserve title to very valuable property they deserved to lose it. Which is very true, but unfortunately this is not an isolated case. Others have occurred and have had a bad effect on the interests of British Columbia through disgusting men who had invested large sums of money in this province. And this is the point of view from which the matter should be judged, not that it is the business of the Legislature to protect those too negligent to carry out the conditions under which mineral rights are held, but to protect the interests of the Province by making these conditions as plain and simple as possible, and by minimizing the risk of forfeiture and its heavy losses as much as possible." At the same time we made the following suggested amendments to the Act:—

(1.) The failure to record assessment work on or before the expiration of the present time-limit shall not render the property liable to forfeiture, but omission in this respect shall be punishable by fine on a system of cumulative penalties. For instance, if a record is made within one month after the legal limit, a fine of, say, five dollars, shall be imposed; if within three months, the sum to be paid shall be fifteen dollars, or twenty-five dollars if the extreme limit of the six months' extension is not exceeded. After six months the property should revert to the Crown.

(2.) No location or mineral claim on which one assessment, or work to the appraised value of one hundred dollars, has been performed, shall be "jumpable" or open to re-location, but shall revert as a claim with designated boundaries to the Crown. At stated periods, of which adequate notice must be given, properties thus forfeited shall be sold at public auction by the Gold Commissioner or Mining Recorder of the district, a minimum reserve price being placed on every claim thus offered for sale.

(3.) The present clause relating to the location and recording of mineral claims should be repealed,

and the Colorado law of compulsory assessment before a claim can be recorded submitted therefor.

These suggestions, if acted upon, would be productive of several, in our opinion, beneficial results. In the first place the man who spends either his time or his money in a bona fide attempt to develop a mineral property, but who by ill-chance or even carelessness omits to regard a trivial technicality of the law would be reasonably safeguarded against serious and complete loss by forfeiture. Secondly, if opportunity was not taken of the reasonable chance afforded, the Government would benefit by the acquisition and sale of the property and not some private individual or "jumper" whose moral, if not legal right, to the work of others is certainly questionable. Again by the means proposed promiscuous staking of claims in new districts would be largely checked, by preventing re-location after one assessment, and lastly a large increase in revenue from mining districts might be counted upon for the prosecution of useful and necessary public works in those localities.

During the past few weeks conditions throughout the Kootenay mining districts are said to have considerably improved, from what causes, however, it is somewhat difficult to say. In the Slocan, for instance, it is stated that claims are being sold and bonded freely, while a greater number of mines are being worked than at any previous time. If this is true it is somewhat inexplicable, as lead and silver prices are certainly as low as they well can be, and facilities for marketing are unchanged. It is possible, of course, that the reported proposed action of the Idaho lead producers of establishing lead works in the Coeur D'Alene in opposition to the trust, may have something to do with the movement but as yet this report is the veriest gossip, and probably does not contain an element of truth. In Rossland, of course, the resumption of operations at the Centre Star and War Eagle mines has necessarily had an excellent effect, while the termination of the Fernie strike has enabled the Boundary mines to again continue shipments on a large scale. Really good times in the Kootenay depend, however, on either a general rise in metal prices, or in some of the camps the application of still cheaper methods of treatment, or a combination of both. In the Boundary costs have already been reduced to practically a minimum, but a slight further reduction may be expected upon the completion of the branch railway connecting with the Great Northern system, when freight rates and fuel supplies will probably be considerably less than at present..

It is reported that the Vulcan furnace recently installed at Ferguson is not a metallurgical success. Is that so very astonishing?

The MINING RECORD was, we believe, first in calling attention to the reported discoveries of tin in the Yukon. A contemporary, the *Mining Reporter*, of Denver, Colorado, in a recent issue now announces that an expert sent some time ago to investigate the truth of these rumours has returned and reports that the metal does occur in large deposits. The *Mining Reporter* remarks: "This is welcome news to the tin plate manufacturers, as the world's production of the metal has been steadily decreasing for the last six years, while its utility is becoming more and more pronounced. The price of the metal has more than doubled in this time and grave apprehension has been felt that the present condition would grow worse rather than better. This new discovery is probably authentic and Alaska thus seems to have again demonstrated itself as one of our most valuable possessions. Tin, so far, has not been discovered in the United States proper, in paying quantities, while we are the greatest consumers of the metal." But a still further reduction in cost will have to take place in the Yukon before tin ore, however rich, can be profitably mined.

THE MOUNTAIN GROUSE.

Or the Prospector's Lament.

Snow, snow, beautiful snow!
Where is the fellow who wrote,
"Snow, snow, beautiful snow?"
I'd like to get hold of the goat!
I'd bury him deep in his beautiful snow!
How would he like to be me,
Breaking a trail with a pack on my back
In snow well over the knee?

Six long miles from the railroad track
In snow to the top of the hill,
With a good round fifty pounds on my back
Up a grade that is fit to kill;
Snow on the ground and snow in the trees
That falls now and then on your head.
If you stop too long for a "wind," you freeze,
So you plug to the top half-dead.

The idiot who wrote of the "beautiful snow"
Is the self-same silly moke,
Who talks at times with a poet's glow
Of the "scent of the camp-fire glow
"Wreathing blue in the mountain air,
"And curling up to the skies,
"Dispelling thoughts of a town-bred care,"
Did it ever get in his eyes?

As he dodged round a camp-fire trying to cook,
After a twenty-mile grind
'Cross wind-jams and rock-slides? It does for a book,
But not for a prospector, mind!
I'd like him around when the "skeeters" are thick,
And you build up a darned good "smudge,"
I'd smoke him then till I made him sick,
And he called his own poetry "fudge."

—Richard Lawrence.

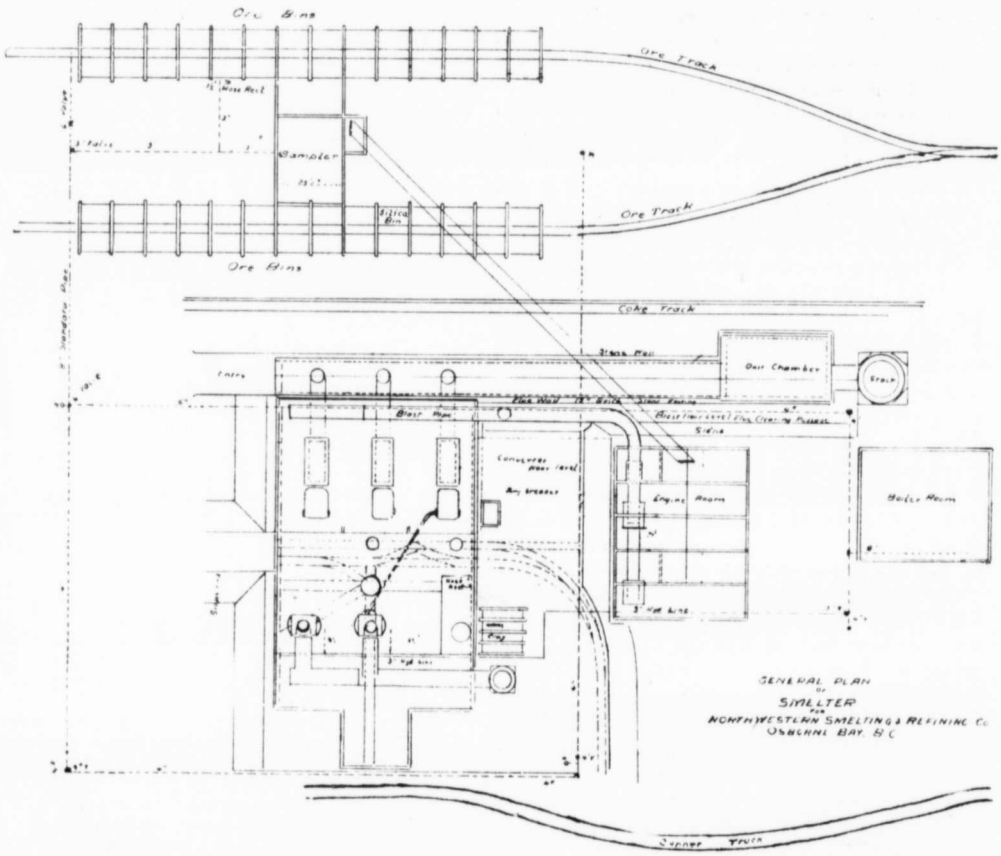
THE NEW SMELTER PLANT AT CROFTON.

(Written for the B. C. Mining Record by W. M. Brewer.)

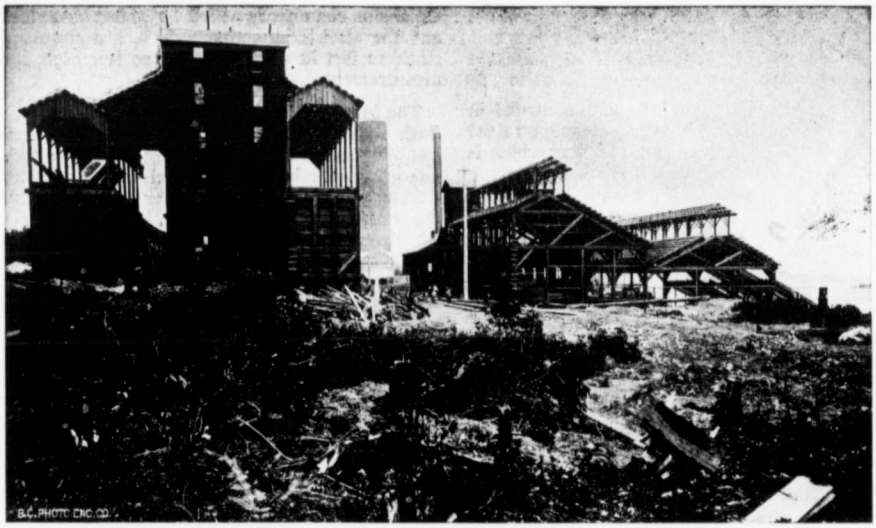
THE smelter at Crofton, at Osborne Bay, on the east coast of Vancouver Island, about forty miles by railroad and about fifty by water from Victoria, was erected by the Northwestern Smelting and Refining Company, of which Mr. James Breen is the president and general manager, and Mr. Herman C. Bellinger assistant manager and metallurgist in charge. Both of these gentlemen are thoroughly experienced smelter operators and eminently skilled metallurgists, having built and operated the Heinze smelter at Trail, B.C., the Le Roi smelter at Northport, Wash., and later the smelters of the Montana Ore Purchasing Co., at Butte, Mont., and their connection with the new works is a sufficient guarantee that the undertaking will be successfully conducted.

Although contracts have been entered into for the reduction of the entire output from the Lenora mines at Mt. Sicker, which is the base of ore supply, yet it must not be imagined that the operations at this smelter will be confined to those ores, or to the ores of Vancouver Island. As a matter of fact it is proposed to purchase ores from any portion of the Pacific Coast from Alaska to Valparaiso and as far inland as conditions for transportation permit.

The smelter plant occupies a position adjoining the townsite of Crofton on the south. The reserve embracing about forty acres of land, on one side of which is the narrow gauge railway constructed from Mt. Sicker to the wharf at Crofton. A short distance west from the general office building of the smelter company—the most westerly building on the reserve and situated about 1,200 feet from the shore end of the wharf—the line of the railroad branches towards the southeast to convey ore direct from Mt. Sicker



on to the trussels over the ore-bins. Another branch has been constructed in the same direction and almost paralleling the ore road for the delivery of coke, and still another line of railway has been built following the coast line from near the shore end of the wharf, southerly to the copper house on the shore for the delivery of the product. This system of trackage is all laid with three rails in order to facilitate the transfer of broad gauge cars from the ferry slip on the wharf. The convenience of this arrangement has already been demonstrated in the delivery of machinery which was transferred from the Mainland on the



Crofton Smelter Buildings in Course of Construction.

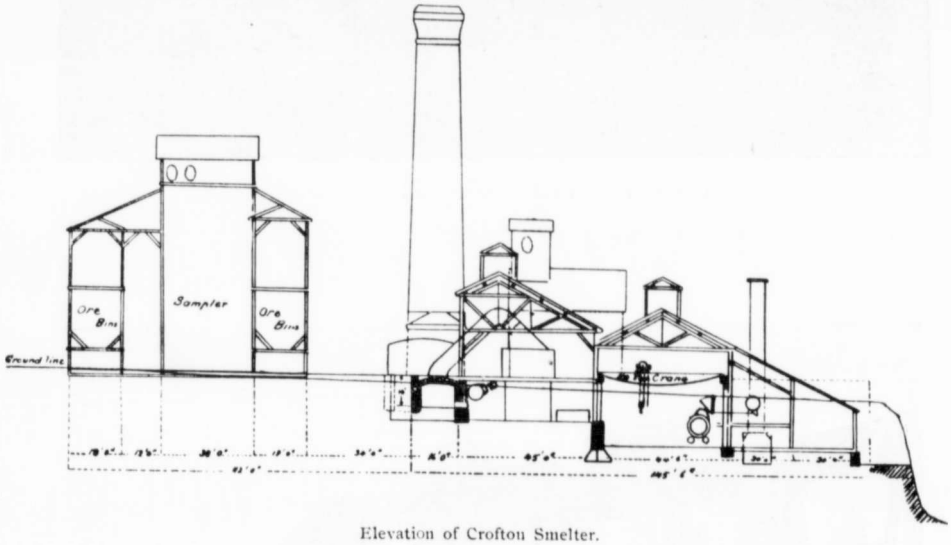
Sleay Engine and Ore Cars on Trestle at Crofton,

car ferry "Georgia," thus avoiding the breakage of bulk. The wharf itself is about 750 feet in length, with a depth of about 21 feet at low tide, and contracts have been entered into to further extend this wharf into still deeper water, and erect at the sea end the most modern appliance for unloading vessels in order to insure rapid work. Connected with this unloading appliance will be bunkers of sufficient capacity to accommodate a ship's cargo.

Starting from the wharf the ore will be carried in cars hauled by the company's own locomotive to the point where the railroad branches and near which is located the track scales of the latest design by the Fairbanks Company, and having a capacity to weigh sixty tons. These scales have a patent device which registers on a card by perforating the gross and tare weights so that it is absolutely impossible for any dispute to arise. From these scales the cars are pushed on to the trussel and over the receiving bins, of which there are six, each bin having a capacity of about 300 tons. These bins are arranged in a line parallel to the sampling mill with the automatic discharge gates about 30 feet distant from the crusher, which is built in a pit in the foundation of the mill. The ore is taken from the receiving bins in ore buggies, again weighed on a Fairbanks platform scale, then dumped into the crusher, which is a Blake 10x20 inches, and with which is connected the elevator system. By this the ore is elevated to the higher floors of the sampling mill which has a capacity to sample 1,000 tons per day and a total height of 80 feet, where it passes through rolls and is automatically sampled, the final sample being delivered on the crushing floor of the mill for transfer to the assay office situated about four hundred feet northerly from the mill while the remainder of the ore passes through chutes into the delivery bins arranged in a line parallel to the sampler on the east side. There are eight of these bins, each having a capacity of about 300 tons, and furnished with automatic discharge gates.

The distance from the delivery bins to the charging floor of the furnace building, which is situated to the east and nearer the shore line, is about 45 feet. This space is occupied by the coke track and the flooring over the dust chamber. The dust chamber is 200 feet long, 10 feet wide and 12 feet high; the expansion chamber is 24 feet by 40 feet by 20 feet high and the stack connecting with it is a circular brick stack 12 feet in diameter and 120 feet high, interior measurement.

The furnace building is situated with its south side flush with its south end of the dust chamber and sampling mill. It is 73 feet long by 45 feet wide, the charging floor being on a level with the roof of the dust chamber. In this building are three furnaces, the smallest being a cupola for re-melting matte whenever desirable and the two larger being a water jacket smelter with a capacity of 350 tons per day, the other, a Garretson furnace, having about the same capacity and of a new type by which with certain sulphide ores the quantity of fuel can be reduced from 11 to 12 per cent. to less than 3 per cent; while smelting and converting can be carried on in one operation.

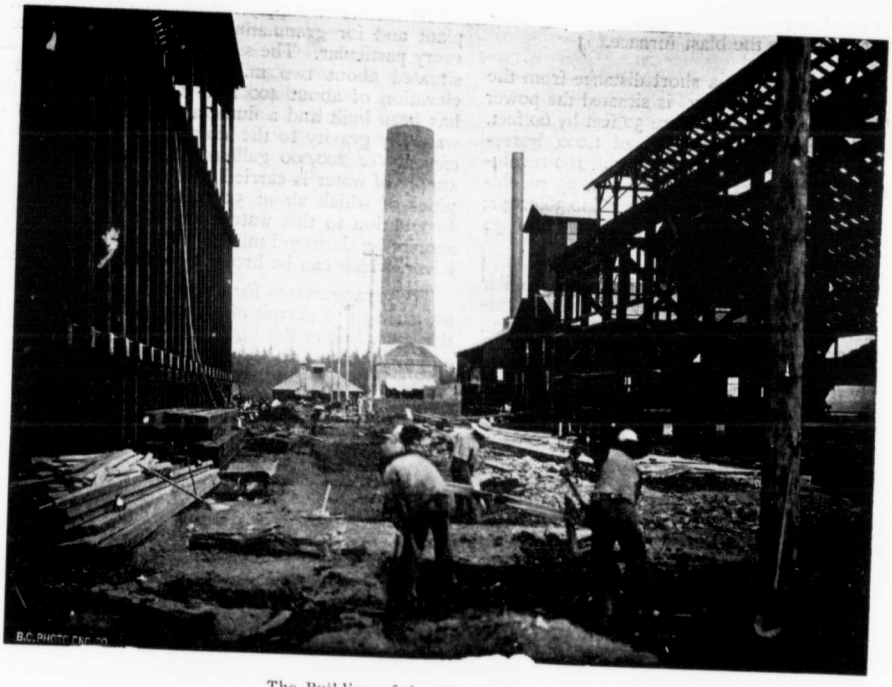


Elevation of Crofton Smelter.

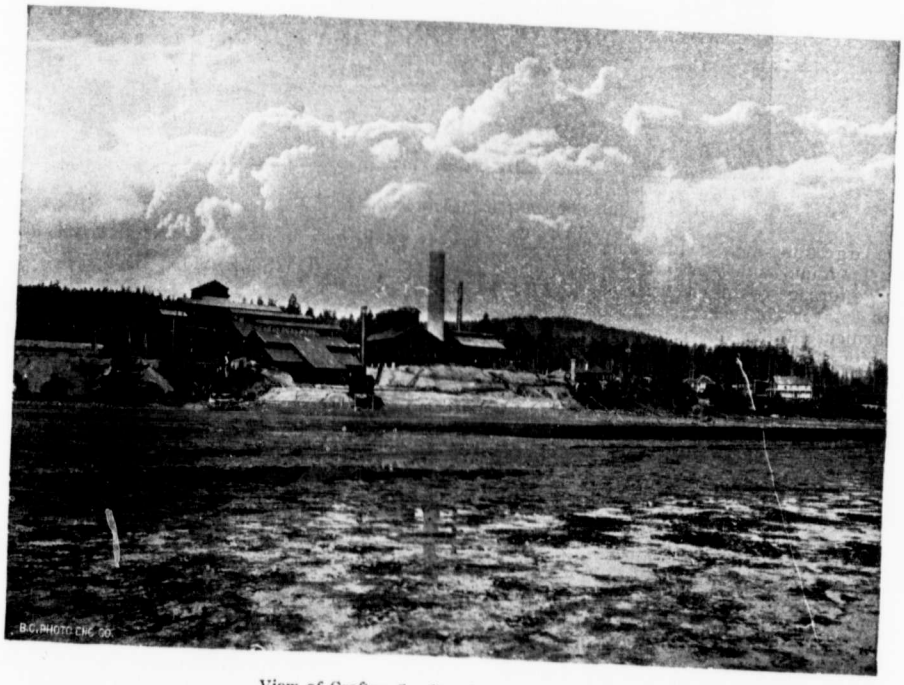
In order to secure the advantage of drawing matte from the furnaces and transferring to the converter building by gravity, about 17,000 yards of material have been excavated next to the shore line, so that the floor level of the furnace building is about 14 feet lower than the charging floor, and the floor level of the converter building eight feet lower still.

The converter building, which joins the furnace building on the east side, is 73 feet by 45 feet. In this are installed two converters, each having a capacity to treat 50 tons of matte daily. Adjoining, to the east of the converter building is the copper room, which, as has already been stated, is connected with the wharf by railroad tracks.

The converter building is arranged for a 50-ton electric crane for handling the converters, and a hydrau-



The Building of the Big Stack at Crofton.



View of Crofton Smelter from Osborne Bay.

lic elevator has been installed to handle the slag from the converters up into the blast furnace.

To the north and [illegible] in a short distance from the furnace and convert[illegible] is situated the power house. The dimens[illegible] are 50 feet by 60 feet. In this are installed [illegible] or of 1,000 horse-power; two blowers, one a number eight, 100 revolutions a minute, the other a number five, 25 revolutions a minute; blowing engine 16in.x36in.x42; power engine 18x36x42 inches and dynamo of 52 kilos for lighting the entire plant.

North from the power house is situated the boiler house, 40x48, in which are installed three 200 horse-power boilers with foundations already for a fourth when necessary.

Northerly from the smelter plant proper and about 400 feet distant is located the assay office. This is one of the largest and most commodious buildings of this character found anywhere in the West. It contains a large furnace room, chemical laboratory, balance room, assayer's office and store room, with such an arrangement of the furnace room that affords ample facilities for the representatives of shippers to witness the final operations with regard to pulp sampling. In fact great pains have been taken by the management to arrange suitable accommodation for consignors or their agents for the facilitation of business.

To the west, and about 200 feet distant from the assay office, is situated the general office building.

From the foregoing description, it will be readily seen that in the construction of this plant every detail with a view to compact arrangement of the buildings has been given deep consideration, in order to insure the most rapid transit of ore and material from point to point, and at the same time minimize the handling by manual labour, and thus conduce to efficient and economical operations. The arrangements for water supply for the boilers, the smelting plant and for granulating the slag are complete in every particular. The supply is obtained from a lake situated about two miles from the smelter at an elevation of about 400 feet, where a retaining dam has been built and a flume a mile long to carry the water by gravity to the storage tanks, which have a capacity of 200,000 gallons. From these tanks the supply of water is carried to the smelter tank in iron pipes of which about 5,000 feet has been installed. In addition to this water supply, the company have acquired a thousand miner's inches in the Chemainus River, which can be brought to the plant by gravity.

The arrangements for dumping the granulated slag are such as to permit of dumpage into the sea along the shore line to the east and south from the smelter, and even though the capacity of the smelter should be increased many fold, yet no difficulties in respect to dumpage are likely to be encountered.

Bringing Ore from the Lenora Mine.

GLASS MODEL OF THE POORMAN MINE, NEAR NELSON, B. C.

WE are indebted to Mr. Norman Carmichael for the following description of a glass model made by him of the Poorman mine, Nelson:

The model of which the accompanying illustration is a photograph represents the vein and working of the Poorman mine, near Nelson.

The model is constructed of glass and is 40 inches long by 20 inches wide and 14 inches deep, and being made to a scale of 40 feet to the inch, thus represents a block of ground 1,600 feet long by 800 feet wide and 560 feet deep. This (to be correct) also includes a certain amount of "atmosphere"—it is supported on a suitable stand.

Referring to the photograph it will be seen that the model consists of a series of panes of glass held in a vertical position by means of small brass angle pieces screwed to the top of the stand, and are placed parallel to one another one behind the other from

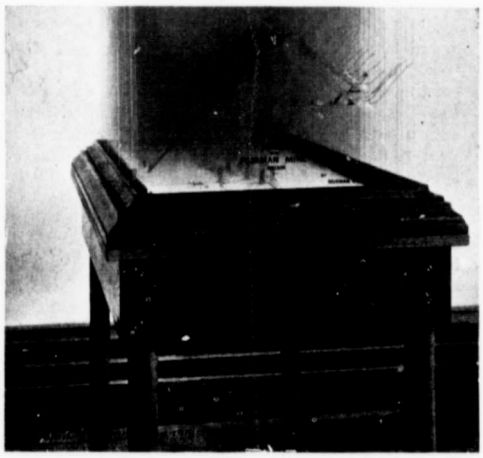
front to back, at equal distances apart, each interval corresponding to 50 feet along the strike of the vein.

These panes or sections are set over a plan of the mine done in heavy drawing paper and which covers the top of the stand supporting the glass, so that each sheet of glass represents a section through the mine on the line over which it is set up.

Along the further side and beginning near the top of the glass Eagle Creek will be noticed wending its way between the sloping hillsides which rise from it and which are outlined in green; the outcrop of the vein is shown a short distance up the right bank and can be followed to a point near the bed of the creek, where it is obscured by slides.

The model is so arranged that the longest dimension is approximately parallel to the general strike of the vein and therefore the sections are at right angles to it and show as nearly as possible the true dip of the vein, which is seen to vary from 40 degrees in some places to 50 degrees in others, the undulations, so to speak, being very marked.

As the tunnels naturally follow the vein they are shown by black spots where they cut through the



sections; the mouth of the main adit tunnel is seen at the right hand side of the front section, whence it cuts obliquely through several sections till it meets the vein, which it follows to its face. The upper tunnels are similarly shown, but are shorter than the main tunnel and the small crosscuts leading into them from the surface are omitted.

The upraises are indicated by heavy black lines and can be seen connecting up the tunnels in various places.

Where important development work happens to fall between the sections, which was bound to occur since the sections are placed at a uniform distance apart, intermediate sections have been set up with such features plotted on them and placed in their correct positions between the main sections.

In one instance a long and important upraise happens to fall obliquely across two of the main sections, having been put up from No. 3 tunnel to the surface, a distance of 266 feet, on a portion of the vein where it folds away from the general strike. In order to show this raise in a clear manner the main sections are cut and the special section with this raise plotted on it is slipped in between at the correct angle.

Where the vein has been sufficiently developed to be called "ore in sight" it is shown by two thin black lines representing the foot and hanging walls; the space between is left blank until the ore is extracted when it is coloured red. Thus in the upper parts of the mine much more stoped ground is seen than in the lower levels. Of course in the photograph all colours are simply shades and may be somewhat difficult to distinguish.

At a point a short distance in from where the main adit tunnel reaches the ledge will be seen the shaft station where the ore bin, gallows frame and hoisting engine may possibly be seen; below this the shaft follows the dip of the vein to a further depth of 300 feet where the two lower levels, one at 150 feet down and the other at the bottom are being driven. A raise not yet shown has been made some 200 feet in from the shaft connecting No. 5 level with the tunnel above and proves that block of ground which is shown accordingly.

An interesting series of faults and dykes complicates matters a little bit, but after all it is the *raison d'etre* of the model.

These dykes vary from a fraction of an inch up to 20 feet, and where possible are shown to the correct scale. For the most part they dip in the opposite direction to the vein though with some important exceptions, and pursue a somewhat irregular course through the mine. On the model they are distinguished by different colours to enable the observer to more easily trace them, but in the photograph are apt to look decidedly muddled.

In some cases the dykes are accompanied by faulting, and the reader's attention is particularly directed to a rather noticeable fault which can be seen cutting up through the middle of the mine and which displaces the vein some 25 feet.

The sections are numbered and can be easily slipped out and in, so that with little trouble fresh work may be plotted on them from the mine plans, and in this way the model kept up to date. Ordinary oil paints are used and mixed with oil and turpentine to such a consistency that they will flow freely in an ordinary drawing pen.

MINE TIMBERING BY THE SQUARE SET SYSTEM AT ROSSLAND, B.C.*

(By Bernard McDonald.)

IN mining operations, when the ore extracted exceeds a width of 10 or 15 feet, it has been found that the cheapest and only effective method of timbering is by the square set system.

The system may be generally described as a rectangular skeleton framework of timbers, extending from wall to wall of the vein as exhausted, the different members of which are so framed as to stiffen and support each other, and equalize and distribute local strains after the manner of a truss.

*Read at the meeting of the Canadian Mining Institute September 10, 1902.

The invention of the square set system of timbering was made by Philip Deidesheimer, while superintendent of the Ophir mine, on the Comstock Lode, in 1860.

In Monograph IV of the United States Geological Survey, "Comstock Mining and Miners," the following reference is made, which will be found interesting under this heading:

"At the 50-foot level (of the Ophir mine) the vein of black sulphurets was only 3 or 4 feet thick, and could readily be extracted through a drift along its line, propping up the walls and roof when necessary, by simple uprights and caps. As the ledge descended, the sulphuret vein grew broader, until at a depth of 175 feet it was 65 feet in width, and the miners were at a loss how to proceed, for the ore was so soft and crumbling that pillars could not be left to support the roof. They spliced timber together to hold up the caving ground, but these jointed props were too weak and illy supported to stand the pressure upon them, and were constantly broken and thrown out of place. The dilemma was a curious one. Surrounded by riches, they were unable to carry them off.

"The company was at a loss what to do, but finally secured the services of Philip Deidesheimer, of Georgetown, California, who visited and inspected the treasure-lined stopes of the Ophir."

During Mr. Deidesheimer's engagement at the Ophir, all the principles of square set timbering were evolved, under his immediate supervision, and the wide and rich ore bodies occurring in that mine were successfully extracted without the loss of ore or injury from caving by the use of this system. The system was then used in all the mines on the Comstock Lode, and subsequently, in all metalliferous mines elsewhere where the ore bodies exceed a width of 15 feet, the extreme width that is practical to timber by stulling.

The "square set" has undergone numerous modifications of detail in dimensions and the framing of its members in the various camps where it has been since used, owing mainly to local conditions, the dip of the vein and the character of the ore bodies and the enclosing rock.

Vein Characteristics at Rossland.—In the Rossland mines, the ore deposits have widths ranging up to 100 feet or more, and lengths of several hundred feet along the veins. The veins are sheer zone fissures, the vein filling consisting of country rock, which is now found replaced and cemented to various degrees of completeness by auriferous pyrrhotite and chalcopyrite.

The ore and the enclosing rock may be designated as extremely hard, and the veins dip at angles of about 70 degrees. These conditions facilitate and simplify timbering, without, however, doing away with its necessity.

Preliminary Work.—In stoping out these deposits the work is begun at the level drives or drifts run in the vein and continued upwards in steps or stopes.

The first work in opening up an ore chute or deposit preparatory to extraction consists of running drives or drifts through it from the level stations at the shaft, which are generally cut at distances of from 100 to 200 feet in depth below each other. Such drives may happen to be run along either wall of the vein, or through the vein at any point or distance (usually varying) from either wall.

These drives are considered as random bores, made longitudinally through the vein to determine, in a general way, its course or strike, and the behaviour and characteristics of the ore chute. They serve, besides, as preliminary thoroughfares for the traffic, drainage and ventilation necessary for the preparatory work of stoping, to be hereafter described.

As generally run, the drives have widths of about 6 feet, and heights of about 8 feet, and require no timbering, owing to their comparative small size and the hardness of the vein rock.

When it is decided to begin stoping on any new level, the first work done is to excavate the ore along the drives from wall to wall of the vein, making the excavation of sufficient height to receive the "sill floor" set of timbers, as the first series of square sets on the level is called, and to leave a space of 2 or 3 feet over the set. This space serves to provide room for blocking and wedging the timbers to place, and to receive a layer of old timbers, which act as a cushion in preventing the possible breaking of the timbers by the masses of rock that must be blasted down on them as the work of stoping out the ore above proceeds.

Sill Floor Construction.—The sill floor is a framework, made of 10x10-inch sawed timbers, laid down on the working level in the ore body; they serve as the sills or foundation timbers on which the square sets are to be erected. It is, therefore, the first, as well as the most important part of the square set system of timbering.

Figure 1,-plate 1, shows the sill floor as laid down and ready to receive the "sill floor set" of timbers. The members of the sill floor consist of three pieces the stringer or long sill, the spreader or short sill, and the butt spreader or brace. These members, when repeatedly laid in duplicate, will make up a sill floor to any extent required by the size of the deposit.

The dimensions and details of the framing of these members are shown on the plate.

The long sill measures 15 feet over all, and is framed from a 16-foot timber, which allows 6 inches to be cut from either end to square the piece and remove sun cracks.

The short sill, as framed, measures 5 feet 4 inches in length, over all, three of which may be cut from a 16-foot timber, if it overmeasured a few inches, as it generally does, and the ends are sound.

The butt sill or brace is framed of varying lengths, to suit the existing space, which generally varies owing to local bulgings or contractions of the vein. It is framed on one end exactly like the short sill, while the other is cut square or beveled to fit or butt against the wall rock, from which it is wedged tightly to place against the long sills.

A description of the method of framing the sill floor set of timbers is not needed, as it will be fully comprehended by a glance at the figures on the plate.

In laying the sill floor the long sills are set ends abutting flush against each other and as nearly as possible parallel with the general strike of the vein, ignoring any local bulging of the walls.

The first sill is laid close and approximately parallel to the foot wall, in which position it is levelled and

held by blocking or butt braces; the other long sills are laid paralleling this one at proper distances apart, that is, 5 feet 4 inches between centres. The cross sills fit on tops of these, lying level with them, the ends behind halved in framing to rest into similar halvings in the long sills, and to abutt flush against each other and extend endwise from wall to wall of the vein.

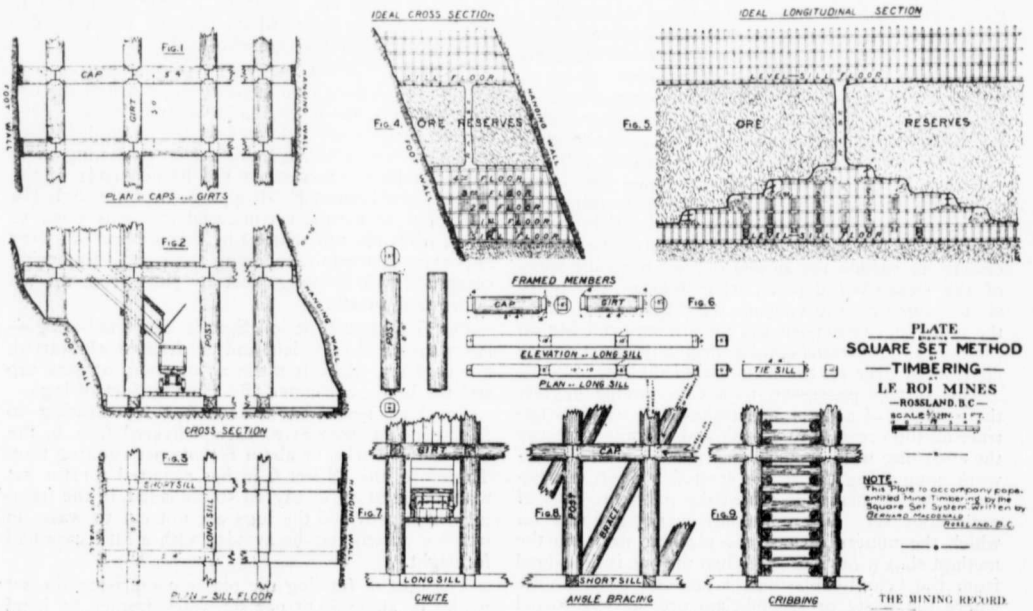
When the long sills reach as near the hanging wall of the vein as desirable they are braced from it by the butt spreaders or by blocking wedged tightly to bring all the members into proper position. The philosophy of this design of the sill floor is as follows:—

The long sill is made 15 feet in length, so as to better sustain the superstructure of square sets erected on it when the ore upon which it rests comes to be stoped away. For instance, when the ore is being blasted from under the sill floor by the work of stoping, coming from the level below, and the blasting tears away a portion of the ore upon which the sill floor rests, making an opening, as it generally does, of, say 8x8 feet, the long sills would overreach such opening, and one or both ends would rest on the solid rock beyond. Nor would the short sills drop away through such opening, owing to the fact that they rest on top of the long sills, as previously described and shown on the plate.

Through the opening thus made in the ore, the portion of the sill floor exposed would be supported by posts set on the timber sets in the stope below. Thus the long sill operates to allow the work of stoping out the ore upon which the sill floor rests to be safely conducted if such portions of the sill floor as become exposed as the work proceeds are properly supported by posts from the timber work underneath.

Timbers and Methods Used After Sill Floor is Laid.—The first tier of square sets erected on the sill floor is known as the "sill floor sets." The assemblage of the framed timbers into square sets then proceeds upwards, by floors, set over set, vertically, pari passu as the work of stoping exhausts the vein. The timber structure over any level is referred to in subdivisions as the "sill floor sets," "first floor sets," "second floor sets," and so on until it reaches the level above and catches up and supports the sill floor on that level.

This method of reference to the timbering as it advances carries with it the data for a general calculation of the portion of the vein exhausted over a level, as each set of timbers in place indicates that 9 feet vertically and 5½ feet horizontally of the vein is exhausted, 9 feet being the bare height and 5½ feet the width of space required for a set of timbers. Each square set in place indicates that twenty-four tons of vein has been extracted.



Aside from the sill floor, all the timbers employed in the square set system, except the planks for floorings and chutes, are framed from round logs. These logs are preferably of red fir, it being the strongest native timber, but pine, spruce and tamarack may be used. When cut in the woods, the logs are peeled and allowed to season for a period of from six to twelve months, during which time they lose about one-third of their green weight, which is a very important advantage in subsequent handling. In diameter they range from 12 to 20 inches, but generally average about 16 inches, and are sawed in lengths of 16 feet 6 inches.

The logs may be framed by hand or with machine saws into the various members of the square set, as follows, viz.: posts, caps, girts or braces, and butt

caps. Like the members of the sill floor, these members may be duplicated to any extent required by the size of the excavation to be timbered.

The posts as framed are 8 feet 2 inches over all; the caps are 5 feet 4 inches, and the girts or braces are 5 feet; the butt caps, like the butt spreaders, of the sill floor are cut in varying lengths to suit such spaces as may exist.

The details of framing the logs into members of the square set are plainly shown in figures on plate 1, and need no further description. The philosophy of this method of framing the timbers is that the cap pieces of the various sets form continuous stringers of timber running horizontally from wall to wall of the vein, no matter what this distance may be. Such stringers offer the end grain or greatest strength of the timbers to the walls, from which the greatest strains are generated.

The posts and girts rigidly support the stringers thus formed of the several cap pieces in true horizontal position, bearing on the joints from right-angled directions, while the cap pieces and the girts support the posts in true vertical position.

The whole framework forms a strong rigid structure capable of indefinite extension upwards and longitudinally as stoping proceeds, allowing at the same time for any expansion and contraction in width to suit such irregular widths of the vein as may occur.

Besides the function of the various members of the square set system to support each other in the manner described, that of the cap pieces is to receive directly to sustain the strains coming from the walls of the exhausted deposit, while that of the posts is to support the vertical weight coming from the undercut ore deposit and the broken ore lying on the floors, but strains coming from any direction are distributed over all the members of the set.

The system possesses, to a considerable degree, the qualities of a truss, and makes it possible to extract all the ore of any deposit and effectually secure the enclosing walls from caving in. When the framework comprising the sets is erected, a floor, consisting of 3-inch plank, is spiked down on the caps of each floor set. These are the working floors on which the miners operate the machine drills, in the method shown on Fig. 5. When the ore is dislodged from the vein by blasting, it falls on these floors, where the waste or second-class ore may be sorted out from the shipping ore. The shipping ore is shovelled into chutes, which are built of 4-inch plank spiked to the timber framework and carried upwards with the square sets, as shown in the plate. The second-class ore, or waste sorted out, may be stored temporarily or permanently in the framework of the timbering, from whence it may be drawn off at any time through chutes, should removal elsewhere be desired.

Figs. 4 and 5 are ideal cross and longitudinal sections illustrating the method of timbering and the work of stoping as it is caried on between the levels. Fig. 4 is a cross-section through the line A-B on Fig. 5, which in turn represents the longitudinal section through the line C-D on Fig. 4. On Fig. 4, the original position of the level drive in the vein is assumed as shown at the point X. This drive, as already stated, furnishes the point from which the excavation of the vein matter for the sill floor is commenced.

The step method of excavating the ore is shown on Fig. 5, where stoping is proceeding in double-headed steps, each step excavating the ore from wall to wall and having a vertical height of 9 feet in the clear, which allows the erection of one floor of timber sets, which in turn provides the scaffolding from which the miners may attack the ore above.

In stoping out the ore on any level, the ordinary method is to keep the sill floor at least 30 feet in advance of the first floor, and it about 30 feet in advance of the second, and so on, as is shown in Fig. 5. One machine drill, or generally two, in case the vein is wide, are assigned to the work of the two opposite headings of any floor, going in opposite directions, working on each heading alternately. When one face is drilled and blasted, the machine drills are changed to the opposite face, and the shovellers pass the broken rock into the chutes, or sort it, if sorting is required. When the ore broken is thus removed from the face, the timber gang erects another unit of timber there, and the stope is again in readiness for the machine drills, which have by this time finished drilling on the opposite face.

Generally, the step method of stoping proceeds in opposite directions from a raise, run through the ore body between the levels, as shown in Fig. 4. The framed timbers are delivered in the stope by dropping them down through this raise or hoisting them from the level. Sometimes the framed ends of the timbers are injured by dropping them through the raise, but as a rule, no material injury is done to them, while the time gained by this method is a very important factor in cheapening the cost of timbering compared with hoisting piece by piece from the sill floors underneath.

Per Tonnage Cost of Square Set Timbering.—After the sill floor is laid and the framework started, a square set, which is made up of one post, one cap and the brace, consumes 18½ running feet of logs.

The logs, peeled and seasoned, cut measuring 16 feet 6 inches, cost $1.20 each delivered f. o. b. the cars at the works, or about 8 cents per running foot. Therefore, the 18 feet 6 inches required for the set would cost $1.48, or say, $1.50 unloaded, in the framing shed, provided the logs are not cut to waste in framing, which may be avoided with a little care and foresight.

The cost of framing the pieces comprising the set would be about $0.55 per set, when framed by hand labour, carpenters being paid $3.50 per day of nine hours.

Cost Data Per Square Set, Hand Framed.—Material.—A log measuring 16 feet 6 inches, costing $1.20, cuts into two posts, or three caps, or three braces; therefore:

Material in one post costs	$0 65
Material in one cap costs	43
Material in one brace costs	40
Total cost of material in one set is, say	$1 50
Labour.—One carpenter frames per day:—	
About 21 posts, costing each	$0 167
About 21 caps, costing each	167
About 16 braces, costing each	219
Total cost of framing	$0 553
Total cost of labour and material in set	$2 053

The details of cost of the individual members of the set, framed on the surface ready to go into the mine, are, therefore, as follows:—

One post costs for—Material, $0 650; labour, $0 167	$0 817
One cap costs for—Material, $0 430; labour, $02 19	649
One brace costs for—Material, $0 400; labour, $0 187	587
Making the total cost	$2 053

The costs next attaching to the square set, or unit, of this method of timbering are:—

Lowering into the mine, approximately	$0 10
Delivering to place required, approximately	0 10
Labour in erecting, approximately	1 50
Incidental material, such as blocks, wedges, tools, nails, approximately	0 10
Cost of sill floor, averaged over eleven sets between levels 100 feet apart, approximately	0 15
Total	$1 95

These costs, last above given, may very greatly, being increased or decreased with the completeness of the facilities for handling the framed timbers, the cost of the several items as stated may vary accordingly from time to time, but the total will be about the average cost, and will closely approximate that of carefully supervised operations. Therefore, from the foregoing, it will be seen that the cost of the square set placed in the mine will come down, as follows:—

Total cost of labour and material, as above	$2 053
Labour and material when set is in place as above	1 950
Total cost, say	$4 003

When framed by machine saws, the cost of framing a square set does not exceed 30 cents, including the cost of power, as against 55 cents by hand—a difference of 25 cents per set. Therefore, if the framing is done by machinery, the cost of a set in place would be $3.75 as against $4, as shown above, when the framing is done by hand work.

The per tonnage cost for timbering by this method works out as follows: The average space to be excavated for each square set is 5.3 feet wide by 5 feet long by 9 feet in height, or 240 cubic feet. The Rossland ores, being heavily impregnated with iron and copper pyrites, yield a ton of 2000 pounds for each 10 cubic feet of ore in place. Therefore, from the 240 cubic feet of vein required to be excavated for a set of timbers, the yield will be twenty-four tons. If the timbers were framed by hand, the cost of timbering, so far as described, would be about $0.17 per ton; if by machinery, $0.156—a difference of $0.014 per ton in favour of the machine-framed sets.

In addition to the costs above tabulated, there still remain the costs of the chutes, floors, ladders and railings necessary for the convenience and safety of the miners and passage of ore and supplies. These require, on an average, about 100 feet of lumber, board measure, per square set, which, at $11 per 1000 feet, would add for the lumber $1.10, and for placing it say $0.10, or a total of $1.20 to each square set, which would then cost, in the case of hand framing, $5.20, or a total cost of $0.216 per ton of crude ore; and, in the case of machine framing, $4.95, or a total cost of $0.206 per ton of crude ore.

Incidental Costs.—The cost of timbering, per ton of ore shipped, would be greater than the figures given above in proportion to the quantity of waste or second-class ore that would be sorted out from the crude ore extracted.

In the Rossland mines about 20% of the ore mined is sorted out and goes to the second-class ore dump to await profitable treatment, expected to come in the future. Deducting 20% of the 24 tons of crude ore in a square set, there would remain 19.20 tons as the shipping ore, against which the total costs of the square set, as above $5.20 or $4.95, as the case might be—would have to be charged. This would raise the per tonnage costs on the ore shipped to about $0.27 and $0.26, respectively.

Where there is a reasonable expectation that the second-class ore will eventually pay a profit after suitable treatment, it would only be fair to charge a pro rata cost of the timbering to it, and the cost would then remain $0.206 and $0.216 per ton as above.

In cases where, on account of bad ground, angle bracing, bulkheading or cribbing and filling would be required, the per tonnage cost would be still further increased, but to a comparatively small extent.

Limitations of the Square Set.—The limit of the capacity of the square set system as already described, without any re-enforcing devices to withstand the pressure that may be exerted on it by the enclosing walls of an ore body when that ore body is extracted, may be reached.

The limit depends on the nature of the walls enclosing the deposit and the extent of the excavation. If the wall rocks are solid and do not swell on exposure to the air, and dip at a high angle, the ore body may be extracted between levels say 100 feet apart and for a length of 200 or 300 feet along the vein, and the pressure likely to be exerted by the walls will be sustained by the skeleton square set without reinforcement of any kind.

If, however, the vein dips at a low angle and the wall rocks are decomposed, or of a talcose or serpentine character and disposed to swell, the pressure that might be exerted on the timbers, when even a comparatively small excavation of the ore body has been made, may cause them to crush, "jack-knife" or collapse, allowing the wall rocks to cave in and close up the stope. When the members of the square set become squeezed out of the truly right-angled position which they should occupy, their capacity to resist wall pressure or strains from any direction is practically nil.

When, owing to wall pressure or imperfect erection of the sets, "jack-knifing" of the square sets results, the cave-in, which sooner or later will follow, with disastrous consequences, may be prevented by either bulkheading, cribbing or filling the skeleton framework of the timbers.

The cost of the foregoing methods of reinforcement which are the only practical ones that can be successfully used in bad ground, cannot be given with any general degree of accuracy, as that is so much affected by the local conditions in each case.

A general idea of what the cost is likely to be may be gleaned from the description following:

Reinforcement Methods — Angle Bracing.—If, after the square sets are properly erected in place, the members manifest an inclination to swing out of the right-angled positions they originally occupied to each other, this tendency may be arrested and prevented by a system of angle bracing. This consists of placing diagonal braces made of round or square timber on the sill floor and against the foot of the posts and leaning the heads so they will fit snugly against the top of the posts underneath the caps or girts, as the case may be, of the next adjacent set. The head of this diagonal brace should lean in the direction from which the pressure comes. This method is illustrated in Figure 8.

Cribbing.—When the square sets manifest a stronger tendency to swing than in the case above referred to, the collapse threatened may be prevented by crib work. This consists of crossing alternate layers of round or square timbers of any convenient size between the posts of the sets until the space between the sill and cap is filled, as shown in Figure 9. This crib work may extend from wall to wall through two or more rows of sets if required, and the spaces between the sets thus cribbed may be filled with waste rock, but this is called "filling," and will be referred to under that heading below.

Bulkheading.—This method of reinforcement consists of placing timbers closely together in much the same way as the crib work above referred to, and wedging them tightly between cap and sill.

Filling.—This method consists of filling the spaces between the members of the square set with any material such as waste rock, earth or sand. When the filling is done it is retained within proper bounds and the necessary passageways are kept open through the timbers by building crib work around them as described.

Waste rock for "filling" purposes is generally secured from the development or dead work that is being prosecuted in other sections of the mine, but where a large quantity is required it is often found necessary to mine it specially for that purpose, or drawn from the waste dumps on the surface. About eight cubic yards of material is required to fill the vacant space of the frame of a square set, and the cost of such filling will be the cost of obtaining and placing such material, together with the crib work required to retain it within proper bounds.

General Remarks.—The square set system of timbering is used successfully and exclusively in all mines where large deposits of metalliferous ores occur.

Where favourable conditions, such as railway transportation and a moderate supply of timber, exist, it is comparatively cheap. If care is taken in the construction of this system in the mine, it ensures that all the ore existing may be extracted without injury to the workmen or the mine. Round logs or sawed timbers of any dimension, ranging from eight inches upward, may be used, but the sizes are governed by the economic conditions and the mining requirements.

In the mines of Rossland the round logs or timbers used for the square sets cost $1.20 for each log 16.5 feet in length f. o. b. the framing shed at the mine. These logs are cut in the State of Washington and delivered over the Spokane Falls & Northern Railway on flat cars, over distances ranging from 45 to 75 miles, each flat car being loaded on an average with sixty logs. The unloading at the framing shed is done in a few minutes by cutting off the retaining standards on the flat cars and allowing the logs to roll off on the storage platform.

Of course, where waggon transportation is required from the railway terminus the expense will be correspondingly increased.

In every mining camp there will be more or less variation in the method of framing and in the cost of the square sets in place, also the tonnage of ore to be extracted from the space occupied by each square set.

Where the dip of the vein is at a flat angle, or the walls are bad, shorter posts than those described herein will probably be more advantageous; the more vertical the dip of the ore deposit the longer the posts may be, and vice versa.

Where sawed lumber is comparatively cheap, 3-inch plank is preferable to lagging poles for floors, on account of the greater floors it offers for shovelling, and the fact that it may be removed and reused.

THE INFLUENCE OF GOVERNMENT ON MINING.*

(By Edmund B. Kirby.)

IN most mining districts of the world the difficulties which we as engineers have to confront are mainly business-technical problems. Methods and economies in mining, transportation, milling and smelting, studied both from the scientific and business side, absorb our attention.

In few cases do questions of State economics force themselves upon us, because mining is almost everywhere a favoured industry, treated by governments with fostering care, and considered worthy of every sacrifice and every encouragement by the State. It is rightly recognized as the mother of industries, focusing the attention of the entire world upon each newly-discovered area. Upon this all the resources of civilization in men, money and skill are poured out. Around it agriculture, stock-raising, and lumbering spring up; railroads appear without the aid of land grants and subsidies; manufactures and towns follow, and a commonwealth is established.

Now, the British Columbia mining industry is unique in the world, not only in its entire lack of State recognition and fostering, but in the fact that difficulties imposed by State economics overshadow in importance all the ordinary technical and business problems with which mining men have to deal. It affords to-day a curious and interesting illustration of the injury wrought by unwise government, and also of the reaction of repressed mining upon commerce and other industries. These effects are emphasized by contrast with the present prosperous condition of the other Provinces of the Dominion, and also of the United States.

It is clearly recognized by the Canadian Mining Institute that British Columbia contains one of the largest and most promising mineral areas of the Dominion. But in considering the welfare of its leading industry of what use is it to concentrate attention on the fine points of machinery, mining

*Paper read before the Canadian Mining Institute, Nelson meeting.

methods and ore treatment if we ignore such realities as a government taxation which amounts to one-fifth of the gross value of the product, and a single item of which bars the treatment of low-grade ores?

The phenomenon before us presents the following features: The Rocky Mountain range has been developed from lower South America to British Columbia, yielding a practically continuous chain of productive mining districts. It is found equally productive at the two points touched of Southern British Columbia and the Yukon. The unexplored area between, some six hundred miles of which is in British Columbia, should average up as well as the part already known. Concerning the development of this area I quote from a memorial of the British Columbia Mining Association of June 28th, 1901:—

"The development of those resources, begun a few years ago so auspiciously, has been brought to a practical stand-still, and whereas a few years ago the mountains were swarming with prospectors, today these pioneers of the mining industry have nearly disappeared. The flow of capital into the Province has been practically cut off, the metal production is at present decreasing, numbers of producing mines have closed down and those operating have, with a few exceptions, ceased to pay dividends. The working mines are struggling under heavy burdens which are still accumulating each year. It is now frankly admitted by mining men that the industry is prostrated in many mining divisions, and that its condition is rapidly becoming worse."

Allowing for all the reaction of the mining boom the Association correctly ascribes the increasing paralysis to its two main causes—excessive taxation and oppressive legislation.

At present conditions are even worse than those then described. Prospecting, and the development of new deposits to replace those exhausted, has practically ceased. Of 14,326 Crown-granted and recorded claims held December 31st, 1901, only 78 yielded ore in excess of 100 tons total production for the year. This is about one claim out of every two thousand held. The bulk of the tonnage was confined to a dozen or so mines, most of these operating at a loss. The increased metal statistics of $15,000,000 for 1901 against $11,348,000 for 1900 was due entirely to two mines, neither one of which yielded dividends, and one of which has announced a large increase in its debt.

Moreover, the statistical figures of production are fictitious in that the metals are valued theoretically by New York quotations for the refined product, the true or actual values received by British Columbia industry being much less. Meanwhile the serious financial condition of the Province has been clearly shown by Mr. F. J. Proctor in his pamphlet on "The Financial Crisis in British Columbia," and it is currently reported that the Government failed in its recent attempt to float another loan in London. The stagnation of commerce and the present exodus of population are recognized by everyone.

It is not of interest here to go into details about the oppressive and threatening legislation which in British Columbia has so characterized the dealings of the State with its chief industry. What is of moment is the spectacle, unknown elsewhere in the Dominion or in the Empire, and probably unparalleled in the world, of a mining industry trying to exist under a burden of taxation which amounts to between twenty and thirty per cent of its gross product.

The gross products of British Columbia in 1901, as nearly as they are indicated by statistics, were about $27,000,000, distributed as follows:

Industry	Probable Annual Production.	Per cent.
Metal mining	$15,070,582	55.1
Coal mining	5,016,398	18.3
Fisheries	3,065,900	11.2
Lumbering	1,690,000	6.2
Agriculture and Miscellaneous	12,520,000	9.2
	$27,362,680	100

Without considering an increase in the $10,000,000, debt of approximately $800,000 yearly, the actual taxes collected, Dominion and Provincial, amount to $5,350,000, which is 20 per cent. of everything produced. This is from a population which probably does not exceed 125,000 to 130,000 whites. Through the shifting of taxation by other industries on to mining the burden on the latter probably approaches 30 per cent. of its product, even when the latter is valued by the aforesaid fictitious method. In this remarkable state of affairs the fact that mining exists at all is the strongest evidence of the value of British Columbia ore deposits, and of the future which awaits the industry here whenever these artificial burdens are removed.

Even if the total load permitted it, low grade ores must remain for the most part untouched on account of the so-called 2 per cent. tax on the gross output of the mines. This tax is only one item in the total mentioned above, but it has the peculiar effect of exacting an increasing proportion of the net profits when applied to the lower grades of ore. For instance on the milling grades of Rossland it will seize anywhere from 10 to 20 per cent. of the net profits. This bars Treadwells in British Columbia.

The present state of affairs is instructive not only to the mining profession, showing how unwise government can injure mining, but also to students of economics, presenting an extreme case of the blighting effects of taxation on industry. To the student the phenomenon is marked by the same familiar symptoms which always accompany evils caused by acts of the political organism. There is the same curious indifference and refusal to see facts as they are, the same tendency to ascribe evils to every cause but the right one. There is the usual effort to conceal the truth from the outside world and to condemn those who boldly and clearly call for reform. There is the same old anxiety not to correct the evil but to find excuses for evading action.

WHAT GOVERNMENT COULD DO FOR MINING.

Buckle, in his history of civilization, briefly characterizes its progress as the gradual abolition of bad laws. Beyond this industry requires nothing. All it wants from the State is what Diogenes asked from Alexander—"Keep out of my sunshine." As every economist knows, the State is all-powerful to injure industry, but cannot directly aid it except by the familiar procedure of assisting one branch by robbing others for its benefit. Indirectly, however, the State can do wonders by the gradual, persistent removal of laws which oppress. Few people realize the sensitiveness of industry or the narrow margin

of profit by which it lives. Upon its delicate organization taxation acts literally as the hand of death. It shrinks, withers or dies at its touch. Taxation which is excessive or badly placed is worse in effect than war and pestilence. As industry declines the burden becomes heavier on the survivors, and thus the disease accelerates its own progress. Such taxation kills the goose which lays the golden eggs, and the bankruptcy of the State inevitably follows.

The simple principles of modern scientific taxation are well understood. In theory, if not in practice, the world has progressed since Colbert, the famous Minister of France, summarized government finance as "the art of plucking the goose with the least amount of squealing." In the light of modern knowledge taxes may be so laid that industry is not only uninjured, but is, on the contrary, actually benefited by them. In this twentieth century there is no excuse for excessive taxation or for mediaeval methods.

The State may, if it will, not only relieve the "Mother of Industries" from all its burdens, but it may in a less important way encourage and aid it by attending to those matters which are beyond private enterprise. Maps, geological surveys, studies of districts and the collection and distribution of all kinds of information valuable to the industry, are peculiarly the province of the State. It should, however, be confined to this field, the only exception being the few cases where it is necessary for the State to interfere by regulations for the distribution of mining property and for public safety. It is easy for a department of mines to maintain such close touch with the whole industry, and such cordial relations, as to secure its effective co-operation in all its work. It should in fact as well as in theory be its representative its advocate and its watchful guardian.

As to the outlook for relief in British Columbia, we do not delude ourselves with any illusions. The disease has gone too far. History shows clearly that in all such cases the evil forces which control the machinery of government hold out to the last against reform. No government ever reforms until it is forced to do so by the overwhelming power of popular will. The exertion of this power is always long delayed because of the apathy and blindness of the public towards economic questions, and the long time required for it to recognize the causes of its distress. It is probable that a prolonged period of depression and suffering will be necessary to educate voters and compel reform. Meanwhile only the richest and most fortunate mining enterprises will survive.

But notwithstanding the gloom of to-day, we mining men, looking far beyond the present, have a clear view of the future grandeur of the commonwealth of British Columbia. We know its wonderful natural resources, the character and energy of its people. We know that civilization cannot be held back. Some day there will be good government, and with this one requisite supplied will appear an era of prosperity beyond the wildest hopes. Whether its arrival will find us here or labouring in other parts of the world we neither know nor care. We only know our present duty, which is to maintain a united front to the evils before us, and steadily to press the fight for reform.

THE MINERAL RESOURCES OF VANCOUVER ISLAND.

(By W. M. Brewer.)

THE mineral resources of Vancouver Island comprise gold-bearing quartz, copper-gold sulphide ores, bornite ore, iron ore, coal and auriferous black sand.

The industry of lode mining is at present only in its infancy. In fact systematic prospecting was only really commenced about 1897. Since then the coast lines have been fairly well exploited, but the interior of the Island, except around Mount Sicker and Alberni, has not been explored. The reasons for this are that while prospectors can travel along the shore lines of the numerous inlets, bays and lakes by boat or canoe, it is only with the greatest difficulty that they can travel in the interior, where the growth of timber and underbrush is so dense, mountains precipitous and the streams too rapid to permit of navigation even with canoes.

With these difficulties to overcome, and the further fact that until the present time all ore mined on the Island had to be exported to the United States for treatment, it is hardly to be wondered at that metalliferous mining has made no greater progress in the past, but in the future this rule should not apply, because smelting plants have been installed on the east coast of the Island, the Government has been extending the trails and improving the roads, and the population of the Island is more thoroughly educated in the work of the prospector and the business of developing mines.

The actual productive districts of the Island to-day, so far as metalliferous ores are concerned, are the Mount Sicker, Kennedy Lake, Alberni, Sidney Inlet and Quatsino. Of these, Mount Sicker takes the lead, the Lenora mine alone having shipped about forty thousand tons of copper-gold ore, while in the Tyee mine there are about sixty thousand tons of the same character of ore blocked out. This grade of ore yields per ton an average value of about five dollars in gold (five per cent. (dry) in copper and variable silver values sufficient to appreciably increase the commercial value of the ore. Besides this grade of ore there are some forty thousand tons of second grade on the dumps at the Lenora which carries sufficient value to pay a profit to the mine owners as well as for treatment at the smelter plant of the Northwestern Smelting and Refining Company at Crofton.

It was in consequence of the large amount of ore in sight and the promising prospects in the Mount Sicker District that the smelting plants at Crofton and at Ladysmith were erected during the past summer. The former of these, with a capacity of about seven hundred tons per day, erected by the Northwestern Smelting and Refining Company, has contracted for the entire output of the Lenora mine, production from which constitutes for the works a base of supply. This smelter will, in addition, to secure this tonnage, purchase copper-gold ores from all points on the Pacific Coast, with the expectation of treating mine products from as far north as Alaska, and those

also from South America. The smelter at Ladysmith, with a capacity of one hundred tons per day, has been erected by the Tyee Mining Company for the purpose of treating the ore from that mine.

The productive mines in the Alberni District have been the Three Jays, the Monitor, the Three W.'s, and to a limited extent, the Alberni Consolidated. The two last named produce gold-bearing quartz, some of which carried very high values, the others copper-gold ores, the grade ranging from five to ten per cent. copper (dry) and about $3.00 in gold and silver per ton. In addition to these properties there are in the Alberni District a very large number of promising prospects partially developed which really merit thorough exploitation and systematic work. Besides the copper-gold and gold-bearing quartz ores in the Alberni District, there are quite extensive deposits of magnetic iron ore. During the past two years serious attempts have been made to determine the extent and permanency of these deposits, control of which has been acquired by a syndicate from the United States with the avowed purpose of establishing iron and steel plants on that side of the line. The ore carries from about 55 to 65 per cent. metallic iron, very low contents in phosphorous and silica, and no titanium.

In the vicinity of Kennedy Lake comparatively narrow fissures filled with high grade gold-bearing quartz were discovered in 1899 and worked to some extent. On the Rose Marie claim a concentrating plant was erected and the concentrates shipped to the Tacoma smelter, but the owners becoming involved in financial difficulties the plant was closed down. However, during the past season several other mineral locations were made in the same vicinity and samples of the ore shipped to the Crofton smelter for treatment with satisfactory results to the mine owners.

In the vicinity of Clayoquot Sound and Sidney Inlet a large number of mineral locations have been staked and the assessment work kept up on them. The ore is usually a fairly high grade chalcopyrite associated with magnitite, but on some locations in the Sidney Inlet camp considerable quantities of bornite carrying high copper values occur at and near the surface but is usually replaced by chalcopyrite before any great depth has been attained in the workings.

The Quatsino Sound District has during the past year attracted much attention, due largely to the fact that a Tacoma company acquired by purchase a considerable tract of mineral land on which very extensive surface showings of good grade copper ore occurred, and immediately commenced systematic development on a large scale. An aerial tramway and bunkers were erected to facilitate shipment of the ore quarried from the outcroppings. The grade of the ore had been established previous to the commencement of the construction of these improvements through shipments made to both Tacoma and Crofton smelters. The permanency and extent of the ore bodies at depth are being determined by actual work.

The section in which these ore bodies occur embraces quite a large territory near the northwest end of the Island and during the past season has received more attention from prospectors than any other portion.

The coal mining industry of Vancouver Island is so firmly established and the areas of coal-bearing land so well known that any description in this article is unnecessary, nearly all being embraced by the land grant of the Esquimalt and Nanaimo Railroad except about thirty thousand acres which was purchased by the New Vancouver Coal Company from the Hudson's Bay Company previous to confederation and a limited area on Quatsino Sound owned by a San Francisco syndicate.

Owing to the discovery and use of fuel oil in California, which has in the past been the most important market for Vancouver Island Coal, the collieries have not produced as large a quantity during the present year as previously. Roughly speaking, the output has, in the past, averaged nearly one million and a half tons a year, about two-thirds of which has been exported. The establishment of smelters on the Island will prove beneficial to the coal mining industry, because of the increased demand for coke as well as coal.

REDUCED COST OF MINING.

THE following is the full text of the interview with T. G. Blackstock, vice-president of the War Eagle and Centre Star mining companies, a telegraphic summary of which appeared in the Nelson *Daily News* Toronto despatches recently.

The interview was given to a *Globe* representative. Mr. Blackstock said:

"For a long time past, I might almost say for some years, it has been apparent to us that the charges of mining and development in Rossland, on the one hand, and of freight and treatment on the other, were such as to preclude the possibilty of these mines paying the dividends that were expected. The reason for this was that the high-grade ore bodies were segregated, and a great deal of dead work had to be done to reach them, often through ore of too low a grade to stand these charges. It appeared to us, therefore, imperatively necessary to obtain, first, a substantial reduction in the cost of mining and freight treatment, and, secondly, to discover some means of handling these low grade ores at some profit.

"Since dividends were last paid we have succeeded in reducing the cost of mining development very materially, in fact from about $4 a ton to $2.10 a ton, or cutting them about in half. This has been done chiefly by introducing a modified form of contract system. It was only lately, however, that the smelter people saw their way to make such a reduction in the freight and treatment charges as would justify us in commencing shipping on a large scale. Meanwhile, during the last three years, development work has been steadily pushed, and even while not shipping we have had at least 225 men employed constantly in the two mines.

"The whole cost of freight and treatment," Mr. Blackstock continued, "has been reduced from $6 to $5 a ton on ores containing values to the amount of $9.50, while in ores under this grade the charges have been reduced from $6 to $4.

"During this time, also, attention was paid to the problem of treating the low grade ores by some

process other than smelting. As the result of our experiments we have secured a mill at Silica, on Sheep Creek, a few miles from Rossland, which we have reconstructed and enlarged to a capacity of about 100 tons a day. It is not intended to use this mill for anything except experimental purposes, as a guide to us in erecting a larger mill, of a capacity of 500 tons or more per day, which mill we propose to erect next spring. I think that I can safely say that $5 ore may be treated by milling at a profit. For reasons well known to mining men, high-grade ores can generally be more cheaply treated by smelting. I am satisfied that in a few years we shall be able to treat $4 ore at a profit."

"How much do you propose shipping now?" Mr. Blackstock was asked.

"Under our new contract the two mines are to deliver 12,000 tons a month of high-grade ore, and as much more under the $9.50 limit as they choose, which will probably be from 6,000 to 12,000 tons a month more. We have not shipped in any quantity since the strike of a year ago last July, but have simply been making shipments from time to time of ore encountered in development, and also shipments to test certain ore bodies. I would like to emphasize the fact, however, that we have never ceased operations, whether we shipped or not. At the time of the strike 500 men walked out, but since then we have had 250 men working on development work continually. I expect in a few weeks we will have fully 500 men employed again. The labour troubles out there, I think, are settled."

"You can hardly speak yet of dividends, I suppose?"

"No, except to say that it will be some time before any are paid. The fact, however, that we will be making profits right along will afford a good deal of encouragement to shareholders. I am confident that we are on solid ground now, and getting to a basis where we shall be able to save something from the low-grade ore, as we pass through to richer ores. The truth is that nobody understood the nature of these mines nor the way their ores had to be treated. It has fallen to us to be the pioneers in that respect."

VANCOUVER AS A MANUFACTURING CENTRE.

(By G. A. Walkem, B.Sc.)

THE City of Vancouver has in the last thirteen years become one of the first cities of the Province of British Columbia. About thirteen years ago a fire swept over the then small town completely blotting it out, but this disaster proved a blessing in disguise, as the city grew on new and modern lines to the proportions it has now attained.

Situated on the Mainland, on one of the finest tidewater harbours of the world, at the end of a great transcontinental railway, the City of Vancouver possesses advantages which should place it in the first rank as a manufacturing city, of such manufacturing as it is possible to do on the Coast.

The city has for its size a large number of industries, among which the largest and most important and rightly so, is the lumber and sawmill industry. The mills owned by the B. C. M. T. & T. Co., by Tait, by Robertson & Hackett, the Pacific Coast Lumber Co., and others, do an immense business in this line, and these mills, besides the various shingle mills of the city, have at the present time to keep operating night and day to fill orders. The question of how long the supply of timber will last is one of vital importance to these mills, and to Vancouver. Already there is a scarcity of logs and other means have to be resorted to to get the logs out of the woods than were employed ten years ago. It is probable, however, that the supply of logs will be sufficient for a good many years to come, and that the mills will add to Vancouver's prosperity for a considerable time.

After the timber in importance comes the iron industry. At the present time there are four or five works in Vancouver which manufacture and repair machinery of all kinds. The problem of manufacturing on the Coast is a very difficult one. Even in San Francisco, an old city as compared with Vancouver, I do not think it is too much to say that 75 per cent. of the machinery used, is shipped in from the East, and that the machinery manufactured is machinery whose weight or bulk prohibit it being brought from the East, with the present means of transportation, or that it is manufactured for local work whose peculiar conditions demand it, such as placer mining, etc. It is the same in Vancouver or any of the Coast cities, so long as the raw supplies are brought from the East we will be seriously handicapped. The Vancouver manufacturer has to confine himself to the manufacture of things for which there is a local demand, and because of his proximity to his market to try and attain the perfection in these lines which the Eastern manufacturers cannot. The Eastern manufacturer's market is so much larger that he can build from 20 to 100 machines where we on the Coast will build one, and has a great advantage, and this combined with the lower wages paid to mechanics in the East, more than offsets the difference in freight rates of 80 cents per hundred on the raw product and $1.30 on the finished. I think, however, that notwithstanding all these things, should the labour unions not be too exacting in their demands, there is work enough in Vancouver for two or three iron working establishments.

The mines of the Province use a large amount of supplies which can be transported round the Horn, and these are transhipped at Vancouver. It is true that Vancouver does get an advantage in the raw material that she gets from England as this can often be brought round the Horn at a cheap rate of freight by sailing vessels, and this gives us an advantage over the inland cities which Vancouver should not be slow to take advantage of. Pig iron, bar iron, sheet steel, and other raw products can be thus imported and are manufactured here into the finished article. The Cariboo district has taken a large amount of machinery from Vancouver, such as hydraulic pipe, and other machinery used in connection with the placer mines, and will require a lot more should this district produce gold in any great quantity. Vancouver is catering for this trade lately, and will get more and more of it as time goes on.

The Yukon district is a territory which rightly belongs to Vancouver, but which heretofore has not drawn a fair proportion of its supplies from this city.

Our American friends being more numerous, having more money and perhaps being more enterprising than us, had control of this market for some time, but now this state of affairs is changing. Machinery built in Vancouver, sugar made here, candles, lumber, shingles, and other articles all manufactured here are shipped in, in greater or less quantities.

The British Columbia Sugar Refining Co. is an institution of great importance to Vancouver. Importing as it does its raw material, in bulk from Java, Borneo and other places, in the raw state and refining it here, it furnishes employment for a large number of men. This refinery has just been enlarged at a great expense, and its trade extends as far as the Province of Manitoba. All varieties of sugar are refined here, white lump, granulated, brown, varying in color from the almost white to the heavy dark are produced by the refinery. A new and larger refinery is proposed at the present time, but it is doubtful if there is room for more than one.

The Imperial Syrup Co., operated by Ramsay Bros., does a large manufacturing business, drawing its supply largely from the refinery and turning out confections of all kinds. The various sash and door factories deserve special mention, and their product is shipped as far East as Winnipeg.

While it is too early in the history of the city to prophesy that we will have large manufacturers here, there will without a doubt be work enough to keep a large number of establishments supplying the needs of the Province and as the Province grows, so also will grow these industries.

THE COMMISSION ON COAL MINING.

(Specially Reported for the Mining Record.)

THE commission on coal mining, appointed to enquire into that branch of mining with a view to lessen accidents by explosions, returned to Victoria on Saturday, having concluded its labours as far as the Mainland mines are concerned. The Commissioners held their sessions for the taking of oral evidence at Fernie, but previous to calling witnesses, spent a week in examining the mines at Fernie, Morrisey and Frank, the Crow's Nest Coal Company affording every facility for the inspection. Having seen all possible at the mines, the taking of testimony under oath was proceeded with, about 25 witnesses being examined at length, in which as well as in the preliminary inspection, the practical knowledge of two of the Commissioners, Mr. John Bryden and Mr. Tully Boyce, was of great assistance.

Mr. D. Mackenzie, the secretary of the local Miners' Union, supplied the Commission with the names of most of the witnesses, which included miners of long experience, and all the underground staff of the Coal Creek mines. There were also some volunteer witnesses whose evidence was of much value on the various points touched, which included explosives, watering of dusty mines, tamping, safety lamps, electricity in the mines, ventilation and velocity of air, special rules for operating, examinations of miners, firemen, overmen and shot lighters, etc., etc., having in view the amending of present legislation governing these and the greater safety of all concerned.

Most of the witnesses were in favour of excluding the present explosives altogether from gaseous mines, substituting for them the permitted explosives in use in British mines. All advocated the watering of dusty mines by pipe and spray system, except where watering would weaken walls or roof, the danger from the finer dust being apparently almost as much dreaded as from gas, so highly explosive is it.

Th use of electric motors was condemned, except in main airways, by most of the witnesses, some regarding them as a source of danger anywhere in the mine.

Tamping came in for a large share of enquiry, the system of tamping with coal dust as at present being generally considered satisfactory. The regulations for examination of the hole by the shot-lighter before charging seems to be very little regarded in some places, probably leading to accidents involving the individual miner or more serious consequences.

The merits of different safety lamps, of which half a dozen were exhibited to the Commission, were thoroughly canvassed, the Glanny, Gray, Wolf and the old Davey having each its advocates. The regulations for the use of the lamp *as a detector of gas* seem from the evidence to be lightly regarded, the familiarity with a dangerous calling breeding contempt in the minds of some to the danger of themselves and others. This was shown by evidence of smoking in mines, and the possession by men underground of matches, pipes and tobacco, for which offences most inadequate penalties have been the rule. Small fines are no deterrent. Only terms of imprisonment without option of a fine as given in Great Britain will have any effect on this serious class of offences.

The examinations for certificates of overmen, firemen and shot-lighters call for alteration according to the view of the witnesses, a change in the examining body to the board examining mine managers being advocated. The certificate to miners, it was the general opinion, should be granted only to men who had been employed for a year at the face or in timbering, and not in minor employments about the mine.

Altogether, much valuable information on which to found legislation was obtained and the Commission adjourned to meet at Cumberland on the 24th inst., to continue its investigations into the working of the Island coal mines.

Cumberland, Oct. 1.—The Commission on coal mining finished at Cumberland to-day and left for Nanaimo by the noon train. Evidence of 23 witnesses was taken and with few exceptions, was to the same effect as that heard at Fernie last week, the subjects touched being the same. All were agreed on the absolute necessity of an adequate system of watering dusty mines. There was, however, a difference of opinion as to the necessity of shot-lighters examining holes before charging, the idea of some being that a competent miner might be trusted to clean and load the hole carefully. One of the miners propounded to the Commission a new and interesting theory on the subject of powder, stating that some new powder he had used gave off an acrid smoke on firing, which drew the flame of the safety lamp in a manner dangerous where there is gas. Others who followed had also observed this, and it was the general opinion that a clause providing for a government inspection of powder, with marking of qualities, etc., should be one of the proposed amendments to the mining law.

The great lamp question came up, one very experienced miner giving a long list of reasons for prefer-

ring the Ashworth-Hepplewhite-Gray as the best lamp for general purposes and use by men experienced with lamps; a great feature being the good light it gives.

The management of the local mines and the mining inspector were among the witnesses, the latter giving it as his opinion that the chief cause of the explosions in this district was probably blown-out shots. All mining men will understand the difficulty of fixing the cause of these unfortunate occurrences, but the conclusions of this gentleman is probably correct.

It is very evident that here too, as at Fernie, the men do not take advantage of the rights to inspect the mines, one of the managers stating he had asked them again and again to do so and that no obstacle was placed in the way of a thorough inspection.

The Commission goes to Ladysmith to-morrow and will resume its hearings there on Thursday, previously visiting the local coal mines.

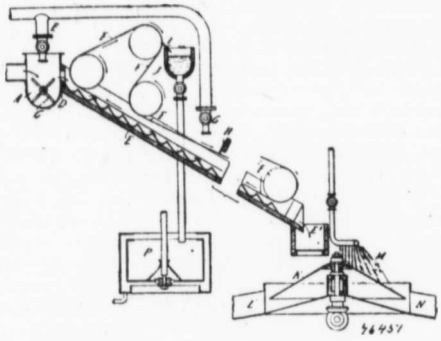
RECENT CANADIAN PATENTS OF MINING APPLIANCES.

MR. ROWLAND BRITTAIN, patent attorney, Vancouver, kindly sends us the following report, as being representative of the most recent improvements in the work of ore recovery and reduction:—

No. 76451.—A. S. Elmore, London, England, is one of the patents covering the system of ore recovery being introduced by the Canadian Ore Concentration Co., and about to be tried on the Rossland ores.

Claim 1. Apparatus for effecting the separation of minerals by the selective action of oils and like substances, comprising a mixture of the oil with the theaqueous pulp of pulverized mineral, an incline for downflow of the mixture having steps or baffles, an endless apron, means of distributing oil over it and means of causing it to travel in a direction opposite to the said downflow, a conical revolving sieve adapted to receive the discharge from the incline, a nozzle for delivering a shower of water over one side of the sieve, two launders, the one lined with blanket adapted to remove the matter that pass through the sieve and the other to receive the matters that are washed over the sieve, substantially as described.

2. In apparatus for effecting separation of minerals by the selective action of oils and like substances, the combination of a stepped incline for downflow of the mixed pulp and oil with a travelling apron provide with a distributor of oil over its surface, substantially as described.



3. In apparatus for effecting separation of minerals by the selective action of oils and like substances, the combination of a conical revolving sieve, a distributor of water shower over part of the sieve, a launder adapted to lead off the matters washed over the sieve, and a launder lined with blanket adapted to lead off the matters that pass through the sieve, substantially as described.

Fig 1

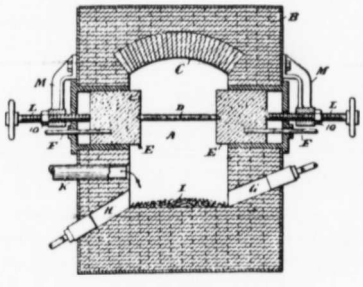
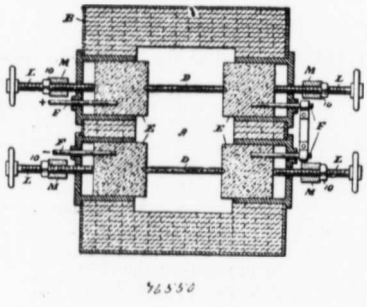


Fig 2.



Patent No. 76550—W. T. Gibbs, Quebec, is for an electric furnace for the reduction of ores by the heat of radiation and reflection.

Claim 1. An electric furnace for the reduction of minerals and analogous purposes, having one or more continuous resistances supported under pressure in an electric circuit, and a furnace chamber enclosing said resistances with a space below the resistances for the material to be treated, said chamber and resistance being so arranged that the resistance is out of contact with the material at all times and the heat generated by the resistance is applied to the material solely by radiation and reflection, substantially as described.

2. An electric furnace for the reduction of minerals and analogous purposes, having one or more continuous resistances in an electric circuit supported under adjustible pressure, and a furnace chamber enclosing said resistance or resistances with a space below the resistance for the material to be treated, said chamber and resistance being so arranged that the resistance is out of contact with the material at all

times and the heat generated by the resistance is applied to the material solely by radiation and reflection substantially as described.

3. In an electric furnace for the reduction of minerals and analogous purposes, the combination with the furnace chamber, of one or more continuous resistance rods D, enclosed within said furnace chamber and above the space for the material to be treated, moveable abutments E, between which the rods D are held, and means for adjusting said abutments toward each other, substantially as described.

Patents issued to British Columbia inventors since our last report are as follows:

T. S. Barwis, Vancouver, an improved water wheel.

G. Lund, Victoria, gas burner.

C. St. Jaque, Cranbrook, combination match box.

W. G. Trethewey, Vancouver, on an improvement on his automatic train pipe coupler. This device has been adopted by the C. P. R., and is now supplied to the trains of the Imperial Limited.

S. Fader, Vancouver, on an improved means for attaching a door handle to its stem.

LONG DISTANCE ELECTRICAL TRANSMISSION.

THE *Electrical Review* remarks that the biggest electrical power transmission works in the British Empire have just been opened in Southern India. The generation station is constructed just below the Cauvery Falls, which are on the borders of the Mysore State, and one of the great sights of the country. They are situated in wild country, thirty miles from a railway. All the heavy machinery had to be conveyed over this distance by road, bullocks hauling, elephants pushing behind. The electrical power is conveyed across the jungles for a distance of over ninety miles to the Kolar Goldfields, where all the mines will henceforth be entirely worked by it. A feature of peculiar interest in connection with these great works at the Cauvery Falls is that they were carried out under the supervision of a Canadian, Captain Joly de Lotbiniere, R.E., a son of the Lieutenant-Governor of British Columbia. But it is very gratifying to learn that the United States supplied practically all the machinery. Captain de Lotbiniere had great difficulty at the outset in overcoming the Hindu superstition that the goddess of the sacred river would destroy all who meddled with the stream. This superstition found corroboration in the native mind from a severe outbreak of cholera and heavy mortality from maleria which marked the commencement of the operations. However, tact and common sense were eventually too strong for superstition.

MINING IN THE KOOTENAYS

(Notes by a Special Correspondent.)

ROSSLAND AND BOUNDARY.—The opinion prevailing is that the long period of dullness in the Kootenays is at an end and must be followed by one of equalled prosperity, and the public who has for so long "refused to come in" may now confidently be expected to return to their old numbers. It is not likely that the start will be a false one. The permanent future of many of the camps, even though the gold-copper shipments have continued fair throughout the long depression almost entirely depend on the introduction of cheaper methods of concentration and other treatment. Now we learn with particular gratitude of the announcement from Mr. Blackstock, vice-president of the War Eagle-Centre Star Mining Co. at Rossland, that the concentrating problem of treating $5 ore has been solved and the probability of milling in the near future $4 ore at a profit. This announcement following so close upon Mr. J. J. Hill's recent visit to Rossland when better freight rates as between coke supply and smelter points were definitely promised, has infused the widest confidence into the camp. The impetus of activity shown by the Le Roi, is shared pretty well by all other companies. Large increases in the crews are being made. The Elmore Oil Process has been tested with very favourable results.

Mining operations are in full swing at the War Eagle and Centre Star mines, while the Le Roi is surprising everybody. The 1902 returns from the Rossland Camp will show a marked gain over last year. The sudden revival of interest is likely to affect the production from the camp which has of late averaged five and six thousand tons weekly, to an output of ten to twelve thousand tons for the rest of the year. The Great Northern and C. P. R. are both prepared for heavy shipments with increased facilities now on the spot.

In the Boundary the smelters are in full blast, and are again running at full capacity. There are seven furnaces in operation in the Boundary with a total capacity of about 2,500 tons.

This month we hear a ledge of galena and grey copper averaging from ten inches to three feet in width and traceable on the surface for 600 feet was discovered at the North Fork of the Kettle River, 90 miles north of Grand Forks. The Granby smelter gives values of surface specimens which speak for themselves: 590 ounces silver and 15 per cent. copper; and 55 ounces silver and 10 per cent. copper per ton respectively.

The surface workings up on the northern part of the B. C. Copper Company's Mother Lode property, in Deadwood Camp, show a decided improvement in the quality of ore as compared with that heretofore mined on the same claim, and this notwithstanding that these older and much more extensive workings have latterly been turning out a better grade of ore than they were three months ago. This means, with ore running somewhat better in the big quarry and considerably better in the new quarry, that the position is better for the mine, even though the expected rise in the price of copper has not yet taken place.

As the ore in the new quarry carries a higher percentage of both iron and sulphur than that from the old, it serves admirably to flux the more silicious ores from the older surface workings. The gold and copper values compare favourably with those carried by the chutes of good-class ore occurring at the 300-foot level of the mine, so that in this respect, too, there is substantial reason to be well satisfied with recent developments.

The ore output of the mine is now between 600 and 700 tons a day. The Granby Company has started work on a tramway to be used in connection with the new crusher recently ordered for the mine. The tramway will be 1,000 feet long, and will be of the three-track pattern, except at the turnout. It will be used to bring ore from the upper benches of the glory hole of the Knob Hill mine, which will be crushed in the new or breaker. Work on the tramway is now well under way, the bents and grading where necessary being in an advanced shape. It is expected the tramway will be ready for use by the time the crusher is installed.

Advices from the makers at Sherbrooke, Quebec state that the ore crusher has been shipped to Phoenix, and the machinery should arrive here shortly, when it will be at once installed. The 100-horse power motor, which comes from Peterborough, Ont., is also ready for shipment, and the entire outfit will have arrived and be ready for use by the time the Cascade Water, Power & Light Co. are ready to supply the electric energy which has been contracted for.

The ore crusher will be not only the largest of its kind in the Boundary, but the largest in British Columbia and it is believed in Canada. When running at full capacity it is capable of handling 3,600 tons of ore each 24 hours. The building for it has been completed, the ore to be dumped directly from the crusher into the C. P. R. dump cars and then taken to the company's smelter at Grand Forks.

NELSON MINING DIVISION.—The improvement is maintained and though there is nothing sensational to report, withal, most of the mining properties are engaging extra hands. The terminals for the tramway from the Venus to the Athabasca mill are being erected. About 60 men are employed on this property. The Ore Mill group on Sheep Creek, owned by Godfrey Birtsch is to have a five-stamp mill on the property, the contract having been given to D. J. McNally.

The Ymir Camp indeed may be said to be in a flourishing condition. A five-stamp mill is now on the ground at the Referendum, and extra men have been employed at the Poorman-Granite and Molly Gibson, which are both looking well.

KASLO AND SLOCAN.—Silver-lead shipments continue to improve, but while profits are, however, as a rule small, compared with those of the past a number of the mines are only making working expenses, whilst in general only the richer properties are producing largely, still general statistics are most favourable. Ore shipments from Kaslo show an increase of over 100 per cent. compared with the same period in 1901. The Arlington and Enterprise are working full forces and are the healthiest evidences of life in the division. It is authoritatively stated that a powerful Minneapolis syndicate has been formed for the purpose of building and operating monorail electric lines, both for passenger and freight service. The headquarters will be at Kaslo, and parties are now out surveying the proposed line. The syndicate has applied for a charter to erect smelters, refineries, etc., for the treatment of ores. There seems little doubt of these propositions going through, and as the tramways will operate through a large extent of country, mines hitherto hampered by the need of transportation facilities will be opened up. Owing to the several rich strikes made recently, the feeling pervading the dry ore belt is decidedly optimistic. In spite of the low price of metals the returns from the Enterprise are showing a steady improvement each month. The Enterprise mine is supplementing its concentrating plant on Ten-Mile with the Elmore oil process, it being contended that this new auxiliary will prove more profitable than the water process, which can hardly be said to be a success with the sulphide ores of this mine. Professor J. R. Parks, of Columbia College, is making an examination of the Arlington and Speculator mines, with a view to effecting a saving in the treatment of the siliceous ores of the dry ore belt. His researches may mean much for the mine producing ore similar to that of the Arlington and Speculator. An important strike has been made on the lower tunnel of the Speculator. It is reputed to be the biggest chute yet encountered. A zinc market for the zinc ores of the Slocan seems fairly assured. Representatives of the Lanyon Zinc Company of Iola, Kansas, are in the district and making contracts with the mines for their product. In view of the depression caused by the low price paid for lead ore, this is relieving. The Bosun mine never looked better; much development work has been done with sound judgment. The long No. 1 tunnel has come in contact with a fine showing of zinc. The chute is about 18 inches in thickness, and assays average 607 ounces of silver per ton and two per cent. copper. There is a vertical depth of 600 feet on the lead at the point where the ore has been encountered, and an upraise has been made for a distance of 175 feet to connect the No. 1 tunnel with a 90-foot winze sunk from the No. 2. Thirty-five men are employed.

LARDEAU MINING DIVISION.—Very large deposits of free-milling ore are being developed on Lexington Mountain, and in the same belt as the well-known Eva mine on Lexington Mountain another rich strike has been made, occurring on the property known as the Rossland Group and owned by the Ophir-Lade Syndicate, Limited. At a point 175 feet from the tunnel's mouth a short cross-cut was made on the hanging wall and a five-foot vein of quartz, apparently increasing with depth, was opened up in which visible gold is freely disseminated.

Camborne and the new town of Goldfields, three miles further up Fish River appear destined to become the centre of the biggest free milling gold camp in the province in the very near future; considerable progress in all directions is now being made. The completion of the Northwestern Development Syndicate's mills at Goldfields will greatly stimulate the growth of that town. Mr. H. Z. Brock, manager of the Camborne group, which is owned by the Northwestern Development Syndicate, Limited, has just returned from the East and is now superintending the erection of a ten-stamp mill and five thousand feet of aerial tramway. A sawmill with a capacity of forty thousand feet per day is being built by the syndicate. During the week an additional force of men has been placed on the property. Great prominence will be directed to this group when all these recent machinery additions are installed and it will be worth the attention of the public to follow the fortunes of the Northwestern Development Syndicate. The Guinea Gold looks most encouraging; two tunnels are being driven on the property, one of which is 110 feet long; 2,800 lbs. of ore was packed down to Ferguson on the 24th ult. Several tunnels have been driven on the Gilman, one being 250 feet in length; latest assays return $54.80 in gold, $16.00 in copper. Mr. A. C. Garde, of the Payne, has bonded the Linson View claim and several men are at work. Ore carrying values of $158.00 a ton has recently been shipped.

In conclusion it may be said that the apathy which has denoted every other district has been a conspicuous feature in this division by its absence. The avoidance of producing stimulating effects in activity is noticeable. The bottom seems to be sound and progress has been continuous from the start; there have been no sudden leaps and bounds and after a careful study of the situation we cannot see how the public can be asked to subscribe for the various species of wild-cat companies that are invariably introduced to general notice at a particular bright period. The views we hold with regard to the Lardeau are not altogether one-sided. The Hon. the Minister of Mines for the Province of British Columbia on his visit last week to the mining districts laid particular stress on this district, saying: "One cannot fail to be thoroughly impressed with the extraordinary activity in the Lardeau. Showings are phenomenally rich and are general and widespread." The assertion is true that the richest free gold propositions have been located here, ore generally carrying extraordinary values. The large number of capitalists who have become interested is significant.

EAST KOOTENAY.—Mining business in East Kootenay is quiet. There is, however, considerable activity among the placer mines at Wild Horse Creek and the camp is reported to be booming. Concentrating works are being installed at the Estella mine at Tracey Creek. An organization to be known hereafter as the Kootenay Placer Mining Co., for the purpose of working four or five miles of placer ground, for which a lease has been obtained from the Government, situated above the falls on Perry Creek, has been formed. A steam shovel, with a capacity of handling about 1,000 cubic yards per day is on the way to the ground. The right of way from the old town to the falls is being cleared. The outlook has improved all round and active development work is more in evidence than for many months past.

AINSWORTH MINING DIVISION.—From Pilot Bay we learn that a gang of men is now clearing out the trail from Crawford's Bay to the head of Gray's Creek, where a number of iron ledges of considerable commercial value are receiving attention.

A very fine showing of grey copper has been encountered in No. 1 tunnel on the Silver Hill property. Samples assayed at Nelson return 480.6 oz. silver and 14 per cent lead. Ore will carry $250.00 in all values per ton.

CANADIAN MINING INSTITUTE.

NELSON MEETING.

A SPECIAL meeting of the Canadian Mining Institute was held in Nelson on the 10th and 12th of September, Western interests being well represented. A resolution having been submitted to and approved by the meeting, providing for the establishment of a British Columbia branch of the Institute, the following gentlemen were appointed to act as an executive committee to effect the necessary arrangements: Messrs. S. S. Fowler (chairman), Hedley, Macdonald, Kirby, Keffer, Parrish, Garde, Cronin, Tonkin, Hobson, Robertson and Brewer. This committee were given power to add to their number, and a first meeting of the branch will probably be held in Victoria early next year. Later in the proceedings papers were read by Mr. Bernard McDonald, Mr. W. Thompson, Mr. S. S. Fowler and Mr. Edmund Kirby. Mr. Kirby's paper on the "Influence of Governments in Mining" provoked a lengthy and interesting discussion, Mr. Croasdaile, of Nelson; Mr. McEvoy, of Fernie and several other members disputing the fairness and strict accuracy of some of Mr. Kirby's figures and conclusions.

RECENT PUBLICATIONS.

THE Journal of the Canadian Mining Institute, Vol. V., 1902; containing the Papers and Proceedings of the Meetings of the Institute. Edited by the Secretary: Ottawa, 1902.

This volume contains forty-one valuable papers contributed by members and student members, together with a report of annual general meetings held during 1901 and 1902. The volume is very handsomely bound and printed.

A Classified List of Minerals, Precious and Other Stones, by Felix J. Troughton. The Abbey Press; 114 Fifth Avenue, New York. Cloth: 50 cents.

As the title indicates, this is a descriptive and alphabetically arranged list of minerals and precious stones, and includes all known varieties. It will prove useful for reference purposes, but the information in some instances might advantageously be made more comprehensive. For example, here are a few definitions taken at random from the list, wherein much is left to the imagination: "Labradorite—A mineral." "Mica—A glistening mineral." "Nicolite—A mineral," and so on.

The Design and Construction of Oil Engines, with full directions for Erecting, Testing, Installing, Running and Repairing; Including Descriptions of American and English Kerosene Oil Engines, by A. H. Goldingham, M.E. New York, Spon & Chamberlain: London: E. & F. W. Spon, Ltd. Price $2.00.

The subject is here treated in a practical manner by a practical man. While several books have been written describing the working of gas engines, this is, we understand, the only work dealing exclusively with kerosene or oil engines. The author draws largely on an extensive personal experience for much of the information he conveys. The book is devided into nine chapters. Chapter II exclusively treats on the designing of oil engines, and the following subjects are subsequently discussed: "Testing engines," "cooling water tanks and other details," "oil engines driving dynamos," "oil engines connected to air compressors, water pumps, etc," "instructions for running oil engines," "repairs," while the concluding chapter describes the several types of oil engines. There are in addition a number of valuable tables and formulae.

The Mining Manual for 1902, by Walter R. Skinner. A record of Information concerning Mining Companies, followed by lists of Mining Company Directors and Secretaries (sixteenth year of publication). London. Demy 8vo. cloth. Price twenty-one shillings.

Mr. Skinner's Mining Manual is recognized as the standard directory of British mining companies. This year's volume has over 1,700 pages, and contains particulars of no less than 3,523 companies arranged in four sections, 688 companies being Australian; 855 South African; 420 West African; and 1,560 miscellaneous (including Indian, British Columbian, American, etc., and the coal, iron and other mining concerns of the United Kingdom.) Full particulars and financial position concerning each company is also given. The lists of directors and secretaries comprise some nine thousand names and addresses. The work is too well known to require commendation from us.

Twenty-First Annual Report of the United States Geological Survey to the Secretary of the Interior, 1899-1900. In Part V—Forest Reserves; Part VII—Texas. Charles D. Walcott, director.

Year Book of the Michigan College of Mines, 1901-1902. Announcement of Courses for 1902-1903. Houghton, Michigan.

CORRESPONDENCE

THE CAPITALIZATION OF THE OLALLA CO.

To the Editor:—Sir: I read with much amusement Mr. Brewer's savage attack upon myself in the matter of the Olalla Copper Company. Mr. Brewer is certainly rather self-contradictory. He commences by saying that he used my report to obtain his information and later on he says that what I say is of no account because I am not a mining engineer anyway. If that is his opinion, surely he did not show himself as careful as he might be when he used the report of a man whose opinion he despised on which to base a letter to the public on such an important matter. The only inference is that at first he saw that the report was perfectly straightforward and unbiased, but afterwards when I saw that he was rushing to extremes in condemning all the claims and endeavoured to counteract the effect of his letter he got angry and now he writes things which in calmer moments I am sure he will regret. As regards over-capitalization, Mr. Brewer's conclusions are based upon a confusion of mind which in a mining engineer is extraordinary. He argues under the impression that the promoters are selling the claims to the public for the capitalization of the company, and that they value their claims at three million dollars. Regarded as a sale the cash value the promoters are putting on the claims is the value of the amount of stock they own, not the value of the whole stock of the company, as Mr. Brewer wrongly assumes. The president of the company assured me that at least ninety-per cent of the stock will be treasury stock to be sold for the necessary cash to test all their claims and open up the good ones, so that we have to divide the capitalization of the company by the figure ten to get to know what the promoters are charging the public for their claims, inasmuch as the cash obtained from the public goes into the development of the claims, not into the pockets of the promoters, who will not realize a cent until they get their dividends. Lots of people talk glibly about over-capitalization when they do not know what over-capitalization means. There is plenty of ground to spend more than the capital of the Olalla company on the claims they own, and when so much of the stock is treasury stock it is an easy matter to reduce the capital at any time. If the promoters had kept the majority of the stock for themselves there would then have been room for criticism. As regards their advertising, I have not seen their advertisement in the newspapers, but whatever they may have said there is no justification for rushing to the other extreme and saying they do not even own one promising prospect. Mr. Robertson's report is extremely fair and impartial, but the best showing. The east cut in the Bullion was not made when he was there last year.

A. A. WATSON.

Vernon, B. C.

[Correspondence on this subject must now terminate. We have already expressed our opinion that the Olalla company is grossly over-capitalized, and that the methods adopted by the promoters to foist the stock on the public are open to the strongest criticism. Our readers are now in a position to form their own conclusions. —Editor.]

COMPANY MEETINGS AND REPORTS.

HASTINGS (B.C.) EXPLORATION SYNDICATE, LIMITED.

AT the fifth ordinary general meeting of the Hastings (British Columbia) Exploration Syndicate, Limited, held the other day in London, the Chairman stated that a year ago they were passing through a test period, and it was then impossible to say what the results would be until the mill was erected and at work. For several months after crushing operations were started great hopes were entertained of their enterprise proving successful. The output for November was estimated of the gross value of £3,370 and for December £4,800, irrespective of 460 tons of ore and concentrates on hand for shipment to the smelter. With such prospects before them, and the assurance of their manager (Mr. Haultain) that there was nearly 12 months' ore in sight, the board felt justified in declaring an interim dividend of 1s. per share. It was a great disappointment, therefore, to receive returns for January which disclosed an altogether different state of affairs. In the circumstances it was thought advisable to hasten the appointment as manager of Mr. Leslie Hill, and that gentleman sailed in March and took over the property at the beginning of the following

month. His report on the mine was most disappointing, and the board had no alternative but to shut down the mill and confine operations to taking out such payable ore as could be easily obtained. Since Mr. Hill's arrival, he had cut down expenditure and managed to make the production of the mine cover all outgoings, which was, in itself, a satisfactory thing. How long the ore would last it was impossible to say. Their one hope of getting any really good return on their money appeared to be in the coal lands of the Blairmoore district. Mr. Hill had formed a high opinion of these lands, and said that there was reason to believe that the company's area would be the most valuable coal property east of the Fernie coal field. The extent of their holding, jointly with other parties, was 9,000 acres, and at the present time negotiations were proceeding with a view to the sale of the land. It would be unwise, at the moment, to state what the probable profit on the transaction would be, but there was ground for hoping that the amount would be satisfactory. Should a sale be effected, the next step would be for the directors to summon a meeting of the shareholders to consider the future of the company.

Bank of British North America.

The net profits of this institution for the half year ended June 29 are £2,360 in excess of those for the corresponding period of last year. The directors have declared an interim dividend at the rate of 6 per cent. per annum, which is the same as a year ago, leaving a balance of £6,099 to be carried forward. The following appropriations from the profit and loss account have been made for the benefit of the staff: To the officers' widows' and orphans' fund, £470; life insurance fund, £380; pension fund, £459. The progressive nature of this bank's business is evidenced by the steady increase of its dividend distribution. Thus, for 1895 and 1896 it paid 4 per cent; for 1897 and 1898, 5 per cent.; for 1899, 5½ per cent., and since then it has paid 6 per cent., while a satisfactory increase of profit is shown by the report just issued.

BOSUN MINES.

The third ordinary general meeting of the Bosun Mines, Limited, was held in London last month. The Chairman, after paying a high tribute to the efficiency of the manager, Mr. Sandiford, explained that although the condition of the mine was excellent, it had been considered expedient to discontinue operations for a period, as the decline in lead and silver prices and the fact that the company was obliged to pay the miners a higher rate of wage, left little if any margin of profit. Recently, however, a considerable deposit of zinc-bearing rock had been encountered, and spelter being at present in great demand, it was hoped that the mine might soon again be worked. It was further stated that Mr. Sandiford had offered to accept a reduction of salary until operations were resumed, while the board agree for the meantime at least to waive their fees.

YMIR GOLD MINES.

Mr. Edward Hooper, who recently visited and examined the Ymir mine on behalf of the company, reports as follows:

The general economic conditions appertaining to this mine, as well as the ordinary details with regard to underground development, machinery and plant, etc., are well known to the directors, and it will not, therefore, be necessary to recount same here, but it will probably suffice to give a general description of the ore deposit, together with a summary of the results of the present examination.

The ore body being worked in this mine is more or less lenticular in shape, and is contained in a fissure-fault traversing the slates which prevail in this district.

The quartz is found at times to follow for a short distance along the bedding planes of the slates where disrupted by the act of fissuring, and these "spurs" have some times been followed for some distance under the impression that they were the main vein.

Several small dykes of igneous rock (probably gabbro) are found crossing the vein and country rock, and as no movement is noticeable they are evidently contemporaneous with the formation of the ore body.

Other disturbances of later origin have somewhat faulted the vein in places, although the dislocations so caused do not play any very important part in the economic working of the property.

The permanence of the fissure is evidenced by the workings at the 1,000 feet level, where the vein is strong and highly mineralized.

The Mine.—The vein has been proved from the surface to a vertical depth of about 1,000 feet, the payable portion varying from 2½ feet to 42 feet in width.

The length of the pay chute at No. 1 level was about 440 feet; at No. 2 level the lateral extent of the vein worked by the stopes increased to 470 feet, but at No. 3 level the "chute" shortens to about 350 feet, and at No. 4 level the payable ore is only found, so far, to have a length of about 200 feet, although the assays for the last 70 feet of the west drift (which is not included in above measurement) would seem to denote that a certain amount of ore exists between this distance. The limits of the pay chute at No. 5 level have not as yet been fully determined, though present appearances indicate a decided tendency for it to pitch to the eastward, and a length of about 120 feet on this level, east of the shaft, has been proved to be payable.

At levels Nos. 6, 7, and 10, no amount of payable ore has yet been found, and all work at these points is suspended until connection has been made with the main shaft of level No. 10. This last mentioned work is of great importance with regard to the extraction of ore below No. 3 level.

It was not found possible to inspect No. 7 level on account of its being temporarily flooded with water.

During the last six months over 80 per cent. of the ore has been obtained from the stopes above levels Nos. 2 and 3, since it was not feasible, owing to inadequate hoisting arrangements, to extract much of the ore exposed below No. 3 level.

The presence of bunches or seams of zinc-blende, galena or iron pyrites in the quartz has hitherto been regarded as the chief indication of the presence of sufficient gold and silver in the ore to reader it payable. That the occurrence of these minerals in the ore is no criterion as to the accompanying precious metals, is sufficiently borne out by the recent development in No. 10 level, where the quartz carries about the same quantity of the sulphurets as near the surface, but very little gold or silver. However, at the present east face of No. 10 level the ore shows an increased quantity of sulphurets, and a selected sample taken here gave a value of $7.51, which is a higher result than any hitherto obtained. This is undoubtedly a favourable indication, and coupled with the fact that the pay chute in the upper levels has shown a decided tendency to pitch to the east, gives one every encouragement for continuing this level to the eastward.

For the same reason levels Nos. 6 and 7 should be extended without delay, confining the drives to the foot wall portion of the vein. The high assay at the west side of the shaft on No. 6 level was taken from the only portion of the footwall which was opened up, as the dyke interfered with the taking of a proper sample from the foot wall on the other side of the shaft.

The Ore and Its Treatment.—The ore is chiefly composed of quartz, with which is associated about 8 to 10 per cent. of sulphurets of lead, iron and zinc. The gold evidently occurs for the most part in a free state, over 60 per cent. being saved by amalgamation in the stamp mill and about 15 per cent. by concentration over the vanners, the average value of the gold left in the tailings being about $1.75 per ton of ore treated.

The concentrates shipped to the smelters from the commencement of operations by the company to 31st December, 1901, contained the average of 1.01 oz. of gold and 12.22 ozs. of silver per ton, and over 20 per cent. of lead. The efforts of the management are directed towards keeping the zinc contents of the concentrates down to about 10 per cent., since a penalty of 50 cents is imposed by the smelters for each unit over 10 per cent.

The average duty of the stamps is not high, viz., 2½ tons per stamp per day, but this is chiefly due to the necessity of giving the frue-vanners ample time to make a close concentration.

The newly erected cyanide plant has a reputed capacity of 200 tons of tailings per day, and originally it was proposed, for the double purpose of ensuring a better and richer leaching product as well as increasing the duty of the stamps, to use screens of a larger mesh in the mill. Owing chiefly, however, to the backward state of development in the mine, and consequent inability to keep more than 50 stamps supplied with ore, the same necessity for increasing the duty of the stamps does not now exist, and the older practice will be adhered to.

Cyanide operations commenced in March, and up to the 30th June, 11,126 tons of tailings had been treated. According to the assays of the tailings and residues about 835 ozs.

of gold and 3,116 ozs. of silver have been saved theoretically although the actual results, which are not yet obtainable, will undoubtedly be considerably less.

The operation of cyaniding has naturally been attended at the outset with many minor difficulties and the average cost per ton of the tailings treated, viz., $0.63, is high, and should still be reduced.

Ore in Sight.—In calculating the amount of ore blocked out, 11 cubic feet have been taken as equivalent to one ton of 2,000 lbs.

	Ore in sight. Tons.
Between the surface and No. 1 level.....	100
Level Nos. 1 and 2	6,460
Levels Nos. 2 and 3	32,540
Levels Nos. 3 and 4	41,152
Levels Nos. 4 and 5	26,116
Total amount of ore blocked out.....	106,368

In calculating the above mentioned quantities, an allowance of from 10 per cent. to 30 per cent. has been made for the waste or poor rock, which should be eliminated from the ore before being sent to the mill.

The ore blocked out can safely be computed to have a value of $7.50 per ton, and should, by the aid of further development work at No. 6 level, and possibly also at No. 7 level, be considerably augmented, although it cannot be denied that the work done at Nos. 4 and 5 levels points to a shortening of the chute in depth, but whether this is of local occurrence or not future developments must show.

Value of the Ore.—The average gross value of the metals recovered has fallen from $11.94 in 1899 to $6.84 per ton during 1902. This decrease in values was rendered more apparent than real by the extraction and shipment to smelters during 1899 of a considerable quantity of rich carbonates and crude ores. At the same time it cannot be denied that a lower grade of ore is being worked than hitherto.

During the past six months the falling off in the values has been most marked, and this may be partly attributed to the milling of ore from Nos. 5, 6, and 7 levels without any previous assorting thereof, for it is plain from the sampling that the whole of the vein as mined will not pay to treat.

The importance of sampling is demonstrated by that done for the purpose of the present investigation. Not only does a "horse" of slate exist in the centre of the ore body at No. 4 level, but that for the most part the ore on the hanging wall is much poorer than that on the foot wall side of the vein.

With the observance of greater care in mining much of the poor and sterile rock in the ore could be prevented from being sent to the mill as at present, and so maintain an average value of at least $7.50 per ton in the ore milled.

Working Costs.—The expenses per ton milled during the past six months were higher than those in the previous year. This is, to a great extent, due to the lessened output, but the figures are also swelled by the construction and operation of the cyanide plant, as well as by the increased amount of development work accomplished. At the same time, owing to the natural advantages for working the property economically, the actual costs of mining and milling are still low, and will compare favourably with other mines working under similar conditions.

Conclusions.—It is obvious that the bold policy which was adopted in concentrating almost all the available time and capital towards the cutting of the vein at the 1,000 feet or No. 10 level, and thereby neglecting the development of the ore body step by step in a downward direction, has failed in its object, for the single reason that where intersected the vein was not payable. However, much valuable information has been gained, and the management will soon be able, by the connection of the Ymir shaft to No. 10 level, to secure, what is most important, good ventilation, besides doing away with the expense of pumping.

The proved continuity of the vein in depth and so highly mineralised, is undoubtedly a favourable feature and engenders confidence for a recurrence of the gold and silver values, although this is a fact which only further development can demonstrate.

This development should primarily consist of the following work, viz.:—

(1) To continue the work of upraising from level No. 6 to connect with Ymir shaft.

(2) To continue driving level No. 10 to the east.

(3) The extension of Levels Nos. 6 and 7 to the west as well as to the east.

LILLOOET FRASER RIVER AND CARIBOO GOLDFIELDS (LTD.)

At an extraordinary general meeting of the members of the Lillooet Fraser River and Cariboo Goldfields (Limited) held on Wednesday at College Hill Chambers, College Hill, E.C., a resolution for the voluntary winding up of the company, passed at the extraordinary general meeting held on August 6 last, was confirmed. It was stated that from the amount in hand a first dividend of 5s. or 5s. 6d. would be paid about November, and that the final dividend would depend upon the realization of some small properties owned by the company in British Columbia.

3 per cent.

MINING RETURNS AND STATISTICS.

CARIBOO.

THE gold output for the Quesnel Forks division of Cariboo will not, it is reported, be as large as was expected, owing to a shortage of water by hydraulicing, but in the Barkerville section the results of the season's work are reported as the best for many years.

It is reported officially on behalf or the management of the Cariboo Consolidated Hydraulic Mining Company, that recent partial clean-ups of the gravels on the property of the undertaking have realized 465 ounces of gold in all, 115 of these coming from the well known Ah Quay claim.

ATLIN.

The opinion is expressed that the gold output from this district this year will exceed that of last season, the value of the yield being estimated at approximately $650,000.

YUKON.

A despatch from Dawson City states that the August gold exports bring the Yukon shipments for the season to the total of $8,060,000, in round figures. It is expected the grand total for the season will reach approximately $10,000,000. This is the last month in which heavy exports of gold are likely to be made. However, if the season should remain mild, shipments may be made the first two weeks of October.

BOUNDARY DISTRICT.

The following table gives ore shipments from this district for the year 1902 to the week ending September 27.

	Tons.
Granby Mines, Phoenix	230,461
Snowshoe, "	6,448
Mother Lode, Deadwood.....	84,268
Sunset "	4,520
B. C. Mine, Summit.....	4,658
Emma, "	16,17
Winnipeg, Wellington.....	785
Golden Crown, "	625
No. 7 Mine, Central.....	482
Jewel, Long Lake.....	2,175
Providence, Providence.....	43
Total, tons.....	336,989
Granby Smelter treatment, tons.....	217,610

ROSSLAND.

Our Rossland correspondent telegraphs on Sept. 27th: Shipments from August 24th to date (inclusive) are: Le Roi, 19,545 tons; Le Roi No. 2, 5,562 tons; Centre Star, 7,322 tons; War Eagle, 4,686 tons; Giant, 895; Velvet, 300 tons. Production for the year to date aggregates 241,544 tons.

The Rossland Daily World publishes the following table of 1902 shipments to September 20th:—

	Tons.
Le Roi.....	165,835
Le Roi No. 2.....	47,694
Centre Star.....	11,148
War Eagle.....	4,201
Great Western.....	2,315
Giant.....	2,149
Velvet.....	750
Cascade.....	300
Bonanza.....	60
Kootenay.....	50
Spitzee.....	20
White Bear.....	20
Total.....	233,522

SLOCAN.

The New Denver Ledge publishes the following table of this district's output from January 1st to September 20th, 1902, inclusive:

NAME.	Tons.
Payne	1072
Ivanhoe	372
Sunset (Jackson Basin)	764
Reco	322
American Boy	737
Arlington	2769
Hewett	765
Bosun	850
Last Chance	168
Wonderful	151
Enterprise	1740
Lavina	85
Bismark	62
Queen Bess	160
Silver Glance	77
Whitewater	2881
Ottawa	8
Capella	40
Florence	1
Trade Dollar	20
Slocan Boy	115
Neepawa	101
Hartney	25
Marion	90
May	5
Paystreak	7
Surprise	22
Monitor	870
Slocan Star	553
Duplex	7
Emily Edith	20
Wakefield	180
Prescott	4
Rambler	3695
Molly Gibson	1500
Washington	187
Elliott	2
C. O. D.	2
London Hill	115
Ruth	588
Antoine	20
R. E. Lee	80
Spectator	4
Red Fox	40
Antione	40
Hampton	4
Mercury	21
Total tons	21,331

DIVIDENDS.

London advices state that the directors of the New Vancouver Coal Company have declared an interim dividend of

COMPANY NOTES AND CABLES.

VELVET, ROSSLAND.—The manager has cabled to the board of the company in London that he resumed shipments of ore on the 4th inst. The first returns received from the smelter are as follows: 85 tons yielded 109 ozs. of gold, 71 ozs. of silver, 13,227 lbs. of copper, wet assay; net proceeds from smelter, $2,441, or an average of $28.71 (£5 14s. 9d. per ton. The second returns received from the smelters are as follows: 83 tons yielded 88 ounces gold, 66 ounces silver, 2,900 pounds copper, wet assay; net proceeds from smelter $2,027, or an average of $24.42 (£4 17s. 8d.) per ton.

GIANT.—Cablegram, dated September 8th, from the resident director at Rossland: "Shipments last week, 170 tons. The average is $18 to $20. Ore leady, steadily improving." Note: "With reference to the word 'leady' it obviously means that the shipment in question contains no copper values, but is made from the Molybdenum ledge, which is smelted on a lead basis."

LE ROI NO. 2—The manager cables: "Shipments during August amounted to 4,585 tons; contents, 2,245 ounces gold, 5,651 ounces silver, 109 tons copper. The returns from ore, after making a deduction of all smelting charges, amount to $36,500. The cost of mining may be taken at $20,500, leaving profit for last month $16,000. Shipments suspended for five days on account of accident at the mine; cross-cut from (a) at the bottom of 700 foot level winze on 900 foot level shows vein to be 39 feet in width, 15 feet of which is shipping ore. The ore chute below 900 foot level will not be subject to disturbance by system of dykes that disordered veins in the upper levels; now cutting station main shaft 200 foot level."

LE ROI.—Cabled returns for August: "Shipped from the mine to Northport, 17,000 tons of ore, containing 7,790 ounces gold, 14,141 ounces silver, and 783,000 pounds copper; shipped from the dump to Northport, 1,200 tons of ore, containing 550 ounces of gold, 650 ounces of silver, and 33,505 pounds of copper; estimated profit $76,500. The manager further states that, after lengthy negotiations, the Great Northern Railway Company has made substantial reductions in freight and coke rates, which will in future enable him to treat a much lower grade of ore at a profit than formerly."

WHITEWATER.—Cable dated August 26th states: During last month 3,929 tons have been milled, producing 218 tons of concentrates. Approximate profit on month's work is $4,092 (£843).

ENTERPRISE.—Cablegram received from Nelson office says: "For the entire month of August—milled 730 tons—estimated profit $3,930 (£810) does not include zinc."

MONITOR AND AJAX FRACTION.—The report for the month of July is as follows: —

July 31st—Ore shipped and settled for—Crude galena 122 tons, estimated net value $8,914

July 31st—Ore in hand—Crude galena 56 tons, estimated net value $3,000
Ore mined during the month—Crude galena 80 tons, estimated net value $4,000
——— $7 000

Cost of mining per ton 7.94
Cost of mining per ton (previous month) 8.28

Development, 145 feet—
Cost of development p. f. 7.58
Cost of development p. f. (previous month) 6.57

No. 5. Last weekly report gives us the ledge in this level as fully 6 feet wide; the large body of ore referred to in the last report has been explored to a distance of 64 feet in a southerly direction.

The mining manager now reports that the chute encountered in this level corresponds with the chute found in level No. 4, Station No. 2, which will be remembered is 217 feet above present level.

The total of ore shipped for eleven months up to 30th July, is 903 tons, of the value of $71,363, say £14,714.

Two new properties to the southwest of, and contiguous to the Portland, through which the Monitor ledge is believed to run, have been acquired this month on very advantageous terms.

The general position of affairs at the mine is regarded as most satisfactory. Very large amount of outside work has been done during the month, for providing suitable accommodation for storing and assorting the ore for No. 5 level, and in laying the rails to connect up this level with the Canadian Pacific Railway.

KOOTENAY MINING CO.—Following is the mine manager's report on the mining operations ended July 31st:—"Exploration and development—No. 6 adit tunnel—This was advanced a distance of 130 feet, making the total length driven from the portal 1,884 feet. The entire distance was driven on ore, making the total length of the chute as now opened longitudinally on the vein 474 feet. This chute carries varying values, divided on the chute as follows: Commencing at a point 1,410 feet from the portal to a point 1,694 feet from the portal a total length of 284 feet, shows low-grade ore, having an average assay value of $2 per ton. Commencing at a point 1,694 feet from the portal, to a point 1,829 feet from the portal, a total length of 135 feet, shows

heavy sulphide ores, having an average assay salue of $6 per ton. Commencing at a point 1,829 feet from the portal, to a point 1,850 feet from the portal, a distance of 21 feet, shows mixed ore and vein matter, having an average assay value of $2.50 per ton. Commencing at a point 1,850 feet from the portal, to the present breast, a distance of 34 feet, shows heavy sulphide ore, consisting of pyrrhotite and chalcopyrite, assaying about $5 per ton. The last 34 feet opened on the chute differs from any other ore found in the mine, inasmuch as it carries considerable copper (1 per cent. to 1½ per cent.). The same chute is apparently opened on the west end of No. 3 tunnel, but carries practically no values on that level. The ore evidently gains in value as depth is attained. The entire breast of the tunnel being in very promising ore, the drift will be continued."

ROSSLAND GREAT WESTERN.—The following is the mine manager's report on the operations for the month ended July 31st: "Exploration and development—During the latter part of the month work was confined to an attempt to locate the downward continuation of the high-grade ore chute below the 300-foot level and west of the main three compartment shaft, the efforts to locate these ore bodies proving unsuccessful. West of the main shaft drifting east was commenced on the 600-foot level south of the main three compartment shaft. At a point 300 feet east of the shaft a body of ore was encountered, which promises well. The vein has been crosscut, and shows the vein to be fully 15 feet wide, with 11 feet of solid clean ore. Samples taken the full width of the face gave average assays of $15 per ton. The vein shows six feet of clean ore on footwall and five feet of mixed ore on hanging wall. The ore chute was not encountered until the last week of the month, consequently but little development work has been done. Judging from present appearances, however, this promises to be the strongest ore body yet discovered in this mine.'

GIANT, ROSSLAND.—The following circular has been issued to the shareholders: Regular shipments to the Canadian Pacific Railway Company's smelter, at Trail, commenced in May last, since which period there has been a steadily increasing output. The profit on these shipments has been most encouraging. In addition, a tunnel to strike the ledge at depth, has not only been commenced, but is rapidly nearing completion. Mr. Richard Marsh, the well known assayer of Rossland, acting on instructions, took over 300 samples from every part of the mine; and he certifies that the average assay of these samples is $25 (in gold) per ton. He furthermore points out that the Giant output (being in gold) is not as with neighbouring mines, subject to market fluctuations, and that it is free from refining charges. I am requested also to point out that the results from the shipments to Trail do not include the results that may be obtained from the Molybdenum the Giant ore contains. Under the present system of smelting the Molybdenum values are not extracted, but exhaustive tests of the Giant ore have been made by the oil process, with the result that when the process is applied to the ore in bulk, the value of its contents should be an additional £4 per ton. Our resident director at Rossland is of opinion that the outlook at the mine—apart from the possible profits to be derived from Molybdenum—is sufficient to warrant him in concluding that the Giant should soon be in a position to earn satisfactory dividends.

LE ROI.—The report for July officially issued is as follows: "The tonnage shipped during the month, together with its contents and gross values per ton, was as follows:—

	Dry tons.	Ozs. Au.	Ozs. Ag.	Lbs. Cu. wet.	Value per ton.
1st class ..	14,492.734	8,437.974	14,099.69	672,314	$17.67
2nd class dump	1,677.534	1,005.887	1,376.89	55,332	$16.35
	16,170.268	9,443.861	15,476.58	727,646	

Mine Expenditure—

The expenditure for the month on mine account was $51,385.53

The cost of breaking and delivering ore on the railroad cars for the month was $2.87 per ton. The cost of loading second class ore from the dump was 27.3c., which, added to the 2 per cent. ore tax for the month, brings it to 40c. per ton. The cost of delivering first class ore on the railroad cars, including all mine expenditure other than cost of second class ore, was $3.50 per ton.

Northport Smelter—

The expenditure for the month was $159,314.86

The following statement gives the details of the ores received at the smelter during the month and the contents:—

Public Ores:	Dry tons.	Ozs. Au.	Ozs. Ag.	Lbs. Cu. wet.
Le Roi No. 2	6,454.924	3,255.196	7,700.19	293,438
Le Roi Ores:				
1st class	14,492.734	8,437.974	14,099.69	672,314
2nd class dump.....	1,677.534	1,005.887	1,376.89	55,332
	22,625.192	12,699.057	23,176.77	1,021,129

The tonnage treated during the month was 19,965, segregated as follows:—

Roasted ores	10,764.5
Raw Le Roi No. 2	5,066
Raw Le Roi second class	2,286.5
Raw Le Roi first class	1,908
	19,965.0

Profit for the Month—

The gross value of the first class ore shipped from the mine was equal to a value per ton of	$17.67=	$256,086.60
From this deduct difference between gross value and refiners' settlement rates, and interest on gold and silver values for 90 days, and copper 60 days	$3.02=	$ 43,768.06
14,492.734 dry tons, net value per ton....	$14.65=	$212,318.54
Deduct cost of mining and smelting.....		119,420.12
Net estimated profit first class ore		$ 92,898.42
The gross value of the second class dump ore shipped was equal to a value per ton of	$16.35=	$ 27,427.68
From this deduct difference between gross value and refiners' settlement rate and interest on gold and silver values for 90 days, and copper 60 days	2.20=	3,690.58
1,677.534 dry tons, value per ton $14.15..		23,737.10
Deduct cost of loading on cars, freight, smelting, interest, etc		287.01
Estimated net profit second class dump ore		$ 15,450.09
Total estimated net profit for the month		$108,348.51

Development—

700 Tregear drift	Advanced 14	ft.
700 Tregear raise	" 40	ft.
900 Josie dyke crosscut	" 46	ft.
1,000 East winze	" 26½	ft.
1,050 West drift	" 57	ft.
1,050 West drift, north crosscut	" 42½	ft.
1,200 East drift	" 90	ft.
1,200 East drift, south crosscut	" 5	ft.
1,200 West drift	" 87	ft.

Mining.—1,200 Level.—The west drift is now out from the main shaft 149 feet. At a point 125 feet from the shaft we have started a crosscut north and south. This crosscut is about under the ore body exposed on the 1,050 level. The east drift is out 157 feet. We will endeavour to locate the ore body by crosscutting. Up to date this level is rather disappointing as nothing of value has been encountered.

1,050 Level.—The west drive is out 261 feet, the face being under the Mulligan chute. As shown on the plan, this drift has exposed a large body of low grade ore, but, so far, we have failed to locate the high grade ore shute developed in the 900 winze. The east winze is down 26½ feet, the bottom being in solid ore carrying values of $8.30 per ton.

900 Winze (intermediate stope).—The ore seems to be pitching off flat to the west, and it is impossible to determine just what it will lead to. This ore is high in gold values, but contains very little copper, therefore I am conserving it to mix with that coming from the 800 stope, which is high in copper and low in gold. The stopes above the 900 where we are operating, are all locating good, except the

first and third levels of the old shaft, which are somewhat lower in value.

We will commence sinking the main shaft within a week.

Smelting.—As previously mentioned, the ore smelted during July was small compared to the capacity of the plant, owing to the shortage of coke in consequence of labour troubles at Crow's Nest Pass (now settled). We, however, produced and shipped 30 carloads of matte, containing $330,000. This was due to the high grade of the ore treated.

No. 1 furnace is in shape to blow at any time. It is practically a new furnace. Furnace No. 3 has been thoroughly overhauled, and we are now putting Nos. 2 and 5 in good condition. We have taken out the bottoms of Nos. 1, 2 and 3, and from the numerous samples taken I estimate the metal values contained in the three at $45,000. I intend to take out the bottoms of Nos. 4 and 5. The latter is supposed to be very rich, owing to the large quantity of furnace bottoms which were fed into it at the clean up made during the time of the late labour troubles. I consider it a waste of time and money to recharge this rich material into the furnaces, as it immediately goes to the bottom, where the greater part of it remains.

I am erecting a small reverberatory furnace that will treat bottoms very cheaply. It will make a rich matte that can be carefully sampled and readily sold in New York. The total cost of this furnace will not exceed $1,500. I expect to be able to ship the rich product now tied up in furnace bottoms about the middle of September.

Cariboo Gold Fields.—The Cariboo Gold Fields, Limited, has so far this season made a modest output, which is stated by the managers to be satisfactory under all the circumstances of the cases. A parcel of 308 ounces of gold was, the other day, sent to the Bank, and the season's yield in all to date—with some more to come—approaches $15,000 in value. Meanwhile the Waverley mine cleared up 243 ounces on the 5th September, and will have another clean-up shortly, ere the season closes. These yields of the above mines are of course only to be regarded as in the nature of preliminary yields and auguries of much greater results expected in the future.

Slough Creek, Cariboo.—Sir J. Bevan Edwards cabled the directors from Barkerville on the 29th ult.: "I have finished visit; the general results of my inspection are very satisfactory; shall leave to-morrow for Victoria; the necessary development works have been very cautiously carried out; to my mind it is absolutely necessary, considering all circumstances; we may expect to be in channel any moment; gravel now in face of upper part of crosscut; there are no special difficulties in the way with regard to water; I fully believe there is a splendid future for the property, which there is every appearance should pay from the date of entering channel and getting gravel; I expect to reach England at the beginning of October."

Ymir.—Cablegram from the company's manager at Nelson, B.C., dated 11th September:—"During last month 50 stamps ran 620 hours (25 days 20 hours). Estimated profit on operating, $113 (£23). Above was arrived at after development, $2,242 (£462). Bush fire, $4,485 (£924); repairs, $800 (£164), written off."

TRADE NOTICES, CIRCULARS AND CATALOGUES.

A DENVER FIRM OF ASSAYERS.

THE Ogden Assay Co., whose office address for many years has been 1429 16th St., Denver, have removed to more convenient and centrally located quarters at 1725 Arapahoe St., of that place. The firm is well known to mining men and prospectors throughout the mining regions of the United States, British Columbia and Mexico, they having advertised continuously for a number of years in this and many other mining publications.

THE TRENTON IRON CO.'S SAN FRANCISCO AGENCY.

We regret to learn of the death, which occurred recently, of Mr. Newton M. Bell, for some time representative of the Trenton Iron Co., in San Francisco. Mr. Bell's successor has not yet been appointed.

JEFFREY WATER ELEVATORS.

An illustrated catalogue and price list of water elevators, manufactured by the Jeffrey Manufacturing Co., Columbus, Ohio. These elevators are operated by horse-power, while a special design is made to float on water and is driven by the current.

KLEIN'S COMBINATION CLASSIFIER.

The Allis-Chalmers Co., Chicago, Ill., publish a pamphlet describing this machine. The Klein classifier embodies a new principle, viz.: the use of compressed air with the water to effect the sizing, thus greatly reducing the quantity of water as a rule required. It is a well recognized fact that to obtain good results in concentration, a very careful, complete and accurate sizing of the material must be made. It is also necessary to make a complete separation of the slimes from each sizing as they invariably contain considerable values which if mixed with coarser material would be lost. This, it is claimed, can be accomplished by the Klein Combination Classifier without any difficulty, thus permitting separate treatment of the slimes mixed with a minimum quantity of water.

COAL EXPORTATIONS AND TRADE.

EXPORTATIONS from Vancouver Island collieries during the month of August were as follows:—

	Tons.
New Vancouver Coal Co.	24,061
Ladysmith	26,396.
	50,457

The San Francisco market remains unchanged. Mr. Harrison, the coal and metal broker, of that place, estimates in a recent report that shipments from Australia this year can hardly exceed 25,000 tons, and remarks that this is an exceptionally small amount, yet it will not lead to any disturbance of values, as the Coast collieries can more than make good any shortage in the deliveries of foreign grades. Prices remain unchanged, and judging from the activity of teamsters on the water front, sales must be fairly large. There seems to be no evidence of any immediate settlement of the coal strike in the East, but as we receive small quantities from there, ninety per cent. of which is for blacksmith uses, our price for eastern coals are varied but little. It may probably effect the value of Cumberland coal some few months hence, as some of the future cargoes of Cumberland must be loaded with high cost coal.

MINING STOCK MARKET.

(Specially Reported.)

THE market during September has been steady, but featureless. Centre Star has been freely dealt in at from 40 to 41 and War Eagle at 19 to 19½. Payne has been in considerable demand recently at 15½ to 16. American Boy has been active at 5½ to 6, as also Cariboo McKinney at 20 to 22 with Western buyers and a considerable advance is expected shortly. Large blocks of Fairview shares have sold at 8 to 8½. The North Star company has paid a third quarterly dividend of 1½ cents, but there has been no appearance of a rise in share prices, sales having taken place at from 19 to 20. Waterloo has been in demand at 3 cents. Republic stocks have slumped badly, being quoted at 8 to 9 cents; Mountain Lion at 18, Lone Pine at 3¾ to 4.

THE METAL MARKET.

THE feature of the month has been the improvement in copper. The market for some time has been very depressed, on account, it is said, of the uncertainty as to the statistical position of the metal. The recent publication of these returns has shown that the accumulations at the beginning of the year have been absorbed and that the present stock is nominal. In consequence there has been large buyings, resulting in noticeable appreciation of prices. This was afterwards followed, however, by a reaction. Lake copper at last account is quoted at 11¾@11⅞; electrolytic in cakes, wirebars and ingots at 11½@11⅝; cathodes at 11¼@11⅜, and casting copper 11½.

The silver market continues dull, but steady. Prices are stationary at under 52. Lead is reported from St. Louis as being firm and in fairly good demand. There is, however, little change in prices, which are quoted at 4.00@4.05, St. Louis; 4.05@4.10, New York. The London market has gained somewhat in strength since last month. Spanish lead is quoted at £10 18s. 9d. to £11. Spelter is firm at 5¼ St. Louis; 5½ New York.

LOCAL STOCK MARKET FOR THE MONTH OF SEPTEMBER.

Prepared by the Stuart Robertson Co., Ltd., successors to A. W. More & Co., Ltd., Stock Brokers, Victoria, B. C.

Companies.	Week Ending Saturday, September 6.				Week Ending Saturday, September 13.				Week Ending Saturday September 20.				Week Ending Thursday, September 25.				Dividends.
	Highest.		Lowest.		Highest.		Lowest		Highest		Lowest.		Highest.		Lowest.		
	Asked.	Bid.	Asked.	Bid.	Asked.	Bid.	Asked.	Bid.	Asked.	Bid.	Asked.	Bid.	Asked.	Bid.	Asked.	Bid.	
Cariboo McKin'y,	$0 24	$ 20	$ 0 21	18½	$ 22	$ 21	$ 19½	$ 18	$ 24	$ 23¼	$ 23	$ 21½	$ 23¼	$ 21½	$ 22	$ 21	.....
Cariboo Hydraulic	90	.....	90	.....	90	.....	90	.....	90	.....	90	.....	90	.....	90	.....	.....
Centre Star	42	40	41	40	42	41	40½	39	41	40	40½	39	41½	40½	41	40	.....
Crow's Nest P. C.	125 00	120 00	125 00	119 00	125 00	120 00	125 00	118 00	125 00	120 00	125 00	119 00	125 00	120 00	125 00	118 00	.....
Dardanelles	3	2¼	3	2¼	3	2¼	3	2¼	3	2¼	3	2¼	3	2¾	3	2¾	.....
Evening Star	4	.....	3	.....	4	.....	3	.....	5	.....	4	.....	5	.....	4	.....	.....
Fairview Corp'n	9	8¼	8¼	8¼	8¼	8¼	8¼	8¼	8¾	8¼	8¾	8¼	8¾	8¼	8¼	8¼	.....
Iron Mask	9	7½	9	7½	8½	6½	8	6	8½	6½	8½	6½	8½	7	8½	6½	.....
Jumbo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Star	20	18½	19½	18	20	19	19½	18½	20	18½	19½	18½	20	18½	19½	18¼	.....
Payne	17	15½	16	14½	16	15	16	15	17	15	16	14	17	15	16½	14½	.....
Rambler	79	74	78	74	78	75	76	73	76	73	74	70	74	70	74	70	.....
Slocan Star	1 00	.....	90	.....	1 00	.....	90	.....	1 00	.....	87	.....	1 00	.....	87	.....	.....
Sullivan	5¼	5	5¼	4½	5½	4½	5¼	4½	5¼	4½	5¼	4¼	6¼	6	5¼	4½	.....
War Eagle	19½	18¾	17	15	20	19	19	18½	20½	18¼	20	19	20½	19¼	20	19	.....
Waterloo	3½	2½	3½	2	¾	2⅞	3	2⅞	3	2½	3	2⅝	3¼	3⅛	3¼	2¾	.....
Winnipeg	5	.....	4	.....	5	.....	4	.....	5	.....	4	.....	5	.....	4	.....	.....
St. Eugene	50	.....	45	.....	50	.....	40	.....	50	.....	40	.....	50	.....	40	.....	.....
Granby	3 00	2 60	2 80	2 50	3 00	2 50	2 70	2 40	3 00	2 70	2 80	2 40	3 00	2 50	2 70	2 40	.....