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THE MONTH.

THE relation of fuel supply to the mining and smelting industry has become a question of great importance to everyone interested in the development of British Columbia, and one keenly discussed at the present time. When a question has trespassed so far as this one has, beyond the limits of business calculation into those of popular prejudice, and has become the rallying point of opposing interests, political parties, and even international jealousies, it is excessively difficult, not merely to distinguish the facts, but also to express a correct opinion or indicate a proper line of action. In a case where four-fifths of the people have their opinions ready made either by political prepossessions or by selfish interests any analysis which accepts merely the general good as the touchstone of action in not likely to be either very popular or very influential. Men are generally desirous of being rather confined in an opinion they already hold by a display of argument than induced to examine a question upon general principles. There are, however, certain salient features about this question which, (although they might very possibly give rise in different people to diametrically opposite opinions) must be thoroughly appreciated and understood before there is room for even a rational difference of opinion not to speak of a general agreement.

SMELTERS AND FUEL.

The theory upon which most countries are supposed to be developed is the rapid alienation from the people as a whole represented in the government of all the agencies of production and of transportation, into the hands of the people as individuals, the common good being protected by the free commercial competition thus engendered. Under modern economic conditions this has become a mere theory, because as rapidly as resources are alienated, monopoly conditions are developed in their exploitation, and if anything has been proved by the economic history of recent years, it is that all attempts to resurrect competition are futile and must fail. In many cases competition is actually dead, in all it is potentially dead, that is to say, that just as soon as its functions become operative these very functions form the foundation of a combination with its ensuing monopoly. At this point two main branches of economic thought break off. The Socialist considers that such a condition of affairs justifies the retention of undeveloped resources by the State. But others see insuperable obstacles in attempting to substitute the collective energy of the people in the development of industry for the individual's desire to make something for himself and they would, therefore, rather see the public good protected by efficient control of monopoly than by an attempt to resuscitate competition or by an attempted retention of industrial initative by the State, with its inevitable paralysis of individual enterprise.

If we now examine the four main factors in the question of smelters and fuel in British Columbia, the Canadian Pacific Railway Company, the American Smelting and Refining Company, The Great Northern Railway Company and the Crow's Nest Pass Coal Company, we find that in the case of not one of them is free commercial competition adequate to protect the public interest. The Canadian Pacific Railway Company is an internal transportation monopoly. Its monopoly is not perfect in all places, certainly, but so far as regards the interests at present concerned it is perfect. The American Smelting and Refining Company is an external industrial monopoly of the completest and most perfect kind. The Great Northern Railway Company is an integral part of a monopoly, which controls practically all the railways in the United States. The Crow's Nest Pass Coal Company is a monopoly, which controls all the present available supplies of fuel for the mining and smelting industries in British Columbia. It is necessary to premise that although a monopoly may give rise to the gravest abuses, it is not in itself an evil. Our Post Office system for instance is a complete and perfect monopoly. Its cost is much less and its operation more perfect than it would be under any system of competition, which could be devised. There is probably as much complaint about the operation of the Post Office monopoly in many places, as there is about the operation of the C. P. R. monopoly, and doubtless the complaints are often justified in both cases. Yet no one would dream of advocating a competitive Post Office as a remedy for existing abuses in the service. Why should so many people consider railway competition a remedy for abuses in railway service? The obvious remedy is control of the rates and service. This is possessed and exercised in the case of the Post Office and its efficiency is recognized. It is not possessed in the case of the railway company and competition is frequently set up as an alternative and superior remedy. Of course a distinction must here be drawn between railways owned by separate companies in separate spheres of influence, and railways owned by separate companies in the same sphere of influence, where alone there is real competition. The fixed charges of operating two railway systems are vastly greater than those of operating one and the interest on capital invested is twice as great. Where the government bonuses a competitive road in order to reduce rates and improve service, the purpose is affected at an enormously increased total cost of transportation and this must come out of the rates or out of the taxes. Such a policy is perfectly futile as a means of affording any relief from evils

which may be present in a transportation monopoly. The obvious remedy is strict legislative control such as is exercised by the Board of Trade in Great Britain, or in the last resort the nationalization of the monopoly in question. In many instances there are grave practical objections to this and until public sentiment is sufficiently enlightened to prevent the nationalization of railroads in Canada meaning their control by a political party for party purposes the less we hear about it the better in the interests of the country. To secure the greatest real economy in transportation a monopolistic system is the best; while to prevent the grave abuses which cluster round a monopoly exercised in the selfish interests of a corporation the powers of legislation should be ample.

There is no great advantage to be gained, however, in regulating an internal monopoly by legislation in the interest of the industries of mining and smelting if these industries are to be left at the mercy of an external monopoly over which we possess no legislative control whatever. It has been charged that a definite scheme is on foot to make the silver lead industry of the province tributary to the American Smelting and Refining Trust, an event not less injurious to the national development of Canada than the annexation of Canadian territory to the United States. The American Smelting and Refining Company claims to control the mining industry of British Columbia now; and its policy has been outlined as the control of the silver lead markets of the world. The interests of the Great Northern Railway as a transportation company are naturally bound up with the interests of the American Smelting and Refining company as an industrial monopoly. If an independent smelting and refining industry is built up in British Columbia then the main system of the Great Northern Railway can benefit but little in the transportation of ore. The ore, however, must follow the coal. If, therefore, the Great Northern Railway could acquire control of the coal supply and draw that into the United States channels of trade it is then in a position to draw the ore after it and secure a certain amount of business it is in danger of losing. When we consider the natural policy of the American Smelting and Refining Company, by which it means to carry out its intention of controlling the silver and lead market of the world, we see at once how a very obvious if somewhat near sighted, manœuvre is to discourage the mining of silver and lead in British Columbia. To control an industry is to fix the price of the product paid to the producer, and also to fix the price of the product paid by the consumer. Such a monopoly as the American Smelting and Refining Company is in a position to arbitrarily decrease the profits of the producer and just as arbitrarily increase the contributions of the consumer. In order to fulfill its purpose the possibilities of production must be limited by the necessities of the monopoly, not by the opportunities of the Market. The silver-lead resources of British Columbia are the greatest of any portion of the world. They are sufficiently great, that is to say, silver and lead can be produced so cheaply in British Columbia, as to make it impossible for any combination to control the silver and lead market unless the silver and lead industry of this province is also under the thumb of the combination. The easiest way to do this would apparently be to place disabilities in the way of the production of silver and lead in British Columbia, to say in effect "the province shall produce just what we permit it to produce and no more." This policy, be it granted is near-sighted and therefore mistaken, but the mistake is a natural one because the capitalists of the United States erroneously place the commercial and industrial initiative of this country on the same level as they do those of Mexico. As we never have done anything for ourselves they jump not unnaturally to the conclusion that we never shall.

What now are the facts with which we have to deal? Coincidently with the completion of the American Smelting and Refining Company as an industrial monopoly, we find the Great Northern Railway Company endeavouring to obtain control of the management and output of the Crow's Nest Pass Coal fields, not merely of the mines owned by the Crow's Nest Pass Coal Company, but of all the other undeveloped coal lands in that neighborhood. We also find the American Smelting and Refining Company raising the values upon the producers of silver and lead in British Columbia; and lest this should merely lead to the establishment of lead smelters in the country itself correspondingly raising the rates on the refining of lead bullion. These things are not susceptible of any explanation, save one, namely, that the interests of the Great Northern Railway and of the American Smelting and Refining Industry, are not identical with the interests of the mining and smelting industries of British Columbia. It is not necessary to accuse these corporations of any calculated malignity towards British Columbia. They are merely carrying out a line of policy which they conceive to be the best for their own interests, which do not happen to coincide with our advantage at the present time. They are neither more nor less selfish than our own transportation and industrial monopolies. But while our own monopolies may be controlled by legislation, when likely to militate against the public good a foreign monopoly cannot be so controlled. Their action, however, upon our resources and upon our industries may and must be regulated by a fiscal policy which will prevent Canada from remaining a hewer of wood and drawer of water to industry located and centralized in the United States. Industrial independence must be the watchword of Canada; and the earliest manifestation of an industrial independence will be found in delivering the country absolutely and eternally from the control of any foreign industrial monopoly like the American Smelting and Refining Company. This cannot be done satisfactorily or permanently by preventing commercial intercourse with the United States. But it can be done and it must be done by a fiscal policy which will enable Canada to go into the business of refining lead and silver for itself. Do we not possess all the raw materials, all the accessibility to the world's markets which are required? Must we arrive at the melancholy conclusion that what we lack is the industrial initiative necessary to enable us to utilize our own resources and advantages to their fullest capacity?

The promised amendments to the Placer Mining Act have, this month been brought down by the Hon. the Minister of Mines, in a bill entitled the "Placer Mining Act Amendment Act, 1901." While in many respects the changes as introduced in this measure commend themselves to us as being in the interest of miners of shallow diggings, there is nothing to indicate that the requirements of enterprises operated on a large scale have been considered. For example, it was urged very strongly that freehold in the place of leasehold rights should be granted to locators of hydraulic ground and deep workings under certain conditions. But apparently the government has decided that no change can be made in this regard. Hydraulic undertakings and deep level workings cannot, however, in our opinion, be classified under the same head as shallow placer mining when little capital comparatively speaking is required. In enterprises of the former nature the conditions of exploitation and development are not so widely different as those governing the opening up of a lode mine, and failing special legislation, which is nevertheless essential, the application of the Mineral Act to the operation of deep placers would be certainly preferable to bringing them within the scope of a Placer Mining Act, which entirely ignores their needs. Applied to the individual miner the proposed amendments to the laws governing placers are admirable enough; applied to corporate enterprises they are futile and worse—for one of the new clauses (section 18), would have the direct effect of further restricting capital from engaging in placer undertakings on a large scale.

Meanwhile we quote the more important changes: Part II. section 7, provides that:

"In 'creek diggings' a claim shall be 250 feet long, measured in the general direction of the course of the stream, and shall extend from high water mark on one bank to high water mark on the other, but when such high water marks are less than 250 feet apart the claim shall be 250 feet square:

"In 'bar diggings' a claim shall be:—

"(a.) A piece of land not exceeding 250 feet square on any bar which is covered at high water, or (b.) A strip of land 250 feet long at high water mark and in width extending from

high water mark to extreme low water mark. In 'dry diggings' a claim shall be 250 feet square:"

Section 8, increases the size of discovery claims as follows:

"17. If any free miner, or party of free miners, discover a new locality for the prosecution of placer mining and such discovery be established to the satisfaction of the Gold Commissioner, placer claims of the following sizes shall be allowed to such discoverers, viz.:

"To one discoverer, one claim, 600 feet in length; to a party of two discoverers, two claims, amounting together to 1,000 feet in length; And to each member of a party beyond two in number, a claim of the ordinary size only: Provided that where a discovery claim has been established in any locality no further discovery shall be allowed within five miles therefrom, measured along water-courses. The width of such claims shall be the same as ordinary placer claims of the same class."

Section 9 provides that:—"Every placer claim shall be as nearly as possible rectangular in form, and marked by four legal posts at the corners thereof, firmly fixed in the ground. On each of such posts shall be written the name of the locator, the number and date of issue of his free miner's certificate, the date of the location and the name given to the claim. In timbered localities all boundary lines of a placer claim shall be blazed so that the posts can be distinctly seen and underbrush cut, and the locator shall also erect posts not more than 125 feet apart on all boundary lines. In localities where there is no timber or underbrush monuments of earth or rock, not less than two feet high and two feet in diameter at base, may be erected in lieu of the said last mentioned legal posts, but not in the case of the four legal posts marking the corners of the claim."

Section 18 is evidently framed with the object of preventing the extensive staking of creeks by one man in the name of others on the strength of powers of attorney. It reads:

"Mining partnerships can locate, record, and re-record in the partnership name a placer claim for each partner, but the name of every partner and the number of his free miner's certificate shall be on the record or re-record of every such claim. The partnership name, and the name of the foreman also, must appear on every such record, or re-record, and all the claims so taken up shall be the property of the partnership: Provided always, that no free miner who is a member of a mining partnership, such partnership holding by right of location a placer claim, shall be entitled to locate and record a placer claim on the same creek, ravine or hill. A set of claims belonging to a mining partnership may be recorded and re-recorded in one record, but the fee provided by this Act shall be paid in respect of every such claim."

To restrict "jumping" as far as possible forms are added to the original declaration when making application for record, and embodied in the affidavit. The application now reads:

"I, of , hereby apply, under the provisions of the "Placer Mining Act," for a record of a claim for placer mining as defined in the said Act [here describe locality, etc., fully], and I make oath and say:—

"1. That I am the holder of free miner's certificate No. issued at on the day of .

"2. That from indications I have observed on the claim applied for I have reason to believe that there is therein a deposit of placer gold.

"3. That I am, to the best of my knowledge and belief, the first to observe such indications and stake said claim (or, that said claim was previous located by as claim known as but, has remained unworked by the said locator for not less than seventy-two hours).

"4. That the said land is at present unoccupied for placer mining purposes.

"5. That I did, on the day of , mark out the ground and make the proper inscriptions required by the Placer Mining Act" amendments, on the claim for which I make this application, and in doing so I did not, so far as I know, encroach on any other valid claim previously laid out by any other person.

"6. That the said claim, as nearly as I could measure, is feet long, running in a and direction, and feet wide, and that the above description sets forth in detail its position, to the best of my knowledge and belief.

"7. That I have not heretofore located any placer claim on the said creek (or, that heretofore I located claim [name and number] on said creek, but I have recorded an abandonment of same on day of , and have posted notice of such abandonment on each of the stakes of such claim).

"8. That I make this application in good faith to acquire the claim for the sole purpose of mining.

In reference to the proposed amendments to the placer mining act, a correspondent sends us the following suggestions, which are very much to the point:—

1. The Act to be in three parts, viz:—Placer, Hydraulic and Dredging, whereof each part shall in itself be a complete Act, for the reason that they are separate and distinct kinds of work, and persons engaged in either one does not wish to refer to the law on a subject in which he is not interested in order to find points relating to the class of work he is engaged in.

2. All hydraulic mining leases to be issued at Victoria on the recommendation of the Gold Commissioner for the district in which the property is situate.

3. The consolidation of hydraulic mining leases to be effected at Victoria, and that without necessarily referring the matter to the Gold Commissioner, the reason being that such could be done during the winter, when in some instances, it is impossible to reach such Gold Commissioner, and further there being certain legal formalities connected with consolidations they can be better attended to in a city than at the Gold Commissioners headquarters, where there is seldom or never legal assistance on the spot.

4. When leases are consolidated, it shall be proof that all notices, applications, rentals, work, etc., etc., have been duly attended to according to law up to the time of the consolidation, with the exception that the Government alone, may in case of fraud cancel such consolidated leases.

5. One lease to be issued in lieu of the several leases which are consolidated, this will do away with the necessity of paying rentals at different periods during the year, the lessee having one payment only to make and that on the date of the consolidated lease in each and every year. At present it is probable he may have to pay his rent on each lease at different dates and thereby risk the loss of a part of his property in the event of his omitting one of his payments.

6. All rentals to be paid in Victoria. Seeing properties of this nature are usually worked until the very end of the season when it is imperative for the employees to hurry out of the country, they have not the time at their disposal to give to formalities which may detain them if only for part of a day, as such detention may mean their having to remain all the winter in the country.

7. All work on hydraulic mining leases to be recorded at Victoria, for the reasons given in No. 6. The present Act is, I think, silent as to the record of work on these properties.

8. In case of the free miner's certificates, rentals, work, etc., etc., be not attended to on the date they should be. The property affected should not be open for re-staking for a period of one year, during which time the lessees should have the right to re-enter upon payment to the Government of certain penalties, such as for instance in the case of a joint stock company neglecting to take out its free miner's certificate, value $100.00, the penalty could be set at 10 per cent. over and above that amount for each month or portion of a month it is in arrears. In the meantime the Government could communicate with the registered owners of the property (whose address should be registered, compulsorily, with the Government at Victoria), this would prevent an agent for non-resident owners dealing in an unlawful manner with property placed in his charge to protect.

9. When a hydraulic mining leasehold has been fully equipped with machinery, a Crown grant of the property may be issued on payment to the Government of such

a sum which when capitalized, would produce to the Government annually an income equal to the amount of the rentals, thus, say, $1,000.00 at 5 per cent. equals $50.00, being the amount of the rental. In this manner the Government would forever have the rental, or its equivalent, and the owner a perfect title, possibly subject to taxation. The Crown grant could be issued to the holder of a leasehold which he had not equipped with machinery say 5 or 10 years after the issuance of the lease, during which term the necessary amount of work would have to be done yearly,—then the same system of payment in lieu of rentals to be made to the Government for a Crown grant. The objection, that lands would be tied up by speculators could hardly be held good under onerous circumstances, such as these, as monies would not be forthcoming to hold lands for speculation upon such terms.

The following letter speaks for itself. It is in harmony with the policy which we have long been advocating and gives an accurate summary of the province's necessities in connection with the Agent-General's office:—

7 Poultry, London, England,
February, 9th, 1901.

To the Editor of the B. C. Mining Record,

Dear Sir:—You are no doubt aware that the British Columbia Government propose, during this year, to re-form the office of the Agent-General in London. This matter is one of the very greatest importance, and it is very desirable that it should be approached in no niggardly spirit.

We Rossland and Kootenay people, have all along insisted that not less than $25,000 per annum should be spent on this office. Certain members of the Legislature are inclined, I believe, to urge that $10,000 per annum is quite sufficient for the Agent-General's office. For many years I occupied a similar position to that under consideration, in connection with the Manitoba Government, and have therefore considerable experience of this kind of work; and in addition to this, knowing both London and British Columbia thoroughly, I have no hesitation in saying that $10,000 is ridiculously inadequate, if British Columbia is to be efficiently represented.

Capitalists in Great Britain and on the continent of Europe know absolutely nothing of the magnificent mineral resources of British Columbia, and of its vast wealth. As is well-known, men from every part of the earth rush to the great financial centres, such as London and Paris, and endeavour to impress capitalists with the advantages of the particular district in which they are interested. The great financiers of the world, and those who largely direct the investments of the public have no special interest in one country more than another, and they naturally invest their own capital, and that of their clients, in countries of whose richness, resources, and opportunities they hear and know most.

British Columbia is a young, and to outsiders, comparatively an unknown country, and if we wish to secure capital to develop its resources, the Government and the people must take active steps to make known to investors the vast riches of the province.

If the office of the Agent-General is generously financed, and is placed in a proper position in the business centres of the city of London; and if in addition to a first-class Agent-General, it is officered by a staff of energetic men combining a knowledge of British Columbia, with a knowledge of the business thought and habits of London men, then we may hope for good results. Much can be done by means of exhibits, lectures, speeches at public gatherings and press items, to familiarize the great investing public with the possibility of remunerative investment in our rich province.

This matter is one of first importance to all British Columbians, and I trust that you will do what you can to draw attention to the subject, and to urge its importance upon the Government,

I am yours truly,

ANTHONY J. McMILLAN.

It is unnecessary to say anything of the authority with which Mr. McMillan speaks on this subject. He speaks from personal experience in the conduct of a similar departure by the government of another province. But the value of his advice does not rest upon the authority with which he speaks, but upon the inherent reasonableness of what he says. It is satisfactory that an effort is being made to put the Agent-General's office on a business-like footing, and it is certain that if this is done the results will be highly beneficial to British Columbia.

The question whether the smelting rates in vogue in British Columbia for lead ores are exorbitant, is raised by some remarks made by our Revelstoke correspondent in a recent letter. It would seem as though the charges were not so unreasonable as the conditions under which the smelters have to work are awkward. It appears that the excess of charge over $10.00 a ton for freight and treatment is governed by the cost of refining the lead, transporting it to the refinery and marketing the product. This excess is divided into two heads. 1. Freight on bullion from smelter to refinery which is covered by a calculated charge on the cost of smelting. 2. Cost of refining and marketing covered by a deduction on the world's market price of lead in the price paid to the mine owner. In the first case the freight on bullion to the refinery on ore going 50 per cent. lead, is approximately $9.00 per ton of ore and as a consequence the treatment charge on ore from 40 per cent. lead, upwards is $19.00, those whose ore goes over 50 per cent, gaining what those whose ore runs between 40 and 50 per cent. lose. This extra charge is evidently not one which the smelters can avoid. In the case of ore running 10 per cent. lead it is $3, rising 20c per unit until $9.00 or 40 per cent is arrived at,—where it stays. The cost of refining and marketing is met by a deduction of $1 per 100 pounds, on the lead in the ore. Thus on an ore running 50 per cent. lead an extra charge of $10.00 per ton would be added. That is to say, the miner would receive $10.00 per ton of ore less for his lead than the market price in London, on the day on which the smelter made the return to him, whereas, on a 10 per cent. lead ore he would receive $2 per ton of ore less. The owner of a ton of ore averaging 50 per cent. lead would therefore have to face a charge of $29.00 on what his ore contained as compared with what was paid him for it—and the owner of a ton of 10 per cent. ore $15.00. But in each the profit of the smelter would be what could be made out of $10.00 after freight to the smelter and cost of smelting were accounted for. Of course the conditions in the United States, where the lead is required as a flux to smelt profitable dry ores and in the interior of this country where the difficulty is to get suitable dry ores even at low rates of treatment and where ores carrying sufficient iron are short,—are altogether different. It will thus be seen that the conditions under which the smelters in the interior have to work,—and not any desire on their part to earn abnormal profits, are to blame for the apparent excessive charges. Nor is it easy to avoid the conclusion that these conditions cannot be modified except by the establishment of smelters and refineries upon the Pacific coast of British Columbia. On the coast iron ores are plentiful, dry ores can be imported from South America if necessary at a very small cost,—as it is notorious that the ships now trading between British Columbia and South America come north in ballast, while the transcontinental freight charges on the product of the refinery to the world's market can be very nearly eliminated by the greater economy of water carriage.

It is a matter for regret that no attempt has been made by the Government to provide for an exhibit of mineral from this province at the Pan-American exposition, which is to be shortly opened at Buffalo. Indications are not wanting that a large proportion of the capital which in future will be expended in mining development in this country will originate from New York and Boston; in fact it is now admitted that it is easier

to dispose of mining property, provided it possesses actual or even potential merit, to capitalists in either of these centres than in London. Buffalo is eminently suitably placed as a site for an industrial exhibition on a large scale and in consequence of its accessibility to the great eastern commercial capitals,—visitors to the exposition will include a considerable proportion of moneyed men, having business rather than pleasure in view. An opportunity like this is not one, therefore, that should be lightly disregarded. However, there is still time in which to make a special effort to attract attention to British Columbia mines at the exhibition to be opened in Glasgow in May next. We understand that the mineral specimens from this Province which were shown at Paris are to serve the same purpose at Glasgow. But as Mr. Angus Stuart, in a descriptive article which appeared recently in these columns, of the Canadian exhibit at Paris, pointed out, the mineral specimens sent there from this province, while forming a collection admirable enough, from the geological and scientific standpoint, were not so well selected as to afford visitors an adequate idea of the mineral resources of the country; and in view of the magnificent collections of ore and gold specimens sent by the Australasian and other colonies the unattractiveness of the British Columbia exhibit was more noticeable. At very little expense, when the probable compensating advantages are considered, the exhibit at Glasgow might be made to serve the purpose of a really valuable advertisement and if nothing else were done, an addition to the existing collection of, for example, models of the large ingots of gold, produced from the clean-ups of the Cariboo Hydraulic mine last season, of some of the Atlin nuggets, with also a few massive blocks of solid galena and copper ores, would materially augment the commercial value of the exhibit.

The object of an exhibit on an occasion of this kind should be mainly to originate the desire to know more about British Columbia in the minds of those who have never heard of the country. This desire will never be originated by a museum like exhibit. That is a fact in human nature, which is perfectly well understood by a successful soap manufacturer, but not sufficiently appreciated by our government. A successful soap manufacturer does not advertise a chemical analysis of his soap. Not at all. He buys a famous picture of children blowing bubbles. That attracts the popular mind to the name of his soap. The people can investigate its merits after, but first they must be attracted. This fact may be illustrated by an incident which actually occurred. A certain British Columbian while in London a year or two ago, was asked to write a series of articles for a paper there on mining matters. The first couple of articles were very full of statistical information and made very solid reading. The next was got up in a hurry and in default of the time necessary to collect facts and work out figures was filled up with a romantic description of the Le Roi mine,—its vicissitudes and the people it had made rich. To the British Columbian's astonishment this article was much more highly appreciated than the others. It attracted attention where the others were completely overlooked. To attract attention the curious novel and romantic features of the country should be worked up. It is only by devoting care to this feature of advertising that anything done at an exhibition will be of the full benefit to the province which should be the case.

We have received, just as we go to press, and unfortunately too late for insertion this month, the general manager's, Mr. E. Nelson Fell's, report of operations at the Athabasca mine for the year ending December 31st, 1900. According to this report 5,054 tons of ore were mined during the year, producing a value of $170,668.96. Against this return is charged the cost of development amounting to $29,014.48, in addition, of course, to the cost of mining and milling, leaving a profit on the year's operation at $29,551.19, or rather less than $6 per ton. Taking all things into consideration the Athabasca returns for 1900 are not unsatisfactory, and we have to congratulate Mr. Fell on the improvement noticeable in the increased percentage of recovery from the crushings as compared with the 1899 report. In 1899 the ore yielded $19.69 per ton with tailings worth $7.45, while in 1900 the ore yield was $33.66, an increase of 50 per cent. and the tailings valued only $8.71. The percentage of recovery in the former year was 72.5; last year it was 79.4, effecting a saving thereby on operations of $14,904.30. We have remarked that the returns are not unsatisfactory all things considered; but the high cost of development, rendered so high by the geological disturbances of the locality, the uneven distribution of values in the vein and the difficulties in the way of blocking out ore and adding to reserves, are less encouraging considerations. However, there can be no doubt but that the past year's work has considerably improved the position of the mine.

We are in receipt of a copy of the third annual report, together with the balance sheet, as presented to the shareholders at the annual meeting held in Toronto on the 23rd of February, last, of the Consolidated Cariboo Hydraulic Mining Company. The total operating expenses last season were $151,181.72, including sluice extensions, and the payment of Government Royalty amounting to $5,567.47. The gold product reached the respectable value of $350,085.77, which together with a profit on stores sold to employees, etc., make the total receipts $353,146.07. The balance in Profit and Loss account seems to have been absorbed in the payment of the company's chief liabilities, and consequently the greater proportion of the profits from this next season's operations will be available for dividends. The manager, Mr. Hobson, in his report states that the character of the deposits show a marked improvement as the workings are advanced up the channel and that the pay gravel is increasing in depth as the thickness of the clay capping decreases. In fact, the condition of the mine and its prospects are both exceedingly good.

The annual report of the Cariboo Camp McKinney shows that that property has had quite as successful a year from the point of view of tonnage extracted and value produced as during any previous year of its history. But the tonnage has been produced and the value extracted in connection with a much higher cost for development necessary to maintain adequate reserves of ore in the mine. As a result the board of directors have been obliged to carry out a dividend passing policy, which has had a beneficial effect on the condition of the mine, but a prejudicial effect upon the market price of the shares. The proper way to describe what has occurred is not to say that the fall in the shares is not justified, but rather that their previous price was not justified by the condition and prospects of the mine. The Cariboo Camp McKinney has not been singular among the mines of British Columbia, in being floated at a capitalization where the dividend earning capacity of the mine appears to have been based on its earnings, over the fixed cost of extraction of the value from ore already in sight, without sufficient allowance being made for the heavy inroads on profits necessary to reach and develop fresh ore bodies. Ledges will fault, veins will pinch, ore will become lean even in the best regulated mines. From vicissitudes of this character no mine yet discovered has ever been exempt. That is the reason why a mining investment should be calculated to afford a much higher rate of interest than other investments even after a limited number of years purchase, has been allowed for as the life of the mine. There is no exaggeration or over straining of facts in saying that the return upon mining investments fixed by the mining investors of eastern Canada, has as a rule been fixed too low. We say of mining investors designedly, because the promoters have had little or nothing to do with it. In nine cases out of ten it was the investor who took the bit in his teeth and rushed the price of mining stocks upwards. Anyone with any mining experience smiles at the idea of a 6 per cent. or even an 8 per cent. investment where the security is a mine. In such a return there is neither sufficient margin for redemption of capital within the life of the mine nor is there sufficient allow-

ance for the varying ratio between cost of development and production. Certainly there are cases where, through discoveries of larger or richer bodies of ore, this ratio alters in favour of legitimate profits, but its average tendency is always to change against profits as the mine nears exhaustion, or even without mentioning the word of evil omen, becomes deeper and more burdensome to work.

The blowing in of the British Columbia Copper Company's smelter is the most important event which happened in British Columbia during the month of February. Its effect is bound to be very marked in the development of the Boundary country. The nominal capacity of this smelter is 300 tons a day, and its active operation raises the production of the Boundary country to 1,000 tons of ore a day. A year ago the Boundary country was producing so little that it hardly counted, now it has outstripped the mines of Trail creek in its production. The most satisfactory feature is that the reduction capacity of the country is entirely inadequate to the redundant over flowing supply of ore developed in the district. We hear of nothing but continual increase in the reduction facilities of the country and yet the supply of ore increases faster than furnaces can be built to treat it.

The consolidation of the mines in the Phoenix camp, owned by the Miner-Graves Syndicate, with the Granby smelter in one company of $15,000,000 calls into being the largest aggregation of mining and industrial capital in Western Canada. The figure of $15,000,000, however, cannot be taken as representing the capital value of the concern on a present dividend earning basis. It was probably adopted as forming the easiest common multiple of the various interests combined, the mines, the smelter and the reserve of working capital. It is quite certain that the company is not in a position with an output of 750 tons per day to earn an adequate dividend upon $15,000,000. It is even doubtful whether with an output of 1,500 tons a day more than 5 per cent. per annum could be paid in dividends. On the other hand it is more than likely that as this great corporation develops the resources which lie to its hand its profits will increase from year to year, until they form an adequate return upon its capital at par. The organization of this enterprise, the skilful adaption of means to ends, the economical efficiency in every department, are a lasting credit to its moving spirits, and a happy augury in the industrial development of British Columbia.

The press reports of the War Eagle meeting,—all the material available for this month's Mining Record, are too meagre in their information to form the base of any lengthy comment. But the movement of the stock has been a sufficient indication of how the report was accepted by the shareholders and by the investing public. Last year we were told that the natural rate of exhaustion for the War Eagle mine was 50,000 tons a year. It appears now that the development of the lowest levels has not been by any means satisfactory, and it would seem as if the development necessary to find the ore would swallow up the profits on mining it for some time to come. The mine is also in debt to the extent of over half a million. We can only hope that excessive conservatism characterises the report and that there are elements of hopefulness in the situation overlooked at the present time by the shareholders.

The mines in what is vaguely termed "The Coast and other districts," are already contributing not unconsiderably to the aggregate mineral output of the province. What they are contributing, however, is a small consideration in comparison with the era of prosperous growth which is clearly foreshadowed by their present condition and prospects. That the coast ranges contain deposits of copper sufficient in themselves to make the province one of the greatest copper producing countries of the world is now more than a matter of faith or speculation if a reasonable inference is to be drawn from the extent of the copper resources already proved and their insignificant relation to the territory still awaiting development. On the coast of British Columbia lode mining is still exotic and not by any means indigenous to the soil. That is to say there is not in the coast cities, as yet, a body of mining men or a wide spread interest among the people in lode mining, such as is so eminently characteristic of towns like Denver, Butte, Leadville, Omaha, St. Louis or Boston, not to mention Montreal and Toronto which, in reference to the development of Canadian mining resources have become centres of great activity. But it is an exotic which is rapidly acclimatising itself, and which as its beneficent fruits become known, will be more extensively cultivated. It is not unlikely that the coast of British Columbia may become the possessor of one of the pre-eminently great copper mines in the world. The Britannia mine on Howe Sound is a colossal fact. No possibility of question can be raised as to the enormous tonnage of ore this property is capable of producing. It may be surpassed by one or two bodies of copper ore known in the world but not by very many. Whether it can be mined and treated at a profit is a question which experience only can prove. But it is significant that every copper expert has been willing to attempt its development and the reduction of its ore, who has had an opportunity of examining it. The question of disposing of the property has been merely a question of the terms and conditions upon which the exploitation of the property would be undertaken. It is to be hoped that good management and economy will prevent anything which might cripple and mar the development of this property, and that it may take the place it seems preeminently qualified to bid for, of being one of the, if not the greatest, lode mines in British Columbia.

THE CONCENTRATION OF ORES BY OIL.

MUCH interest appears to have been aroused in connection with the new Elmore process for the concentration of ores by means of oil. The English technical papers have devoted a good deal of space to a consideration of its merits. It appears to have attracted more attention in England than in this country, for the reason that a practical plant has now been at work for about six months treating a very low grade copper gold ore at a mine in North Wales. The ore from this mine only contains about one per cent. of copper and one and one-half pennyweights of gold, contained in fine particles of iron and copper pyrites in slate, and it is claimed that this ore is being treated at a profit, whereas all sorts of mechanical concentrators had utterly failed owing to the heavy percentage loss of values in the tailings.

It is claimed that the figures from the books of the above mine show that the best work that could be accomplished, by a first class modern jig mill, and vanners, under expert management was a recovery of 20 per cent. of the values. This plant has been entirely replaced by a plant under the Elmore patents and the recovery is now proved to be 80 per cent. of the values, which is exceedingly good work considering the very low grade rock treated.

The process has been thoroughly investigated by the well-known expert, Mr. Chas. M. Rolker, who read a paper on the subject at the London Institute of Mining and Metallurgy a short time ago.

His investigation of the process was undertaken on behalf of one of the best mining houses in London and the result of his report was the formation of a development syndicate. The business is introduced under the best of financial and technical auspices, hence no absurd claims are made as to what the process is capable of. The process depends for its success upon the discovery that heavy mineral oil possesses the extraordinary property of attaching itself to particles of sulphides and metallic surfaces, whereas it will not attach itself to particles of wet rock, thus providing a very perfect means of separation, quite independent of the relative specific gravities of the mineral and "gangue."

The operation consists of mixing the pulp from the stamps, Huntingdon mills or other crushing appliance with a small

quantity of mineral oil, in a specially designed apparatus.

After the mixing the pulp and the oil run into a settling tank when the oil carrying the whole of the pyrites floats on the surface of the water. The tailings are run off at the bottom of the tank and the oil is run to a special form of centrifugal machine which separates the oil from the concentrates. The oil is then ready for reuse and the concentrates are ready for shipment.

It is claimed that the total loss of oil does not exceed one gallon per ton of ore treated.

The apparatus is of the simplest description, the wear and tear being reduced to a minimum. Mr. Rolker, in his paper, above referred to, says:

"The mechanical contrivances brought into action by the inventor are excellently adapted to the work demanded, and bespeak very careful thought as well as patient, systematic, and highly intelligent work. Seemingly insuperable mechanical difficulties in the initial stage have been ingeniously overcome and the process has arrived at a practical working stage."

Tests have recently been carried out on samples of British Columbian gold copper ores, and have given excellent results, the extraction of gold, silver and copper being at the rate of 90 to 98 per cent. of the assay values. It is claimed that such ores cannot be treated by the ordinary wet concentration process without heavy loss from the fine state of division in which the mineral exists.

In the Elmore process it is immaterial whether the ore slimes in crushing or not, as the oil picks up all the float mineral that would be entirely lost on a vanner.

The ore concentration syndicate which controls the patents is located at 4 Bishopsgate Street (Within) London, E.C. They will be glad to receive samples which they will treat free of cost to mine owners and report results.

PYRITIC SMELTING AND HOT BLAST.

IN view of the erection of pyritic smelting works in the Boundary creek district and the possible adoption of ores in other localities of the province to this method of treatment, the following article, which recently appeared in the Engineering and Mining Journal of New York, is of local as well as of general interest:

Pyritic smelting is the utilization of sulphides as both flux and fuel, the metallic bases, excepting copper, uniting with the silica to form a slag, and the copper acting as a collecting agent to gather the precious metals into a copper matte, the sulphur uniting with the oxygen of the blast to generate heat, just as the carbon from the fuel does. Some of the first questions asked by parties contemplating the erection of a matting furnace for the reduction of a great variety of ore—especially if it is to a custom plant—are:

1. Can as high a percentage of the values, gold and silver, be saved with copper as with lead?
2. Can the ore be smelted as cheaply as with lead?
3. Can as many tons of ore be put into one ton of shipping product as in lead smelting?
4. Can copper matte be sold as readily as lead bullion?
5. Can refractory ores be smelted as in lead mining?
6. Can as cheap a slag be made?
7. Will the ore require more preliminary crushing and roasting?
8. Will a plant of the same capacity cost more than if the ore is to be smelted in a lead furnace?
9. Is the matting process as suitable for as many different characters of ore?
10. Will the copper matting process cost more or less than smelting ore with lead for a saving agent?

Question No. 1 can be answered positively by stating that the writer—who has been in the lead smelting business twelve years, and the copper smelting business five years as superintendent and metallurgist in both cases—found that after introducing his large heater matte settling arrangement there was no loss of gold, slightly over one per cent. loss of silver, and an immense gain of copper over the dry assay, and only a slight loss from the wet assay. This was done at a custom plant which is still running, where the ore was all purchased, sampled by the regular coning and quartering methods, and assayed. The concentration was from eight to fifteen tons into one ton of fifty to sixty per cent. matte, first operation.

2. If the ore contains sufficient sulphur to act as fuel, and hot blast is used, the ore can be smelted for less than half the regular cost of lead smelting; in fact, for about what the preliminary rolling and roasting alone costs in lead smelting.

3. As twelve per cent. lead is about the minimum amount which can be used in lead smelting to do the work, eight tons into one is about the best concentration; but in copper smelting one or two per cent. copper in the ore can be the minimum amount and do good work, and the concentration is that much greater accordingly.

4. There is a greater demand at the present time for copper than for lead.

5. On account of the more rapid smelting of the charges in the blast furnace, greater heat and more silicious slag, as a rule, much more zinc can be smelted without trouble when matting than when lead smelting.

6. On account of being able to force more silicia and zinc into the slag, it costs less for flux.

7. As there is no preliminary roasting required, if hot blast is used, nothing but the ordinary coarse crusher is required for the largest lumps.

8. A 200 ton plant where all the ore would have to be roasted, unless roasted in heaps and then there is the capital tied up for months in the ore, if hot blast be used, so as to dispense with fine crushing and roasting, can be built for about one-third the regular cost.

9. On account of being able to make a greater variety of slag without danger of serious losses, when copper matting, it is suitable for a greater variety of ore, excepting ore rich in lead, which should go to a regular lead furnace.

10. On account of the advantages just enumerated for pyritic smelting it does not cost more than one-third to one-half the ordinary cost of lead smelting. Of course, if cold blast is used, and ordinary matting resorted to, the system has but little advantage over ordinary lead smelting, excepting that it requires less copper to save values than it does lead, and a more silicious slag can be made when matting.

The question came up, what ore is suitable for pyritic smelting, or, as I would call it, semi-pyritic smelting? The ore should contain sufficient sulphur to make the desired matte necessary for clean work in the first operation, using fuel. Then, as the sulphur is in excess of the amount required to form the matte, the percentage of fuel can and should be reduced in the blast furnace, so that the oxygen from the blast will unite with the sulphur and not carbon. Quite often, in my experience, after using hot blast, when the matte got over sixty-five per cent. copper, too rich for clean work, the foreman would add either more coke or more sulphide ore, to reduce the grade of the matte. I found mixtures—the lime usually has to be added—of three per cent. and over copper, twenty to thirty per cent. iron, eight to thirteen per cent. lime, and up to ten per cent. zinc, ten per cent alumina, thirty to thirty-six per cent. silica, ten to thirty per cent. sulphur the safest limits. The original ore may carry a very high per cent. of zinc, alumina or sulphur, but the percentages are reduced by the time the ore is fluxed; that is, the excess of bases properly neutralized with silica. Of course, too much zinc is objectionable, but it can be utilized to better advantages as a base in copper smelting than in lead smelting; in fact, zinc blende seems to give less trouble in a blast furnace with hot blast than when roasting in a reverbertory furnace, as it requires so much more heat to liberate its sulphur than when roasting ordinary pyrites; and it must be with hot blast that the oxygen, not having to unite with fuel, has a better chance to combine with the sulphur where such an intense heat exists as in the blast furnace. Of course, at times, when it is necessary, copper as low as one per cent. will answer to save the values. Some metallurgists claim that no copper is necessary, and an iron matte will save the values, and mixtures containing much less iron and more silica can be smelted to better advantage than those I have

named; but it will make these notes too long to go into the question of the different combining powers of each base with silica, and when each should be added or reduced on account of the specific gravity of the proper slag to be made for matte settling purposes.

The first heat required is for heating the air blast up to the temperature when the oxygen will combine with either the carbon of the coke or the sulphur contained in pyrites; then the necessary heat for smelting ores and fluxes so that they will combine to form the proper silicates for fluid and clean slag is produced by the oxidizing of the fuel added to the charge by the free oxygen contained in the blast. If cold blast is used, any free oxygen going in with it is required to oxidize the extra fuel required to heat the blast, thus leaving none for the sulphur. If more cold blast is used so as to get still more free oxygen, it drives the heat still further away from the tuyere openings into the furnace and reduces the smelting area of the furnace in that proportion, driving the heat higher up in the furnace, burning the fuel and smelting the ore so near the top of the furnace that and metals volatilized have no chance to get caught. It keeps the fuel burning so high above the tuyeres that it leaves very little for the blast to encounter as it enters, unless a large quantity has been used.

When the cold blast enters the furnace from the tuyere openings, and encounters the hot material without fuel mixed with it to generate the heat, a crusted furnace is soon the result, starting at the tuyere nozzle and reducing the capacity of the furnace until it closes it. This is the result when too much cold blast is used, or too little fuel is used with the cold blast. By the use of the hot blast this trouble is greatly decreased, and the hotter the blast is the better it is, up to a point where all the remaining heat necessary for smelting can be produced by the combination of the oxygen in the blast with easily oxidized elements in the ore, such as sulphur, arsenic, etc. When these elements are not in sufficient quantity to produce an oxidization the balance of the heat without making too high a concentration; that is, when there is not enough sulphur to make matte for the regular clean working of the furnace; then sufficient fuel should be used in order to save the necessary sulphur for making a proper grade of matte. With a hot blast, a cool top, and careful feeding, a more uniform grade of matte is made than it has ever been possible to make by the use of the cold blast. At the same time, there is less loss of precious metals by volatilization.

The advantages of a hot blast over a cold blast are in the improved chemical conditions, economy of fuel, and the greater capacity of the furnace. When the blast is heated without any expense, every degree of heat so obtained is a saving of a percentage of coke needed for fuel in the working of the furnace. As a matter of fact, the saving goes beyond that point of contact in the furnace from each one of tuyeres, thus reducing the activity of the coke furnished, and imposing an increased demand on it.

This chilling action reduces the capacity of the furnace in proportion to the area occupied by the chilled portions, and near the nozzle of each tuyere will be found a large surface of the charge chilled below the fusing point by the action of the cold blast, which, with hot blast, would be kept active. This portion cuts a material figure, so that the use of the hot blast in that direction alone is a decided advantage. As a matter of fact, it has been found in the practical working of furnaces on a large scale that it is advantageous to heat the blast by separate ovens, where the expense for fuel in operating these ovens was more than double the saving of the fuel in the furnace charge. It was found that the increased capacity of the furnace, and the improved chemical conditions which resulted in bringing about a more thorough fusion of the ore, more than compensated for the extra cost of the fuel to heat the air. This fact having been demonstrated on a large scale, one can see how much advantage it will be in the cost of operating any furnace if the air can be heated automatically without cost. Realizing the field for improvement in this direction several inventions have been brought out to accomplish that end. Most of those I have seen utilized the heat escaping from the fumes of the furnace by means of coils of pipe, at some distance above the feed floor of the furnace. Where a furnace is properly fed and properly operated so as to prevent volatilization of the precious metals, there should be very little heat above the feed floor, so that to utilize the invention it is necessary to keep a strong blast running through the entire charge of the furnace, igniting the free atoms of sulphur and the coke on the top of the charge. This causes a heavy loss by volatilizations where the ore contains tellurides, lead, or other volatile substances, and destroys a great portion of the fuel heat, before the charge reaches the oxidizing portion of the furnace. In other cases, attempts have been made to use the waste heat escaping from the slag, but this has been taken in such a way that the fumes from the slag were driven back into the furnace again, furnishing an impure blast with a great portion of the free oxygen already removed.

The object of my researches has been to secure a hot blast which would furnish the air heated to a sufficient degree of heat to prevent chilling, at the same time increasing the capacity of the furnace and minimizing the use of fuel; and to accomplish this without any additional cost for operation. This I have been able to do by what is known as the Bretherton hot-blast apparatus. In constructing this apparatus I have kept in mind the principal features required for its successful operation, doing away with the back pressure on the blower so that the volume of air would not be minimized; taking the heat of the hot slag by building an oven around the forehearth, the oven having flues passing through it for the escaping fumes of the hot slag; and augmenting the heat acquired in that manner somewhat by using a set of air jackets around the furnace, the air having a continuous passage from the blower to the tuyeres. In this way I have been able to keep the top of the furnace cool, so as to prevent volatilization.

The first and most important item to consider when heating the air blast is to see that it in no way interferes with the regular working of the blower, as the blast passes through the blower cold. All calculations as to the amount of blast required and can be based on the regular volume handled by the blower, the same as when using cold blast. It is customary to calculate the amount of blast furnished by the tables sent out by the manufacturers of the different blowers. In this way, the amount of free oxygen sent into the blast furnace, whether heated or cold, can be calculated, provided there is no obstruction to the free passage of the air through the heating apparatus. It is therefore, necessary that the area of the heating box shall be larger than the inlet where the cold blast enters, so that no back pressure is created. The outlet of this heating box should be made with nearly double the capacity of the inlet.

By our latest arrangement at Silverton, Colorado, we not only utilize what little heat there is to be saved practically above the feed floor, but utilize the heat which would otherwise go to waste through a much needed, large enclosed matte-settling arrangement, excepting that all the heat in that case was obtained from the slag and the wood burned on the settler's surface, as in the one we first started with. With that we reduced our fuel to one-third, and dispensed with all preliminary roasting, where we had been roasting two-thirds of the ore and concentrates smelted.

The matter of the transmission of power from Niagara Falls to Toronto, Ont., has been taken up by two local corporations, the Toronto Street Railway and the Toronto Electric Light Company. Although no decisive action has yet been taken by either of the companies, at least one of the concerns engaged in the development of power at the Falls is confident of selling a large quantity in Toronto. While three power companies intend to operate at the Falls, the Ontario Power Company has been the most active in endeavouring to find its market away from that district. This company is utilizing the natural advantages offered it, by which it secures its water power from the Welland river, the water being carried over the cliff into Queen Victoria Park, will it is estimated, be able to produce as much power with an expenditure of $5,000,000 as the American company has secured at an expenditure of $15,000,000.

PROGRESS IN THE TROUT LAKE DISTRICT.

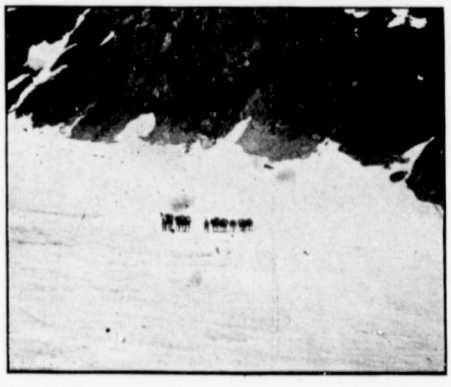
(By R. Leckie Ewing.)

IN some respects the progress made by the Trout Lake District is disappointing in others there is no cause for complaint. The great drawback to the whole district is still the want of adequate transportation. None but the highest grade ore will stand the excessive transportation charges. Consequently the development of the district as a productive mining district has as yet been small in comparison with its resources. On the other hand the exploration made during the season of 1900 has amply demonstrated that the resources of the district are both large and rich and from this point of view the season's progress is a matter of congratulation to everyone interested in the province's industry. The Lardeau country as a whole is one of the largest mining sections in the silver lead belt of British Columbia; it has been and still is one of the least accessible. The mountain ranges are very lofty very rugged and very difficult to conquer by either trails, roads or railways. In spite, however, of the great difficulties under which the district has laboured, progress has been continuous and under the impetus of railway building, 1901 is likely to mark an epoch in the district's history, and place it in the position among productive areas of the province, which its resources entitle it to occupy.

EMPIRE GLACIER, TROUT LAKE DISTRICT.

Only twenty miles of railway are required to connect Trout Lake with the C. P. R. system at Arrowhead. The grade is an easy one and it has already been surveyed.

The camp is a wonderfully rich one, prospects are numerous and attractive in every way and the certain amount of develop-



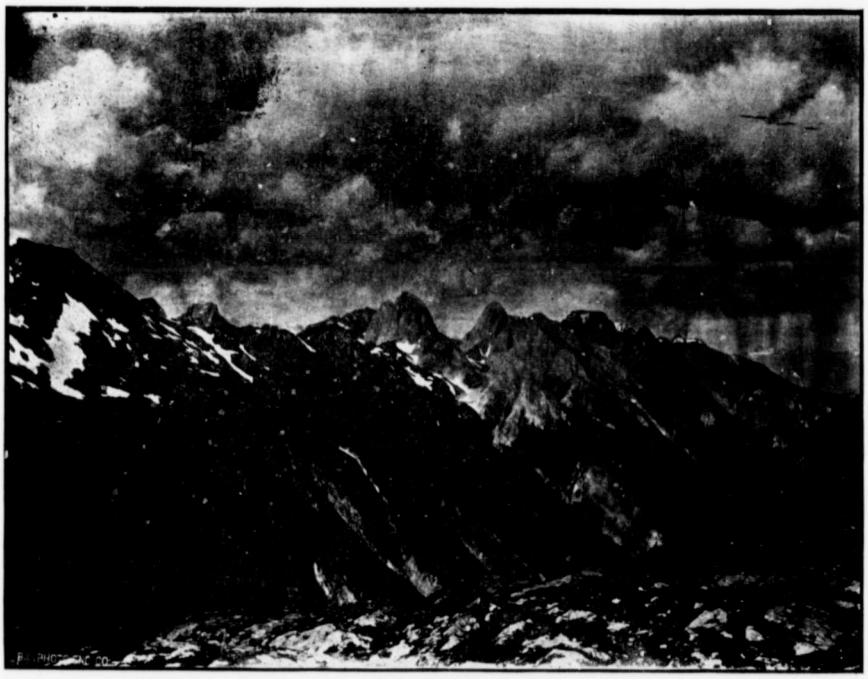
PACK HORSES CROSSING A GLACIER, TROUT LAKE DISTRICT.

SEVEN-MILE WATERFALL, TROUT LAKE DISTRICT.

ment work, which has been done, has in most cases proved encouraging, but it is costly work and capital is hard to induce into a district where access is none too easy, and the chances of economical shipments not fully assured.

The government has spent in roads and trails over $22,000, which has done much to mitigate the hardships of travelling over them, which had to be encountered last year.

make a twenty ton shipment to the Trail smelter, which after paying $47 per ton for freight charges and treatment netted them the handsome returns of $268.84 to the ton. The values in the 20 tons were, gold $237.58, silver $4,985.95, lead $589.96. Picked samples from some of the rich carbonates ran $13 in gold, 989⅓ oz. silver, 58 per cent. lead. The lessees before quitting work for the winter had in a little over four months taken

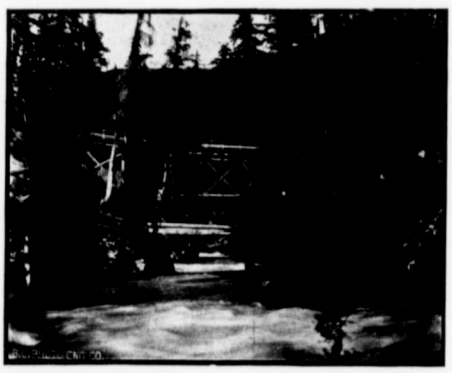


In the Heart of the Selkirks.

Prospectors have been working steadily on their claims and a few excellent results have been attained, notably so in the cases of the Triune and Cromwell. The first named was staked three years ago, but up till last season no work of any importance was done on it. Last year, however, the owners leased the property, and after ten weeks work the lessees were able to

out 200 tons in all, and as careful assaying has been done right along the values of the shipments to come will net them returns quite equal to the first. Needless to say the present owners place a very high value on their property, which is reasonable as the ore shows every sign of holding out.

Next in importance to the above must be ranked the Crom-



The "Bridge of Sighs," near Ferguson.

Empire Mountain, Showing Cabins and Claims in Foreground, Trout Lake District.

well, which was staked a year ago. It is situated in the same mineral belt as the Silver Cup, and Triune, but differs from them in that it is a high grade gold proposition. The ledge lies in slate. The ore buyer from the Trail smelter took seven average samples from the outcrop for a smelter test, and these averaged $213.60 in gold, silver $15.56 or $229.16 to the ton. From picked samples, however, as high as $800 have been obtained. Owing to the early fall of snow the owners were unable (working in an open cut on the surface) to take out more than a 7 ton shipment, which netted them $150 to the ton.

THE TRIUNE TUNNEL.

PEAKS ABOVE THE LADE & BRADSHOT CLAIMS.

The ore evidently not being as carefully sorted as it might have been.

The "Lucky Jim" group is one of the recent and richest finds. These claims are situated in a belt lying between the Silver Cup and Trout Lake. This shows a quartz vein from 5 to 6 feet in width, which contains iron pyrites and copper pyrites, the gold values being carried chiefly in the former. The formation in which the ledge lies is straight schist and slate, the vein is a fissure one and crosscuts the formation at right angles, a picked sample assayed $984 in gold, and 55 oz silver. From a 60 pound sample of iron pyrites taken from the ledge the values ran $544 gold, silver 19¼ oz., copper 2⅓ per. cent. The proposition is a concentrating one and would of course require considerable capital to handle successfully.

Favourable claims have also been staked in the vicinity of the Triune, such as the Triune No. 2. Triune Fraction and from the little work done on them their outlook is promising.

On the north fork of the Lardo prospecting has not been so vigorous as on the south fork; although capital has recently been interested in two properties which appear to have good prospects as the ore is high grade and in a good body. On the Duncan Slope so far as railway transportation is concerned, the district is much the same position as that round Ferguson. A good trail, however has now been carried up the river, and work on properties there has been vigorously pushed, and in the opinion of many, construction of a railway up the Duncan will not be long delayed. The properties depending on transportation by the Duncan, are low grade as compared with those surrounding Ferguson; but the ore bodies are much larger and with capital sufficient to develop and prove them

A SURFACE SHOWING OF ORE ON TRIUNE MINE.

they will undoubtedly be big dividend payers in due time.

The Wagner and Empire groups resemble each other, the surface showings being exceedingly good, and although the ore at present is too low grade to handle profitably, the Duncan railway will alter the situation. The assay values run from $60 to $100. The Wagner having slightly better grade of the two. Work on the Empire for the last season consisted of a 210 foot tunnel and 30 feet drifting. The tunnel crosscuts two veins, each from 3 to 4 feet wide, and carrying concentrating ore, proving the ore body at 150 feet depth. Another promising Duncan river prospect is the Black Warrior, which is situated in the Lime Dyke belt. The surface showings are very fine, consisting of galena and copper ores in carbonates. The surface showings can be traced for over sixty feet and from one to two feet in width of galena ore averaging 140 ozs. silver, and 50 per cent lead, have been developed. The carbonates are richer and assays of 300 ozs. have been obtained.

Development work on the Old Gold, also in the same belt, has disclosed a chute of clean ore two feet in width and consisting of galena, grey copper and zinc blende. This has been

Packing Wood to the Mines, Trout Lake District.

driven along for about 30 feet and is still holding out, and is probably the best strike that has so far been made in the Duncan slope.

I could if space permitted, mention many more claims which from the surface showings, and assays which can be obtained by anyone who wishes to inspect them, offer attractions of a very favourable character to mining men and capitalists, who care to visit the district.

I ought not to close without mentioning the two Banner mines of the camp, namely, the Silver Cup and the Nettie L. Both of these properties (more especially the former) are now proved mines, and with adequate transportation could be large shippers. The ores in both mines are high grade, the former averaging $10 in gold, 200 ozs. silver, 50 per cent. lead and 7 ozs. zinc. Nettie L. ore runs even higher than this, they have several hundred tons ready for raw-hiding, and expect before the winter is over to ship somewhere round a thousand tons.

The accompanying photographs were taken in the vicinity of Ferguson and the Duncan river.

Prof. J. A. Fleming, the well-known electrician of London University, is understood to be engaged in important experiments in connection with a novel form for the transmission of electrical energy. There is reason to believe that the professor has discovered the means by which such power can be distributed without wires by utilizing the ether as Marconi does for ordinary signaling.

The average value of silver was 67.1c per oz. in 1896; 59.79c. in 1897; 58.26c. in 1898; and 59.58c. in 1899. For the first ten months of 1900 the average price has been 60.76c.

CONSOLIDATED CARIBOO HYDRAULIC MINING COMPANY.

MANAGER'S REPORT FOR 1900.

THE canals opened earlier than usual under the influence of the warm Chinook winds that prevailed during the last two weeks of March, and washing commenced on the 4th of April, about two weeks earlier than usual.

The Mine was operated 171 days and 13½ hours, with a quantity of water varying from 2,500 to 2,750 miner's inches.

The season's mining operations were divided into three runs, as follows:—

Washing was commenced in Pit No. 1 on the 4th day of April, and was continued for a period of 66 days 1½ hours, ending on the 1st day of July. During the run 170,753 miner's inches of water was used to wash out 791,899 cubic yards of gravel and top clay, from which was recovered 7,867 ounces of gold, valued at $134,728.45, an average yield of about 17 cents per cubic yard, and a daily product of $2,039.48. The duty of the water attained was 4.63 cubic yards of gravel per miner's inch.

Washing operations were confined mainly to the ground thrown down by the blank blasts exploded in August, 1899, and March, 1900. Both blank blasts included a large percentage of the clay and low grade gravel lying on the south-west rim, east of "Dancing Bill" Gulch. The inclusion of so large a percentage of low grade material explains the cause of the low average yield of 17 cents per cubic yard.

The second run commenced on July 2nd, continued for a period of 68 days and 12 hours, and ended on September 30th. During the progress of the run 188,375 miner's inches of water were used to wash out 751,000 cubic yards of gravel and top clay, from which was recovered 9,058 ounces of gold, valued at $154,848.41, an average yield of 20.61 cents per cubic yard and a daily product of $2,260.56. The duty of the water attained during the run was 3.98 cubic yards of gravel per miner's inch.

After the whole of the gravel and clay disintegrated by the blank blasts was washed out, the run was continued to completion by undercutting and caving the main bank by force of the hydraulic streams.

The breaking up of the large masses of indurated clay by hand and the delay in the delivery of explosives required for the second blank blast, and to keep the pit clear of boulders, caused a serious loss of washing time and explains the cause of the falling off of the duty of the water below that attained during the first run.

The Third, and closing run of the season, commenced on the 1st of October, continued for a period of 37 days, and ended on the 9th of November, when the low temperatures closed the canals and ended the season's washing operations. During the progress of the run 101,750 miner's inches of water were used to cave and wash out 301,039 cubic yards of top clay and gravel, from which was recovered 3,544.5 ounces of gold valued at $60,508.91, an average yield of 20.1 cents per cubic yard, and a daily product of $1,635.37. The duty of the water attained was 2.90 cubic yards per miner's inch. The hard freezing of the gravel and lumps of indurated clay during several periods of low temeprature retarded the progress of the tip work, and explains the cause of a further falling off of the duty of the water.

During the progress of the second and third runs about 5,940 cubic yards of gravel were washed from the lower bench through the bedrock cuts and sluice section No. 1. The product thereof was 320 ounces of coarse gold and nuggets valued at $5,470.00, an average yield of about 92 cents per cubic yard. This product is included in that of the second and third runs.

Washing operations were confined entirely to Pit No. 1, so there is no washing to report for Pit No. 2, which is practically in the same condition as it was at the close of the season of 1899.

SUMMARY OF THE SEASON'S MINING OPERATIONS.

Total time occupied in washing in Pit No. 1. 171 days, 13½hrs
Total quantity of water used .....460,878 miner's inches

Quantity of gravel washed:—

	Cubic yards.
From Upper Bench, Main Bank	1,693,554
" Intermediate Bench	144,444
" Lower Bench	5,940
Total quantity washed during the season	1,843,938

Average duty of the water per miner's inch, about 4 cubic yards; gold product for season, 20,470.91 troy ounces; value of the gold, $350,085.77; average yield of gravel washed, 18.98 cents per cubic yard; average product per washing day, $2,041.30.

The loss of washing time that occurred during the progress of the season's operations is distributed as follows:—

	Days	Hours
Repairing hydraulic plant and advancing giants	5	
Advancing and repairing sluices	5	11
Cleaning up	5	21
Delay in delivery of giants required for use on lower bench	12	
Delay in delivery of explosives caused by unusually heavy roads	18	8
Repairing break on Morehead Canal		14
Total loss of washing time	47	6

The receipts and expenditures attending the operation of the Company's mines for the season will be found distributed in detail in the following statement:

MINE OPERATION EXPENSES FOR THE SEASON OF EXPENDITURE.

Lands and Leases—Rentals, etc		$ 2,137 50
License Account—Free Miner's Certificates		110 00
Mining—		
Labor and Board	$43,105 65	
Explosives	31,622 10	
Stores, etc	1,796 93	
Blasting, including explosives	7,646 87	
		84,171 55
Sluice extensions and maintenance		15,918 42
Port. Hyd. Plant maintenance		5,014 14
South Fork ditch maintenance		5,301 27
Morehead Ditch maintenance		5,061 05
Mine Light maintenance		1,939 25
Camp maintenance, fuel, etc		1,926 55
Buildings maintenance		1,175 95
Roads and trails maintenance		279 13
Wagons and harness maintenance		363 46
Telephone maintenance		94 00
Melting plant maintenance		8 75
Stable expense account		1,495 44
Bullion expense account—		
Government Royalty	$5,567 47	
Transportation and melting charges	4,915 33	
		10,484 80
Transportation of miners, etc		4,665 41
Mine office expenses		1,260 98
Stationery and printing		291 67
Postage and telegraph		291 67
Incidental expenses		31 25
Fire insurance account		485 50
Management		6,232 80
Tools and implements—depreciation for season		845 14
Horses and mules account—loss for season		245 00
Wagons and harness account—loss for season		34 25
Quicksilver account—loss for season		1,485 65
Total operating expenses for the season		$151,181 72

RECEIPTS.

Profit on Stores sold to employees	$ 2,835 76
Profit on blacksmith shop	95 90
Profit on lumber sold	98 64
Rent received from Morehead camp buildings	30 00
Total Profits for season	$ 3,060 30
Gold product for season	$350,085 77
Total receipts for season	$353,146 07

WATER SUPPLY.

The quantity of water available for use during the season of 1900 exceeded that of the season of 1899.

Precipitation for 1899	28.65 inches
Precipitation for 1900	30.67 inches
Exceeding that of 1899 by	2.02 inches

A large percentage of the winter snow disappeared rapidly under the influence of the warm Chinook winds that prevailed during the latter part of March, and while the remaining snow went off under more favourable weather conditions in April and May, it was not sufficient to fill the reservoirs to the height attained during the previous season. The heavy rains that fell during the summer and fall months afforded considerable water, and made up, in great measure, for the limited quantity of water afforded by the winter snow.

	Miner's inches
Quantity of water available for use in 1899	463,056
Quantity of water used in 1899	353,056
Quantity of water remaining in the reservoirs at close of season of 1899	110,000
Quantity of water afforded by precipitation for season of 1900	370,878
Total quantity of water available for use during season of 1900	480,878
Quantity of water used during season of 1900	460,878
Quantity of water remaining in Polley's Lake and Morehead lake reservoirs at close of season	20,000

The 20,000 miner's inches of water remaining in the storage reservoirs will be added to the supply afforded by the precipitation of the season of 1901.

WATER SUPPLY SYSTEM.

The winter frost and heavy rains brought down numerous small slides from the inner slopes of both main canals, and settlement occurred in two sections of flume built on the clay banks of the upper section of the Morehead canal, but nothing occurred during the season to cause a loss of more than 14 hours' washing time.

With these exceptions the water supply system remained in good running order throughout the season, and was maintained at reasonable cost.

CONDITION OF THE MINE.

The character of the deposits show a marked improvement as the workings are advanced up the channel. The heavy deposit of indurated clay overlying the gravel, on the southwest side of the channel, is decreasing rapidly. The pay gravel is increasing in depth in proportion to the decreasing in the thickness of the clay capping.

The channel appears to be widening, and the average yield of gravel washed during the season is a marked improvement on that of previous seasons.

The gravel on the lower bench continues of high grade, and will probably improve as the workings are carried around the big bend and advanced up the channel.

The gold saving appliances are in good running order and prove efficient for the economical removal of the gravel to the dumps and the recovery of a high percentage of the gold.

The Portable Hydraulic Plant is in good working order, but requires an additional 1,000 feet of 24 inch steel pipe for necessary extensions next season. Pit No. 1, with this addition to hydraulic plant, may be considered in good condition for the ensuing season's operations.

A water supply equal to that of 1900 will assure a greatly increased gold product for the season of 1901.

The operating expenses will vary as usual with the quantity of gravel washed and the difficulties encountered during the progress of the season's operations. Assuming that the clay capping will be successfully blank blasted and no accident occurs to interfere with the continuous operation of the mine, the operating expenses should not exceed about six cents per cubic yard of gravel washed.

This report deals with the revenue and expenditure attending the physical operation of the mine, and does not include Head Office expenses.

GENERAL BALANCE SHEET.

Mines, Leases, Water Rights, etc., as per balance sheet, Dec. 31st, 1899		$4,053,288 33
Permanent Improvements, season 1898:		
Drain tunnel, per balance sheet, Dec. 31st, 1899	$ 2,826 74	
Less 20 per cent. depreciation	565 34	
		$2,261 40
Riffle account, per balance sheet, Dec. 31st, 1899	$10,440 01	
Less 10 per cent. depreciation.	1,044 01	
		9,396 00
Permanent improvements season 1899:		
As per balance sheet, Dec. 31st, 1899	$55,115 85	
Less 10 per cent depreciation on Riffles, $5,676.88	567 88	
		54,548 17
Total improvements, seasons 1898 and 1899		66,205 57
Inventory as per manager's report		47,144 31
Accounts receivable		6,318 85
Gold specimens on hand		271 93
Cash, head office		18 05
		$4,173,247 04

LIABILITIES.

Capital authorized	$5,000,000 00	
Capital issued	$4,000,000 00	
Accounts payable	63,221 67	
Bk. of Montreal, Vancouver cheques outstanding	12,937 98	
Bk. of Montreal, Toronto	8,245 81	
Profit and loss account.	88,841 58	
		$4,173,247 04

PROFIT AND LOSS ACCOUNT.

Debit.

To balance, 31st December, 1899		$ 49,209 21
To operating expenses for season as per statement from mine		151,181 72
To drain tunnel, 20 per cent. written off for depreciation	$ 565 34	
To riffles, 10 per cent. written off for depreciation	1,611 69	
To head office expenses		1,907 58
To interest and guarantee account		59,828 95
To balance profit		88,841 58
		$353,146 07

Credit.

By bullion recovered	$350,085 77
By stores account profit on sales to outside parties	3,060 30
	$353,146 07

The largest corundum mill in the world, which is situated in Raglan township, Renfrew county, Ont., was started on the 21st inst., and when in full operation, it will turn out more corundum than all other plants in existence. The full capacity of the mill is 15 tons of corundum per day, reclaimed from 100 tons of rock. The orders are chiefly from great engineering works in Europe and the United States. Mr. George C. Edwards, of Bridgeport, Conn., is president of the company.

A distinct feature of electrically distributed water power is the advantage it offers to manufacturers of small and medium capacity. Experience has shown that the consumer of 100 horse-power will probably have to pay somewhat more per unit than the consumer of 1,000 horse-power, but the difference in rates will represent only a small fraction of that in cost which would result were a separate water wheel installed for each case or any other form of power plant used.

COMPANY MEETINGS AND REPORTS.

MCDONALD'S BONANZA (KLONDIKE).

THE second ordinary general meeting of the members of McDonald's Bonanza (Klondike), Limited, was held on Thursday, Mr. James McKillop, M.P., (the chairman), presiding.

The secretary (Mr. James Stewart, C. A.) having read the notice convening the meeting.

The Chairman said: In submitting the report your directors regret that the returns from the property (although showing a profit) have not come up to expectations. During the present year the number of working days occupied in treating the gravel have been 82. The season was very wet and cloudy, thus necessitating the use of steam for thawing the frozen gravel, whereas the previous year the heat of the sun during July and August was sufficient for the purpose and more effective. The use of steam has caused extra expense and a reduced tonnage thawed. It is undoubtedly the experience of almost all the Klondike companies that returns have not come up to anticipations, in many cases no profit at all resulting; indeed, in our experience the representations made by experts from that region as to large and easily obtained returns of a profitable nature from the placer deposits there have in most cases failed to be realized. Gold does not exist over large areas; however, it appears that it is only here and there that it is sufficiently concentrated to be of a highly payable character. As a goldfield, Klondike seems more adaptable for individual effort than for companies (even with moderate capital), which must necessarily have more expenses connected with them, and besides, the individual prospector and operator by the laws of the country escape charges which are exacted and binding on a company. It is well known that the conditions of mining in the Klondike as regards light, climate, distance, social life, and rate of living, in addition to the exorbitant royalty and other charges, to which I will refer more fully later on, make the cost of working claims very high. Some of these objections will always stand, but it is to be hoped—at any rate, in so far as taxation is concerned—that relief will come and that conditions in many ways may be modified to enable a reduction of the present high cost rates. Your board recognizes these facts and are doing their best to face this peculiar position by economizing wherever possible. In the change of management alone they expect a saving of, say, £1,000 per annum will be effected, as well as securing the services of a management all the year round. On reference to the accounts, you will observe that the profit for the period covered has been £19,034 6s 4d., after paying for 16 bench claims and the quartz location, which have cost £2,869 14s 3d. In looking through the items of the profit and loss account, the only matter to which I need draw your attention specially is that of the Government royalty and the bullion charges (that is the bank charges for realization) which, together amount to £7,702 13s 1d. In referring to this matter, I cannot refrain from stating my opinion that an injustice is perpetuated on the investors by the Canadian Government in respect to the afore-mentioned royalty charge. Their demand on companies is at the rate of 10 per cent. on the gross out put. This charge, during the company's existence, as shown by the report, will amount to £6,000 odd, which would have been extracted even if the company had not paid a dividend to the shareholders, and even if it had actually worked at a loss. I repeat and emphasize the fact that the existence of a system which supports such a condition of things is incredible and unjust, and if not repealed or modified, must inevitably result in discouraging British enterprise in that country. The principle underlying royalty has—to my mind—always been understood to mean the charge of a fixed percentage on profits and the departure made by the Canadian Government in demanding royalty upon the gross output, must paralize an industry, and in process of time extinguish it altogether. We have heard, but not officially, that this question is now under the consideration of the Canadian Government, and indeed it is one which calls for immediate attention. The bank charges for realizing the gold are at the rate of 2½ per cent. Taking the royalty and the bank charges together, we find that these represent an amount equal to a dividend at the rate of 7½ per cent, on the priority shares of the company. With regard to

the claims of the company, about two-thirds of Bonanza No. 2 has been worked out, and very little work has been done by the company on the other claims. Owing to the special climatic conditions and delays in machinery, the manager was unable to work the Skookum and bench claims this year, but he anticipates that there should be no difficulty in working at the three points next season. Certain bench claims have been acquired which we are informed are in the neighbourhood of good ground, and the manager considers that the investment should be a paying one. It is your directors' intention to go on acquiring further claims from time to time, and at the present moment have on hand a few thousand pounds, which they hope to devote to that purpose. You will observe that although a dividend has been declared, the directors have for the past season only drawn one-half of the fees they are entitled to, having foregone the other half. Altogether, your board hopes that the shareholders—from our present property, from the policy of continuing to acquire ground and from a reduction of cost, which may be looked for—may be justified in feeling that future results will prove that they have been associated with a profitable concern. I beg to move the adoption of the report, and in accordance therewith recommend the payment of a further dividend, at the rate of 7½ per cent., to holders of preferred shares on the register on 17th inst. This, together with the 10 per cent. interim dividend paid November 30th, 1899, makes a total of 17½ per cent. for the period covered by the report and accounts.

Mr. H. B. Marshall seconded the motion.

A shareholder inquired whether the claims which the company had acquired were purchased from Mr. McDonald.

The Chairman replied in the negative.

In reply to questions put by Mr. Simpson, the Chairman said that Major Laing had gone to South Africa, and, inasmuch as he had not attended the board meeting for the time specified in the articles he would cease to become a director of the company after this meeting. He was not responsible for Major Laing's statement in the prospectus, but if Mr. Simpson desired to communicate with him, he had no doubt the secretary would give him his address in South Africa. Mr. McDonald and Mr. Ferguson still occupied the position of local directors in Klondike without fees, and they were still the largest priority shareholders in the company. Further, they had never sold any of their shares. As to the retirement of the manager, the board did not see their way to continue Mr. Coffey as manager for various reasons. In consequence of the manner which the mine was developing, the directors did not think they were justified in continuing his services at such a high salary as £2,000 per annum. Mr. Archibald Fraser said that he was one of three gentlemen who had been asked to come from Scotland to put certain questions with reference to the company. In the first place he might state that he and several of his friends in Scotland became interested in the company owing to his knowledge of the Chairman, and although they had not entirely lost confidence in the chairman, that confidence had been somewhat shaken. So far the remarks of the chairman had not restored his confidence. It was obvious to everyone that the results of the year's working had been disappointing. The chairman had referred to the injustice perpetrated on the company by the Canadian Government royalty. It might be an injustice to make a charge of one-tenth of their returns but that did not explain the disappointing results. The speaker then proceeded at some length to call attention to the discrepancies between the profits estimated in the prospectus and those given in the report, and asked the chairman to explain why those discrepancies had arisen. They were led to believe by the prospectus that they would receive returns of at least 100 per cent. but instead of that the returns had only gone to 17½ per cent. during the period covered by the report.

The Chairman, in reply, stated that he was not a vendor of the company, but a shareholder like themselves. During the last 12 months he had invested three times more in the company than he did at the start. Mr. Fraser had referred to the royalty they paid the Canadian Government; he wished to emphasize the fact that there was no royalty in Great Britain nor in the world equal to that imposed by the Canadian Government. He contended that was unjust, and that a great many Canadian legislators were of that opinion. Therefore, they had some hopes that it would be changed at an early date. With regard to Mr. McDonald ad Mr. Fergusson, these gentlemen were still in perfect sympathy with the company's interests. He might state that no ordinary shares had been sold by any of the directors, and that all the priority shares held by them had cost £1 each. None of the directors had any money out of the flotation of the company or by selling shares. The promoters had also informed them that they had not sold any shares.

Mr. Fraser then moved the following amendment:

"That the report of the directors be not approved, and that this meeting stand adjourned till Thursday, February 28th, 1901, at 12 o'clock noon, to be held in the same place; that in the meantime a committee of independent shareholders be appointed to inquire into all the matter concerning the flotation and inception and promotion of the company."

Mr. Roberts seconded the amendment.

The Chairman said he would put the amendment to the meeting, because he wished it to be clear to the dissentient shareholders that he wished to do them every justice.

The amendment was then put to the meeting, and lost, and the resolution for the adoption of the report and accounts was carried by a large majority.

Messrs. Ford, Roberts, and Ford were re-appointed auditors, and a vote of thanks was given to the chairman.

THE CARIBOO CAMP McKINNEY.

The President Mr. Jaffray in his report, noted that the "operations for the year ended December 31, 1900, show a net profit of $53,148.02 out of which there were paid to the shareholders dividends amounting to the sum of $50,000. Owing to difficulties encountered in the working of the mine, which entailed unusual expense, the profit arising from the company's operations was not as large as was anticipated. Upon the recommendation of the managing director, the directors have determined to suspend for a brief period the payment of dividends, and to apply the earnings to the development of the ore chutes, with a view to a more economical working of the mine, believing that the result will fully justify this policy."

The managing director, Mr. George B. McAulay, in his report, states that "there has been mined and milled during the year 15,238 tons of ore, yielding 11,463 ounces of gold bullion, and 557 tons of concentrates. The ore mined was for the most part taken from the Saw Tooth and Okanogan claims, between the second and fourth levels."

"The mining of ore from your property was carried on in conjunction with the further exploration of the mine and consequently a considerable portion of the output for the year was ore extracted during the process of development, from the drifts and upraises opened up for that purpose. The development carried on during the year has been to the east on the Okanogan ground, and to the west of the Cariboo ground. The present development of the property includes four shafts, the main shaft being 370 feet in depth.

"The breaking of the vein to an unexpected degree has added to the cost of working the property during the past year.

"Owing to the extended breaks in the continuity of the vein both east and west on the various levels, the increase in the capacity of the company's mill, suggested in my last annual report, was for the present deemed inexpedient. The exploration of the mine at the points where the ledge was found to be broken being expensive when carried on by means of drifts, a diamond drill plant has been secured and is now in operation. It is expected that by this means the cost of exploration will be materially lessened."

Regarding another point, Mr. McAulay says: "The accumulation of tailings from the mill having become so great as to render necessary further provision for their retention, a new dam has been constructed 300 feet below the old dam. Extensive tests have been made of these tailings, and it has been ascertained that they carry values ranging from $2.20 to $4.80 per ton. The treatment of these tailings and extraction of the values contained therein by the cyanide process is a question which should receive consideration at an early date, as it has

been demonstrated that the erection of a cyanide plant for the treatment of these tailings, and its operation in conjunction with the company's present stamp mill, will add materially to the company's revenue. My investigations into the question of the treatment of ore and tailings by the cyanide process have demonstrated that the erection of such a plant at the company's mine will virtually be equivalent to an increase of 100 per cent. in the capacity of the company's mill. There having been up to the present time no provision for the saving of values from tailings, the aim has been to save all that was possible by plate amalgamation and concentration, and to leave as little as possible in the mill tailings. To this end a fine crushing of the ore by the stamps is necessary, yet the mill tailings as above set forth carry considerable values, the extraction of which is not possible by amalgamation and concentration. With the introduction of a cyanide plant for the treatment of the tailings, a coarser crushing of the ore would be more advantageous, as all values not saved in the stamp mill would be saved by the cyanide treatment, the cost of which would be no greater than for the saving of the values in the present tailings, while by reason of a fine crushing being thus rendered unnecessary, double the quantity of ore could be run through the mill, thus doubling its capacity as above stated, and rendering unnecessary any present addition to the number of stamps in operation.

"The present shaft at the mine, a single compartment shaft, has hitherto answered all requirements reasonably well. The further development of the mine will, however, render necessary in the near future the sinking of a new shaft, which, in order to provide for present and future requirements and facilitate an economical working of the mine, should be a three compartment shaft. The proper location for this new shaft will be determined by the exploration by means of the diamond drill now in operation at the mine."

Mr. McAulay winds up his report by saying that the pursuit of the policy outlined will increase the yielding power of the mine and its ultimate value.

Shareholders will be glad to learn that the output for January, 1901, much exceeded that for January, 1900.

The receipts from bullion for the year were $160,831.85, and the cost of machinery and of working the property for the year was $83,964.01.

BRITISH CANADIAN GOLD FIELDS OF THE KLONDIKE.

The ordinary general meeting of the directors and shareholders of the British Canadian Goldfields of the Klondike, Limited, was held on Friday afternoon, at the Institute of Chartered Accountants, Moorgate Place, E.C., the chairman (Mr. J. Allen) presiding.

The secretary (Mr. John P. Elliot) having read the notice convening the meeting.

The Chairman said: Gentlemen, I presume you will take the report and accounts as read. The directors are pleased to have the opportunity of meeting you here to-day and of enlightening you as to the position and prospects of this company. As briefly as possible I will endeavour to show you that, although the company has not reached the dividend-paying stage, it is now well equipped with assets as a parent concern, and, in the ordinary course of events, should be well able to justify its existence. As you are aware, a serious misfortune overtook the company at the time of its original issue, and to this alone can be traced the comparatively small amount of public subscription it obtained. Simultaneously with the issue of the prospectus, as you will remember, there appeared in the Times newspaper a letter from the secretary to the High Commissioner for Canada (in the latter's absence) denying the fact that Mr. Olgivie had promised the company his assistance and support. Such repudiation, unwarrantable as it was, could have but one effect and convey but one impression. Your directors, however, boldly faced the difficult situation in which they found themselves. In the personal knowledge that Mr. Olgivie had expressed his approval of the project, and convinced that his promises of assistance would be fulfilled, they went to allotment on a much less sum than they might otherwise have done. We have, I am glad to say, been able to go along steadily in spite of this unpleasant and unfortunate incident. As regards the balance sheet little comment is called for. It relates to that state of the company's career which is invariably distinguished by a heavy load of initial expenditure. In the report, the London disbursements are given at £1,307 19s 11d. net this being exclusive of the sum of £1,400 10s. for directors' fees accrued, though not drawn. To avoid misapprehension I would remind you that included in the item of £1,307 is a considerable amount expended in legal and registration charges which will not figure in any future balance sheet. At the scene of its labors the progress of the company has been in every way satisfactory, but it is not yet enjoying the popularity it deserves. Among the causes of this, early difficulties of transport, the high cost of labor, living, and heavy Government royalties on the gross output, are in particular responsible. The construction of the White Pass and Yukon Railway has now rendered available improved facilities for transport, and it is generally anticipated, I might say practically understood, that the Dominion Government will reduce the present royalties by one-half during 1901. It speaks cheerfully for the future of the Yukon Territory that, nothwithstanding all the obstacles to progress, it should have produced gold this season to something like $15,000,000 royalty from the placer diggings. In this connection I would remark that while we possess placer claims which we hope will develope into a source of revenue, our present policy, is, based upon authority, to employ our energies in the direction of hydraulic mining. At any rate, we give the latter preference, because it is promising of better results, in the long run. A placer claim is of limited extent, and is, moreover, worked out in the course of a few years. The hydraulic "Concession" covers an area of miles in length, and if not so rich in gold as the placer diggings, furnishes an abundance of material, which with the employment of proper machinery, amply compensates for a probable poorer average in value. We are now engaged in the development of one of these hydraulic concessions, namely, the Frost McGregor on the Indian River, and the results obtained have been such as to fully justify your board's policy. The prospecting was commenced in April of this year, and our last report states that a number of shafts have been sunk on this property and work was also proceeding along the benches on either side of the stream. In No. 2 shaft, at a depth of 19 ft., gravel was discovered which yielded as much as 2c to the pan, or about $2.10 to the cubic yard. These figures will convey to you some idea of the richness of the concession. But they do not represent the possibilities as the concluding paragraph in the report of our manager at Dawson would indicate. Mr. Ritchie observes: "I consider the prospects got so far most satisfactory, and there is almost a certainty of much richer pay being got." On our "hillside" claims on Dominion creek work had temporarily to be suspended owing to the scarcity of water. We have a strong faith in the future of these claims, however, and the fact that the owners of an adjoining property have made application to us to be allowed to work our No. 5 on what is known as the "lay" system, suggests that their value is by no means problematical. Under the "lay" system we shall bear no part of the cost of working, and will receive a percentage of the gross output. Such an arrangement is, of course, distinctly to our advantage since it is likely to yield substantial profit, but does not admit of any loss. So far as these claims are concerned, development work has, up to the present, been confined to No. 5—a property 250 feet wide and 100 feet long. The lower boundary of this claim adjoins a placer digging, from which gold to the value of $100,000 is said to have been taken out. In his last report, Mr. Ritchie says that seven shafts were sunk on our claims, and he proceeds to enter into technical details, which, I am afraid, would not be of great interest to you. It will, perhaps, suffice if I remark that Mr. Ritchie concludes his report in the following words: "I am confident that a good return can be got (from claim No. 5) over and above working expenses." I would add that instructions have now been given to our manager to accept the offer made to him to work the property on the "lay" system. That offer has been accepted. With our other holdings we have not as yet been able to deal, and this is a matter upon which I would claim your attention for a few moments. At the meeting held in January last you were given the opportunity of hearing the views of our man-

ager (Mr. P. R. Ritchie's) views, which will no doubt, be fresh in your minds. In the interval, we have pushed ahead satisfactorily on the fields; we have acquired what we are assured will prove other valuable interests. But the serious financial depression prevailing throughout this period has precluded the company from placing a portion of its unused capital, or forming subsidary undertakings for the purpose of providing means to exploit the valuable concessions it now holds. The resources at our command we have employed in the best interests of your company, and your directors are confident that, when the character and potentialities of these concessions are appreciated, no difficulty will be experienced in raising the capital necessary for their proper development. Apart from the shareholders, there are many channels in which money can always be obtained for a promising undertaking, such as the holdings of the British Canadian Goldfields of the Klondike prove to be. But these outside arrangements carry their penalties. Naturally, the people who put up capital would require a substantial quid pro quo. The question you have to decide, therefore, is whether you will allow others to come in and appropriate a certain portion of your future profits or yourselves provide the further sums required to render the company's properties productive. You will remember that this company started with the intention of remaining its own proprietor and promoter. Whatever we have acquired has been through the agency of our local representatives on the spot who have been enabled to avail themselves of the valuable counsel of Mr. Ogilvie. I now ask you to refer to the list of assets as summarized as an appendix to the report and balance sheet, and I would request you to compare them with the expenditure this company has incurred. By doing so you can arrive at one conclusion only—that as a parent concern, the proportion and value of our holdings to actual outlay, gives us a position which is quite uncommon for an undertaking of the character of this company. Take the Indian River concession itself, and you have an asset, which, if it represented every penny of your issued capital, would entitle the British Canadian Goldfields of the Klondike to great importance. That, then, gentlemen, is the position to-day. We have husbanded our resources very well so far, and we still have sufficient capital at our disposal to continue operations for some time to come. But the directors are anxious to find a clear road to success and they cannot achieve that object unless the company's funds are eventually augmented. The shareholders may rest assured that when it becomes necessary to make an issue of shares they will be given the first chance of taking them from us. I regret the scanty attendance of shareholders. I could have wished that more had been present. I shall be glad to answer any questions.

None having been asked,

The Chairman then moved the adoption of the report and balance sheet.

Mr. R. W. Wood seconded, and the motion was unanimously carried.

Messrs. Ford, Rhode and Ford were re-elected auditors for the ensuing year.

A vote of thanks to the chairman, who acknowledged the compliment, concluded the business.

By metamorphism is meant the process by which rocks are changed or altered; thus limestone is changed into crystalline marble, shale into slate, sandstone into quartzite, coal into anthracite or graphite. The process is usually that of heat combined with chemical action, and is one involving increase in crystallization and hardness, and the other characteristics, which we observe as making the difference between an unaltered mud shale and a crystalline schist. The appearance of the one is dull and earthly, of the other, bright, sparkling, crystalline.

The first elevator bucket dredger operated in the Northwest was built at Bannack, Mont., on Grasshopper Creek, in 1895, by H. J. Reiling and others, and was named the F. T. Graves. It was rebuilt in 1896, and became a success in 1897.

THE GREAT LOWER SIMILKAMEEN.

COPPER MOUNTAIN may be considered the heart of what is properly known as the "great upper Similkameen country." The Similkameen river, as shown by the accompanying map, takes its rise south of the international boundary line, flowing pretty nearly due northward, a distance of 55 miles to Princeton in this province, where its waters are augmented by the inflow from the west of the Tullameen river; then sweeping round past Princeton it bends southward and eastward till it again crosses the boundary line, not many miles from where it flows into the Okanogan river in the State of Washington. Within this angle, and within a margin of 10 or 12 miles bordering it on the outside, having as its base the international boundary line, its apex Princeton, and its sides the Similkameen river, lies one of the richest mineral areas in British Columbia. But it is a district, although within 200 miles distant from the coast, less known to the general public than any other part of the province south of the Canadian Pacific Railway line. The cause of this, of course, is that it is off the beaten track of the travel between the coast and the great mining centres of the Kootenays, and also out of the way of people going via the Okanogan waters into the Boundary Country, now so rapidly coming into productive importance. But the Similkameen is not much longer to remain in the background for it has merits such as cannot be long overlooked, and which must soon induce the construction of a railway or railways which will furnish the only remaining essential for the rapid development of the great mineral lodes to be found here.

The little town of Keremos lies on the eastern bank of the Similkameen river, at the point where Keremos creek flows in from the north. There is a valley here a mile or more wide, affording a beautiful site for a town, with abundance of good water, and a country lending itself to the easy construction of roads in all directions.

About two and a-half miles up the Keremos creek from this point, Olalla creek joins the Keremos from the northwest, and some seven or eight miles up the latter creek and just over the divide westward to the Similkameen river, lies a group of eight mineral claims, known as Uniman's group, called after the discoverer's name. The group has now passed into the hands of Mr. Bullock-Webster.

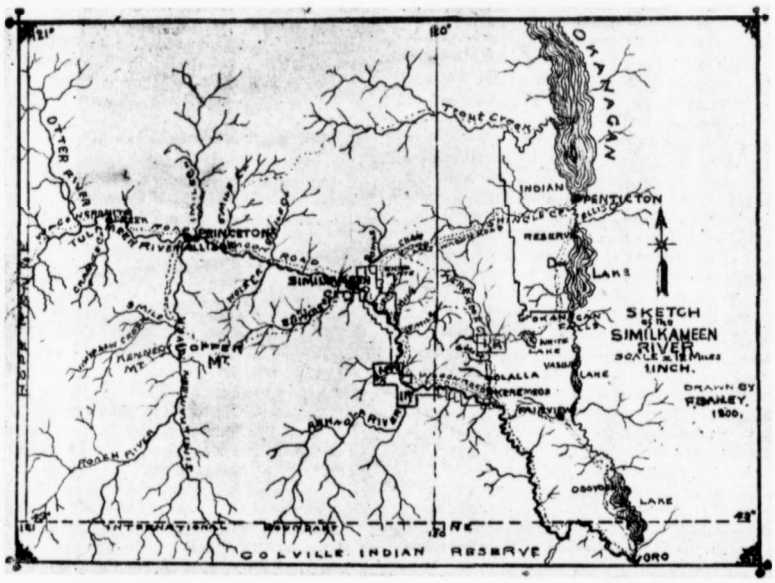
But before giving a description of the properties themselves, it will be interesting to detail something of the mining history of the whole district. The best known property in the district, and doubtless also the richest, so far as is shown by the development, is the Nickel Plate, in the basin of Twenty Mile creek (shown on the map) which flows into the Similkameen river, near where the townsite of Similkameen is located, some 15 miles south of Allison and about 19 or 20 miles northwest of Keremos. The Nickel Plate was first located as far back as 1886, but afterwards abandoned and re-located, I am told, several times. It was not, however, until two years ago that the property fell into the proper hands, Messrs. Arundell and Wollaston, both Victoria men, were the lucky re-stakers in the fall of 1898, and they were not long in finding a purchaser, for in December of the same year they bonded the property to the Marcus Daly Syndicate for a sum variously quoted at from $50,000 to $80,000.

The discovery of the Nickel Plate and its acquisition at so large a figure by such celebrated operators as the Daly people ot once precipated an activity in prospecting that has within a couple of years resulted in something over sixteen hundred claims being recorded within a radius not more than 15 miles in diameter. Nor was it certain that among lands that have so recently been taken up there are not numbers of other claims that development work will prove to be equally as rich as the Nickel Plate. Amongst other promising claims may be mentioned several owned by Mr. T. Bradshaw, who carries on a hotel for the convenience of travellers about three miles south of the point where Twenty Mile creek flows into the Similkameen; also a property owned and now being worked by a number of Italians. Every acre of the ground in this locality is staked and hundreds of prospectors are busy with their assessment work. The Daley people have some 50 or 60

claims, and are buying up as many of the more promising ones as are offering at reasonable figures. They have also secured extensive water rights on Twenty Mile creek, and ground for a smelter site. As is well known the surveyd line of the extension of the Columbia & Western Railway runs up the valley of the Similkameen on its course via Allison and Graveyard creek, onward to Spence's Bridge, so that when constructed the Twenty Mile mine owners will have a railway right at their door.

On the west side of the Similkameen river, opposite Twenty Mile creek, and for a considerable distance north and south, the same geological formation occurs as that which carries the mineral lodes on Twenty Mile. Two good sized creeks flow into the Similkameen from the west, namely, Sterling and Henry creeks. Quite a number of claims have been taken up, and the prospecting work that has been done shows extremely promising veins. The most notable claim is the Copper King, owned by Messrs. John Neil and C. A. Whiessiel, of Keremos. The workings show up two ledges, one of 20 feet wide and the other of 8 feet. The ore is chiefly arsenical iron, with copper sulphides showing through it. Numbers of assays show gold values ranging from $20 to $100 to the ton. The same owners have two claims adjoining the Copper King, on the upper side, the Independence and the I. X. L., through both of which the Copper King lead is easily traced. On Sterling creek the chief claims are the Golden Cup, Pride of the Mountain, Knockout, Bumblebee, Yellow Jacket and Humbolt. On Henry creek Messrs. Pollock and C. A. Whiessiel are the owners of several promising properties, the ore being of the same character as that described above. Sterling creek affords a fine water power, which will afford opportunities for extremely economical mining in this particular part of the district.

But to return to the valleys of the Keremos and Olalla creeks and to Mr. Bullock-Webster's property. This property lies just over the divide and on the slope toward the headwaters of Fifteen Mile creek. The location of the present workings is almost on the summit, and indeed the eight claims owned by Mr. Bullock-Webster spread clear over the height of land. The work done is on the Bushrat and Black Pine claims, the mineral lode running along the face of a fairly steep declivity, which is covered for the greater part with drift. The exposure shows the red oxide of iron. The oxides on the surface and for some depth, being crushed, show free gold in considerable quantities, which of course diminishes or completely give out when the solid ore is reached. A good deal of prospecting work has been done on this lode, enabling the owner to determine with some degree of accuracy the value of the ore, but not enough by any means to explore its extent. At one point a shaft has been sunk on the vein some 12 or 15 feet showing the ore on all sides and at the bottom. Some 250 feet east of this shaft a tunnel has been driven in about 60 feet cross-cutting the vein, and some 75 or 100 feet below another tunnel has been run cross-cutting at a still lower depth and discovering the ore in solid formation. The body of ore seems to lie up against a porphyry dyke, through which a number of rich stringers penetrate to the vein. These stringers in several places have been superficially followed in open cuts, revealing their direct trend toward the main lode. The ore is principally in the form of white or arsenical iron, flaked here and there with copper sulphide, which increases in quantity as depth is reached, a characteristic of nearly all the properties so far as development has shown in this region. It will not be surprising indeed if these mines, or the great majority of them, in their lower workings, should develop copper as the main constituent of value in the ore. The gangue of the lode is calcite or lime, thus affording a most important ingredient in smelting, and rendering the ore in fact self-fluxing. It is impossible to determine with any approximate degree of accuracy from the work at present done, the extent of this mineral lode, but enough has been shown to indicate, in connection with the surface croppings, and the hundreds of feet over which the trend of the vein can be traced, the possibility of an ore body of great magnitude and continuity. In a property of this kind it is almost useless to cite the results of assays, only in so far as they show the existence of valuable mineral. Assays of picked samples, particularly from the oxidized superficial rock, have returned gold values away up in the hundreds. In these samples the free gold is plainly apparent to the naked eye, and, as I have already said, portions if crushed and panned return gold in liberal quantities. A better and safer test is an assay of the ore taken from the bottom of the shaft or the ends of the tunnels, where it is found in the unaltered condition. These assays, made from as fair samples as possible return level values of from $3 to $60 in gold to the ton, with some silver. The situation of the vein and its dip affords admirable opportunities for economical mining. The declivity is steep, and a tunnel driven in at the foot would



strike the vein at perhaps 1,000 feet below where it outcrops, requiring only a minimum of dead work to reach the ore at that depth. There is abundance of timber handy, and in the transportation of ore there would be a down-hill haul all the way from the mine to the railroad which is surveyed to cross Fifteen Mile creek at the point of its confluence with Similkameen river, about 3 miles distant, giving a 25 per cent. grade. In the meantime the waggon road which is being built from the Nickel Plate to Penticton can be easily tapped, thus giving a cheap and ready avenue for the bringing of all necessary machinery for the development of the mine. The height of land a few hundred feet above where the work has been done overlooks the basis of Twenty Mile creek, the buildings and workings of the Nickel Plate being in sight only 2½ miles distant.

There are besides quite a number of claims on which prospectors have done more or less work, and it is marvellous to find ore seams of greater or lesser magnitude so generally dispersed through this camp. The conviction is crowded upon one's mind that here in the near future must be developed a mining camp unexcelled in importance and productiveness in the whole west. The area of country which outlined in beginning, is not as extensive as, say West Kootenay, nor as what is called the Boundary Country, but it is solid and compact and there is mineral everywhere. The statement is confidently made that ores of the gross value of $5 a ton can be mined and smelted in Boundary at a profit. If this be all correct, it can be done equally cheaply in the Similkameen, for here the conditions are equally favourable, and the gross values are very much higher than in the Boundary.

The town of Keremos is connected by an excellent waggon road 30 miles in length with Penticton at the southern extremity of Okanogan lake, over the waters of which a connection is made by steamer with the Shuswap branch of the Canadian Pacific Railway. About 2½ miles north of Keremos and Olalla creeks, a number of claims are being worked by the Keremos mining Syndicate, of whom Messrs. Morris and McDougall are among the chief members, and who are in charge of the workings on the ground. The geological formation hereabouts is principall diorite with considerable felsite and lime liberally disseminated. An area of about 2½ miles by 1½ miles wide contains the most important ore bodies. The ores of value are principally copper, the varieties being native copper, gray copper, copper glance, bornite, calcopyrite and antimonial copper, accompanied by small gold values, occasionally, however, as in case of the Dolphin claim, reaching as high as $80 to the ton. On the Something Good and Sunrise claims are small veins running well in free gold. The principal claims in the camp are the Bullion, Opulence, Flagstaff, Elkhorn, Copper King, Black Diamond, Dolphin, and Mt. Zion. The ledge outcrops on Bullion Mountain 1,200 feet above the valley with a surface width of 150 feet and upwards. Openings have been made on it for a length of 600 feet, and its continuity has been proven on adjacent claims for several thousand feet. The vein material is chiefly a lime fieldspar, strongly mineralized, copper sulphurides and some grey copper being freely disseminated, and also carrying several seams of high grade sulphides, assaying from 20 to 70 per cent. copper. A crosscut tunnel is now being run to tap this ore body at a depth of 700 feet. The tunnel is now in nearly 500 feet and when completed will be about 750 feet long. In the Flagstaff claim occurs a deposit or capping of magnetite having a surface area of several hundred feet in length and breadth. Running into this body and apparently dipping under it are several veins carrying high grade sulphides, while still higher up the mountain is a huge mass of felspathetic material, having a face 150 feet wide, the entire body of which is liberally sprinkled with bornite. This shows an assay value of $12 to $15 per ton. In the Opulence and El Dorado claims is a huge deposit of material in which native copper constitutes the value. This body lies between granitic and feldsytic formations and is nearly 400 feet wide, 200 feet of this lying within the Opulence claim and therein showing the richest ore, assaying all the way from 16 to 60 per cent. copper. Considerable copper glance accompanies the native copper. A shaft 45 feet deep and several pits and open cuts have been made, in all of which ore has been found. The El Dorado and Shamrock adjoin the Opulence, and have a considerable body of the same ore. The Elkhorn is situated on the west side of the valley, opposite the Bullion and appears to be its counterpart in surface indications, although the same large ore showings are not exposed at the surface. The Copper King, also situated on the west side, of the valley and high up the mountain, has a shaft sunk 35 feet all in ore of good quality. These ores are all self-fluxing, and the ledges can be tunnelled at good depths. Keremos and Olalla creeks furnish abundance of water for all uses, and the valley affords an ideal smelter site.

Seven miles northwest from Olalla at Fish creek begins the Upper Keremos valley, and extending westerly about six miles to the head waters of the creek at Riordan Mountain, bringing us back again to the headwaters of Twenty Mile and Fifteen Mile creeks, from the point of commencement, In the mountains on each side of the creek are a number of extensive ore bodies of good grade. The principal group of properties here are the Dividend, Green Mountain, Shamrock, Billy Goat, Penticton and many others. The two principal ore bodies on the Dividend group outcrop from 400 to 1,000 feet in length and from 20 to 40 feet in width, values averaging about $20 to the ton. The Green Mountain ledge outcrops for 600 feet in length and shows widths from 25 to 60 feet. Mr. John Neil is the owner of a claim here called the Grabstake, showing what looks like a big blow-out of iron, but possessing good values in both gold and copper. This upper Keremos valley is reached by trail from the main wagon road, thence through Keremos canyon (a narrow gorge 1,500 to 1,800 feet deep and 3½ miles long) to Fish lake, thence by trail to the northern extremity of the valley. A waggon road is now under construction over this route.

The annual output of gold has increased from $100,000,000 in 1873, to $320,000,000 last year. The consumption of gold in the arts is estimated at from $50,000,000 to $70,000,000 a year, and this would leave a rapidly increasing amount available for use as money. According to the estimates of the United States Mint Bureau, about $500,000,000 in gold was consumed in the arts during the decade from 1880 to 1890, and the world's production for the same period was $1,060,000,000. This would leave $560,000,000 available for addition to the world's supply of money.

In 1880 the United States mined of bituminous coal 41,000,000 tons, in 1899 it mined 198,000,000 tons. In 1879 the production of pig iron was less than 3,000,000 tons; in 1889 it was nearly 14,000,000 tons. In 1880 the United States had less than 11,000,000 cotton spindles; now there are over 18,000,000 spindles. The railroad mileage of 1880 was 92,147; at present there are over 190,000 miles of railroads. The production of cotton advanced from 5,700,000 bales in 1880 to 11,200,000 bales in 1898-99. In 1880 the toal amount of capital invested in manufacturies in the United States was $2,790,000,000; in 1890 is was $6,500,000,000, and the 1900 census will probably show a total of at least $10,000,000,000, with an increase in wages paid to factory hands from $947,000,000 in 1880 to probably over $3,500,000,000 in 1900.

The term horse-power, abbreviated to H. P. by universal agreement among the civilized nations means any power that will lift a weight of 33,000 pounds to the vertical height of one foot one minute; or that will lift a weight of one pound to the height of 33,000 feet in the same time; or that will lift one pound one foot in height during the one-thirty-three-thousandth part of a second.

The Engineer, of Cleveland, Ohio, says: "Probably one of the most interesting and modernized water power plants in America is that of the Quebec Railway, Light & Power Co., of Quebec, Canada, which utilizes the power of Montmorency Falls, seven miles east of the city.

NOTES ON THE WHITE HORSE COPPER BELT,* YUKON TERRITORY.

(By R. H. Stretch.)

THE Alaska, White Horse Copper Belt attracted a good deal of attention last autumn and the present spring, on account of the large size of some of the mineral outcrops and the richness in copper of the specimens taken from a number of claims, of which more than 200 have been located, including quite a number of the so-called concessions having an area of 160 acres each.

The writer visited the locality in May, 1899, and again in August and September, and made a more or less careful examination of some 40 locations, extending some 10 miles along the belt from north to south; and the views here expressed are a generalization of the information gathered at that time. It is evident that in many cases it would be unfair to the owners to specify the names of the claims on which certain facts were observed, so that such references will, as much as possible be avoided, as there is no intention to boom any particular property, or, on the other hand, to belittle merits.

These locations lie in the Yukon Territory, a few miles to the west of White Horse Rapids, in latitude 60 degrees, 40 minutes north, and longitude 135 degrees west; and are accessible by rail from Skagway to White Horse or Closeleigh, as the name appears on the earlier maps.

There is such widespread misconception of the true conditions surrounding mining in Alaska that it seems desirable to discuss the probabilities of successful mining.

First of all the mind must be disabused of the idea of perpetual snow and glacial cold, which has obtained through the wide distribution of pictures of the Chilkoot Pass, and those taken to show the difficulties of railroad construction in winter. The region is no further north than Stockholm and St. Petersburg in Europe, and the cold is no greater than in many portions of Canada and the Northern United States; or than in Siberia, where mining has been carried on for centuries.

At Skagway (lat 59 deg. 30 min. north) the snow line in February was 1,000 feet above sea level. In the region of the White Horse Mines in 1899, while the upper lakes were more or less covered with ice, the country was almost entirely free from snow by May 20th. There is, in fact, in this latitude, no more difficulty, so far as climate is concerned, in operating a mine at White Horse, than in Northern Michigan or British Columbia; and fully seven months can be counted on as available for the necessary out door preparations, with the advantage that for several of these months operations can go forward night as well as day without artificial light.

It is true that much of the gravelly land is frozen to considerable depths, but this is not universally the case, and the laws governing the condition do not seem to be well understood; but this feature is ameliorated by the denudation of the forest and the influx of sunshine, and would have little weight or influence on rock work. The work on the railroad showed that in the open air and working on a large scale the cost of rock work, including explosives, ranged from $1.40 to $2.40 per cubic yard, or about 87c to 1.40 per ton. These rates are fairly applicable to mining at White Horse, and may serve as a basis for computation. Labor was 30c an hour, and $1 per diem was charged for board. The passenger rate from Skagway to White Horse was $20, and the rate per ton on merchandise is 4c a pound on lots of 5 tons or over, and 4½c per pound on smaller quantities. To secure return freight, which is now practically nothing, the railroad offers a very liberal schedule on ore shipments. For ore in bulk under $50 per ton gross value, $8 per ton; under $100, $9; under $150, $10, and under $200 per ton $11 per ton; with a reduction of $1 per ton when sacked. So far as known at present there is no available coal in the region, and all supplies must be brought from the outside. To the above rates should be added a general average of about $8 per ton from the ports of Puget Sound to Skagway, and about $5 for the return voyage. Still further to foster the mining industry the railroad will, for the present, take charge of ore shipments to the outside smelters and collect transportation charges out of the returns, so that the prospector is at no expense, except those incident to mining, sacking and delivery to the nearest railroad station. So far as the writer knows no advantage has yet been taken of this offer.

It is not an easy country to explore. The entire inner country below the timber line may be described as forested, with the exception of some few open grassy slopes, which usually face the south and east and catch the maximum of sunshine. The timber is spruce and birch with cottonwoods on the swampier ground, or on deep gravel banks, through which the tree roots can easily penetrate in search of water. Much of the region is swampy and willow clad; and large forest areas are covered with thick moss, not unfrequently resting on frozen ground. Forest fires have devasted large areas, and though they have left the underlying rock surface visible, the resulting windfalls have made travelling very laborious. To make an examination of the rock structure is still more difficult, a second growth of small spruce and willows has frequently sprung up in the more ancient windfalls. The rock exposures are comparatively few, and to accurately trace and prove an outcrop of ore is a slow and tedious operation.

The topographical features are simple, a wide river and high mountain range running parallel to each other in a northwesterly direction, with a rolling plateau between them, ranging from 2,300 to 2,600 feet above sea level. In this portion of its course, the Yukon river flows between abrupt banks of gravel, sand and silt, which rise to 150 to 250 or even 300 feet with occasional rock outcrops. The absence of heavy rainfall is shown by the smooth slopes of these bluffs, which stand at an angle of 40 degress. It is only the bedded silts which weather into castellated forms. On the river the rock outcrops consist chiefly of the old, reddish, coarse-grained basalts of the Miller Canyon and White Horse Rapids, and these are overlaid by the gravels. On reaching the crest of these bluffs the plateau from 3 to 5 miles wide, extends to the base of the mountain, with a rolling surface and low hills, and a gentle gradient to the northward. This plateau is intersected by a number of small streams (connecting numerous shallow, marshy lakes) which have a general northwest trend, parallel to the mountains, and while traversing wide shallow valleys near their sources, enter the main river through deep V-shaped gorges. Long, low ridges of gravel, containing erratic boulders of the old basalts and other rocks found only to the southward have a similar general parallelism. All these features suggest an ice-worn surface where the general motion was to the north and west; a cross-section of which reveals a series of swampy valleys cut down to the underlying bedrock, with morainal deposit along each side; while between each pair of moraines we find a somewhat higher backbone of rock.

In general terms it would seem that as the ice cap which formed the immense gravel banks along the main river, gradually thinned, the higher rock ridges finally divided the cap into a number of parallel glacial streams, each one of which was employed in cutting its own channel deeper, and depositing laterial moraines; while the resultant streams continued the process, as the interior lakes were drained of their contents. The progress is beautifully shown by the numerous terraces which extend from Bennet Lake to Selkirk, at altitudes up to 400 or 500 feet.

It is on this plateau that ore has been found in a narrow strip following the base of the mountain range and the western edge of the heavy gravel banks, which cover the rocks along the river. The mountains are essentially limestone, with bold escarpments, resting on a granitic foundation, which forms the floor of the plateau as far south as Mount Goldenhorn, which is principally composed of eruptive rocks, and appears to have been the source of the Miles Canyon basalt, as erratic blocks of this rock extend for some miles to the northward, gradually diminishing in size and frequency. The older granites in this floor are cut by many felsitic and porphyritic dikes, but the tangle of vegetation, moss and dead timber makes the tracing of them for any distance impossible. It would seem that many of them must be older than the limestones, as but few instances are found in which they cut the latter. The best instances are at the Little Chief group, where

*Engineering and Mining Journal.

dark blue limestones contrast strongly with a 2-ft seam of felsite, and diabasic rocks are found interbedded in crystalline lime. On the plateau the limestones have been very largely removed, occurring now—as patches varying in size from a few feet across to 600 or 700 ft. in length. It will thus be seen that the geology is very simple. While there are obscure traces of faulting in the presence of sheeted lines, such dislocations are difficult to prove on account of the uniformity of rock structure, and the only evidence of recent volcanic or chemical activity observed is a small cold spring on the Miller Group, which furnishes an acidulated water, but makes no deposit of lime or gelatinous silica. In general terms, there is presented a wide area of lime granite contact, with nearly all the lime eroded from the plateau, and with but small evidence of the penetration of the limestones by intrusive dikes on a large scale. Probably the largest of such bodies is found on the Miller Group.

The ore occurs either at the line of contact of the two rocks or in seams of varying size, penetrating the underlying granites, and it is the extensive erosion of the limestones which has revealed it. Only in a very small number of cases, as at the Little Chief, was ore found penetrating the limestones, and then it accompanied an intrusive granitic tongue, which appeared to be the ore carrier, being largely replaced by magnetite.

Two distinctive classes of ore are present and their occurrence is quite different. We have large masses of specular or magnetic iron, as at the Pueblo, where it is hematite, or at the Little Chief, where magnetite prevails, both carrying a moderate tenor of copper; or outcrops of much smaller dimensions in which the ore is essentially bornite, with occasional patches of chalcopyrite and green copper carbonates, in the condition of sand, or disintegrated granular limestone stained with copper. Azurite is rare; chalcocite and black oxide occur sparingly, but native copper seems to be absent as well as the red oxide. The typical ore is bornite. These outcrops are scattered all over the plateau, and denuded in the general erosion. They are found resting on the granite with no line in the vicinity, or associated with the patches of lime which still remain; and their discovery in the dense tangle is largely a matter of accident, even to the careful searcher.

Many of these outcrops prove to be connected with a series of more or less east and west seams, penetrating the granites, some of which may produce considerable ore when explored, but the writer saw no evidence of massive vein structure to support the popular theory of a great north and south lode. This idea has probably arisen from the fact that in some cases the stream has cut a deep gorge in the granite below the line of contact, which now shows, with its accompanying ore, as two slightly divergent lines, on either side of the stream gorge. At one or two points, where there are apparently dioritic intrusive masses, the lime contact stands much steeper than the usual angle, and these form desirable points for exploration.

From what can be seen it is, therefore, probable that at one time there existed a number of large masses of iron ore, occupying by replacement cavities in the limestone; that these ores leached of a portion of their copper contents; the latter metal being precipitated on the lower granite contact, forming more or less extensive beds of high grade, oxidized ore; and that the percolation continued downward into the granites where the same had been sufficiently sheeted to allow of such a process. Traces of such precolation were seen fully 200 ft. below the general level of the plateau. All the phenomena presented can be thus explained. That the entire contact was not thus enriched is, however, evidenced by the occurrence of pockets of simple granular magnetite, lying directly on the granite; while in the same vicinity may be found little bunches and stringers of bornite in the magnetite, and not far away good bornite uncontaminated with the magnetic iron; but all such localities show the action of chemical agencies, by the modification of the granite surface, and the formation of epidote, lime-garnets and other lime-iron minerals in abundance as well as the hydration of the micas. The granite seams show crystallized quartz penetrating the ore, a feature which is absent from the larger iron masses. For the reasons just set forth the exploration of the contact beneath the large mass of the Pueblo (the outcrop of which has a visible area of 14,300 sq. ft. in the shape of a huge letter T will be an interesting study. The writer started a shaft in the lowest depression of the outcrop in the hope of proving this probable enrichment with depth, but unfortunately there proved at this point to be a narrow gully filled with surface wash, although ore cropped within 10 ft. on either side, and as this was all frozen ground, the work was stopped at a depth of about 10 ft. Yet more interesting will be the discovery of some point where the contact can be followed by a tunnel into the mountains on the west, where the ore bodies have been protected from destruction, as, from the present extensive iron staining of the surface, at one or two points, which there was no time to examine the presence of other iron masses is possible. In the portion of the belt known to the writer, the best locality for such exploration is on the Anaconda Claim, where the floor of the valley is granitic and massive limestones occur on the east, owing to the gradual depression of the granite floor of the plateau from south to north, and quite likely to the presence of faulting, as the ore at this point stands nearly vertical, an exception to the general rule.

While gold seems to be constantly present, and high assays are said to have been obtained, it was not the writer's good luck to obtain more than quite moderate amounts. A comparison of the bornite assays (from 100-lb samples quartered down to 10 lbs.) seems to indicate the presence of silver to the extent of about ¼ oz. to the unit of copper. Zinc, arsenic, lead and antimony are notably absent, the only other mineral present being occasional flakes of molybdenite, which is also a common accompaniment of granitic contact in the State of Washington. The iron ores show about 45 per cent. metallic iron in a gangue of lime and silica, and such ores should produce an excellent grade of copper.

The district is well watered. There is excellent mining timber in abundance, but fuel for reduction purposes must be brought from the outside or consist of domestic charcoal made from spruce timber. Labor for a time will probably be high owing to the difficulty of keeping good men, but the actual cost of living, with freight rates less than 5c per lb., should not be more than 25c per diem over Seattle prices. Good men on steady underground work will probably command from $4 to $5 per diem, and outside help from $3 to $3.50, as the rates paid on the railroad are about 30c. an hour for common laborers, ranging upward to 55c for higher grades of service.

For some time at least but little mining machinery will be required, as much ore can be collected from the rich surface outcrops and the larger iron bodies are practically quarries, until the output has reached 100,000 tons. It is probable that these latter will require treatment on the ground; the cleaner bornite ores can be hand-sorted up to 30 per cent. and shipped, but the remainder will require dressing up to a fair grade to counterbalance the high cost of suitable fuel.

In every foreign enterprise of an electrical nature which has been invested with British capital, there has been more or less (and generally more) machinery from the United States. The production and selling price of all electrical equipments for both railways, power stations and lighting plants is said to be less costly in the United States than in England, and while, on account of national pride, not many municipal contracts are given by British authorities to American industries, the British engineers, realizing the importance of combining the best possible service with the least expense, where such a thing is possible, turn the contracts over to American bidders, who have been uniformly successful.

A plant for the recovery of gold by electric dredging process has recently been installed in Victoria, Australia. The plant consists of a 500-kilowatt, two-phase alternator from which current is transmitted overhead to two barges about half a mile away, each barge containing a 50-horse power motor for its hydraulic pumps. The pumps are driven by the motors through friction clutches and a rope drive.

THE LATE MR. W. McL. MacKINNON.

WILLIAM McLeod MacKINNON, the news of whose death has been cabled from Western Australia, possessed a personality that no community could lose without a sense of its loss, and a keen feeling of regret.

Educated at one of the large English Public Schools (Haileybury) he evinced a natural taste for drawing and etching, a talent that was in part answerable for the choice of Civil engineering as a profession in which his clever draftmanship would find him fair scope.

After a finished training under some of the best known men of the day, he very successfully carried through some considerable engineering works, always making a special study of hydraulics.

So highly were his abilities rated, that after the Tay Bridge disaster, McLeod MacKinnon, still a youth, was chosen to make a report for the Board of Trade enquiry.

Shortly after this he went out to Australia, accepting the offer of the post of consulting engineer to the government of Queensland.

An energetic and untiring worker he travelled through that large colony, in the northern districts of which numerous fine artesian wells testify to his work and skill. The hardships of a pioneer life in a tropical climate began, however, to tell on his naturally fine constitution and he reluctantly resigned his position, returning to England.

Attracted by the probable necessity for large engineering works in the new country of the far west, and by the glowing accounts of the climate and resources of B.C., McLeod MacKinnon determined to try his fortunes in Vancouver.

During the eight years of his life in B. C., he made a reputation for himself, not only as a thoroughly painstaking and clever engineer, but also as an upright and courteous gentleman.

Realizing that the future prosperity of B.C. depends on the successful development of its mineral deposits, Mr. MacKinnon turned all his energies in this direction, and months of every year were spent in the far outlying districts—especially the Cariboo, Omineca and Upper Skeena—prospecting and making geological surveys of the country.

Many old-timers in the most lonely parts of B. C., will hear with regret of the untimely death of the reserved but ever kindly, hospitable man, who shared camp fare and fire with them.

Armed with a knowledge of British Columbia and its resources, such as few men possess, he made two trips to Australia, in the hope of interesting capitalists and mining men there in the prospects of mining, and more especially gold-dredging in this province. The immediate success of his last trip, undertaken in the winter of 1899, was prevented by the outbreak of war; and the offer of a good appointment as engineer of the "Lake View Consols" tempted him to leave B. C. for a time. Reaching Kalgoorlie last September, Mr. MacKinnon had held his appointment but a few months, when death cut short his life.

Recent letters described the work of his new appointment, but at the same time spoke of his determination to return to British Columbia, and of his longing for the cool climate and the delicious Capilano water. A generous and loyal friend, a man of honour and spotless reputation, to the few who knew him intimately and in private life his death has brought a sense of irreparable loss.

Out of a total area of 382,500 sugare miles in British Columbia 285,554 square miles are forest lands, the percentage being 74.69. In Ontario the percentage is 46.49; in Quebec 51.22. Canada possesses 163 acres of forest per head of the population. No other country in the world possesses 10 acres per head.

The Clogan mine, situated at Barmouth, in North Wales, is a gold mine which has been working for 63 years. The ore averages about one ounce to the ton.

CORRESPONDENCE.

(The Editor does not hold himself responsible for opinions expressed by correspondents.)

THE CROW'S NEST PASS COAL CO. AND ITS NEW ALLIES.

(To the Editor, The B. C. Mining Record.)

SIR:—Since your last issue the dispute between this company and the Canadian Pacific Railway Co., has entered upon another phase, and notice of application, both to the Federal and Provincial Parliaments has been made for a charter to build a railway from some point on the Great Northern in the neighbourhood of Jennings or Kalispel into the Crow's Nest coal field, and northwards throughout the Pass with a diversion by way of Fort Steele and Golden, to some point on the main line of the C. P. R. The notice to the Federal Parliament has been given by Messrs. Gemmell & May of Ottawa: the head of the firm having been a director of the Coal Company from its inception, and before that a director of the British Columbia Southern Railway Company. From the public interviews held with various representatives of the Coal Company and the explicit statements, which they have made, there is no doubt that they are backing these applications, and the matter cannot fairly be considered upon its merits apart from their interest in the result of the applications. It may, therefore, be well to look at the matter from a disinterested standpoint, and to see whether it is in the interests of the province to allow an American railroad to build into east Kootenay, and incidentally to ascertain whether the Coal Company, which is practically the interested party in seeking for a charter, have so discharged their statutory obligations under their own charter received from the Dominion Government in 1895, as to entitle them to succeed in the present application.

First as to whether the interests of the province would be served if a railway were built as desired. Upon this point it would seem that the residents of British Columbia are themselves the best judges, certainly so far as the provincial interests, which might assume national importance, it is conceivable that under certain circumstances these should be allowed to over-ride mere local interests, but the cause would have to be one of the highest importance and one in respect of which there would be practically a unanimous concensus of opinion. In the present instance the expression of opinion in the west has been unanimously in opposition to the proposal. Public men, mining men and commercial men all agree that it would be a fatal mistake to give the American railway a footing in East Kootenay. The arguments adduced in support of this contention are few but forcible.. The principal one is that put forward by the mine and smelter owners, and is based upon the fact that the American Smelting and Refining Company's action in refusing to make lead purchases from British Columbia, coupled with the fact that the powerful financiers with whom Mr. J. Hill is associated, control that Trust, is evidence of their intention to cripple the British Columbia mining and smelting industry. So serious is the outlook for the silver-lead mines that arrangements have already been concluded to transport this ore by rail all across the continent to Montreal, and ship it from that port to the European market next season. This, of course, applies to the surplus which cannot be treated by the British Columbia smelters. There is a further point that if the Great Northern were able to furnish the American Smelting and Refining Company with an unlimited supply of Crow's Nest coke at a low rate,—the American smelters could outbid British Columbia smelters for local ore, and so strike a serious blow at this important industry. There is a further objection, which the managing director of the coal company declares will be of short duration, but nevertheless has to be reckoned with as a factor, and that is that up to date British Columbia consumers have not been able to obtain the quantity of fuel required. Especially is this true of coke and though no doubt the future will see an increase in production, it all

takes time and at the rate of progress, which has recently characterised the Crow's Nest Pass Coal Company, it will be some years before they overtake the requirements of the province. In 1898 they began to build coke ovens and completed fifty. It was at that time given out by the press by the managing director that it had been decided to build 500 ovens as quickly as possible. The following year about one hundred were brought into use, and last year one hundred and sixty-two, making a total of three hundred and twelve in operation, at the present time. If has taken three years to build this number and if the rate of progress is not accelerated, it will be a long time before the company will have any margin of coke to spare for outside consumers, and for that reason among others they should not be furnished with facilities to divert it elsewhere. The more, however, we look into the project the more evident it becomes that the charter for building these railways is being sought solely in the interests of the Crow's Nest Pass Coal Company and their new allies. It is admitted that Mr. Hill has acquired a large interest in the Company. It was officialy stated that he had purchased ten thousand shares and was to secure twenty thousand of the new allotment. Since this it is reported that a large block of stock has been placed on option to Mr. Hill's associates, which would give him a total holding of 40 per cent. of the stock, and as was shrewdly remarked by a leading public man the other day, it is not unlikely that a combination of capitalists, including Morgan, Rockfeller and Hill would be content with four-tenths of the interest. An organ which is friendly to the Cox-Jaffray interests, and which usually takes its lead from the Toronto Globe sees in all this nothing but a joke and calls Mr. Hill the bogey-man. In an editorial this paper asks: "If some day or other the Great Northern, the Northern Pacific and the Canadian Pacific might be brought within combination, what would be the result? Would Canada be wiped off the map? Would Canada be justified in protesting against American control of Canadian railways on the ground that it might be used to build up American commerce?" Evidently the writer of this article has already received a little of the inspiration which is popularly supposed to actuate the policy of the "Globe" and forsees in the not distant future such a combination as he mentions. We leave it to Canadians to answer these questions and if we mistake not, there will be little difference of opinion as to what the answer will be, neither will there be any lack of determination in resisting the first steps of a policy which is likely to produce such a result. The fact that it is advocated in the interests of men who, as shown in our last issue, have by political "pull" secured a property, which they themselves have valued at $20,000,000 and are now seeking, regardless of Canadian interests and in blissful ignorance of any sense of obligation for the unparalleled advantages they secured, to carry through a scheme, the sole object of which is further to enrich themselves and raise the value of their stock, will certainly not be any recommendation in the eyes of Canadians, but will rather appear to be the strongest reason why the project should be defeated if it be not withdrawn. As was said in your last issue the onus of proving the necessity or the advantage to Canada of these railways rests upon the promoters, but so far nothing has been put forth to show that any interest would be served but the interest of the corporation, which has already been enriched by this country "beyond the dreams of avarice."

This brings us to a consideration of the other part of the proposition as to how the Crow's Nest Pass Coal Company has discharged its statutory obligations, and whether even if the country came to the conclusion that we could afford to add to their millions, they have so dealt with their previous obligations as to lead to the conclusion that their record for carrying out agreements is a good one. The first and most important consideration, which influenced the government of the day to grant the charter was that the coal areas should be developed as rapidly as possible, in order to satisfy the requirements of the province, and especially to aid in the development of its mining and smelting industries. On the subject of the rapidity of development it is not necessary to say much, because great allowance must be made for the initial difficulties in opening up coal mines in an entirely new and difficult district. As to whether at the end of five years from the date of the charter being granted and nearly three years from the date of the railway reaching the mines an output of 1,200 tons a day from several mines is to be considered a satisfactory development, we leave to your readers to judge. In this connection it is noticeable how very slow has been the increase of tonnage during the last year. We find from the record that on December 21st 1899, the output had reached a maximum of seven hundred tons a day, and in the year which has since transpired it has only been increased five hundred tons. If, however, the whole of this product had been reserved for use in the province it would not have been so bad. We find, however, that a considerable percentage has gone chiefly in the shape of coke into the United States, and quite recently according to the admission of the present managing director a large contract for coal has been made with Mr. Hill. True it is explained that the obligation to fill this contract is contingent upon further development of the mines and first of all satisfying British Columbia requirements, but in view of the fact that at the present time the company is so far behind the requirements of the province, it does seem premature to mortgage their future output, and that is what such an arrangement amounts to.

There is, however, a much more serious charge which can be sustained against this company, and it is that they have frequently violated the clause in their contract by which they are limited to a maximum selling price of $2.00 per ton for coal free on board cars at the mines. This was claimed by the government to be one of the most important provisions for the protection of the consumers, and in putting the price at this figure they were dealing more than generously with the company as was shown in your last issue, because it practically ensured them a permanent profit of at least $1.00 per ton. Not content, however, with this the company commenced by selling on every hand at higher prices, varying from $2.50 to $5.00. It is true the highest figure was for blacksmith coal, done up in sacks, which no doubt entitled them to charge a higher price, but after making the most liberal allowance for the extra cost thus incurred, it must be admitted that $5.00 was a ridiculous figure. $3.00 would have been ample. No sooner were these high charges made than remonstrances were addressed to the company from all directions by consumers, who knew well just what their obligations were under the charter, and the result was, that wherever the customer knew enough to protest the price was reduced. I have, however been furnished with invoices showing that in parts of the province and in Alberta, prices ranging from $2,25 to $3.00 have been charged for coal, and in some instances this figure was charged to smelters, which used raw coal for fuel purposes. It may be argued, although I join issue on the point, that it was intended that the Coal Company should supply "run of mine" coal at $2.00 but that screened coal might fairly be charged at a higher price. This will not hold water because in the first place the difference in cost between screened coal and "run of mine" coal passed down a chute instead of over a screen does not exceed two cents a ton, including interest on the additional outlay necessary; but when we further remember that the coal dust is just as valuable and more convenient for coking purposes than the large coal, it will be seen that it is a positive advantage to the company to screen the coal. This has enabled them so far to carry on their operations without having to resort to the erection of a costly plant for breaking and crushing purposes as is commonly required in the States. It is therefore perfectly clear that the company has not the slightest pretext, even if they had a right to charge one cent more than $2.00 per ton at the mine for raw coal, and whatever they may say in their defence it is an undoubted fact, and one which should weigh heavily against them, in connection with any future legislation they may seek, that they have extorted from the consumers of the west a higher figure than they are entitled to under their charter.

The extortation, however, is much heavier and much more serious in respect of coke than coal, and I venture to think that the condemnation should be proportionally heavy, because while the raw coal was distributed throughout the west for many different purposes, the whole of the coke was required for the express purpose of enabling British Columbia smelters

to reduce their charges and so develop the mining industry of the province. This fact has been made much of on every possible occasion, not only by the members of the government but by the directors of the coal company and there is no doubt that the government has always believed that they were securing for the province a great boon, and one which was being granted to the full in accordance with the requirements of the charter. No greater mistake was ever made. The government has been completely hoodwinked, and all the while that the directors of the company have been taking credit for reducing the smelting charges, they have been exceeding the price at which they had a right to sell the coke to the smelters by at least $1.00 per ton., It cannot for a moment be argued that there should be any difference in the principle governing the selling price of coal, whether it went away as raw coal or coke, indeed having regard to the importance of the smelting industry, which was more than anything else the raison d' etre of the Crow's Nest Pass legislation, if any difference at all were to be made it should certainly have been in favour of coke. But what do we find? That with the single exception of the Trail smelter, in respect of which there was some special agreement with the Canadian Pacific Railway Company, the smelters of British Columbia have been paying from the first $5.00 per ton for coke, free on cars at the ovens. Now what does it cost to produce this coke, allowing the company their price of $2.00 per ton for the raw coal which goes to make it:

1½ tons of coal at $2.00	$3.00
Cost of hauling, charging, burning, drawing and loading	50
Interest on capital outlay required for erection of ovens	50
Total	$4.00

This allows $800.00 per ton for construction and $800.00 per oven for railway, trestle, bin, and motive power, outlay being capitalized at 10 per cent, surely a more than liberal estimate. Upon what basis then does this company defend its action in charging $5.00 per ton for coke. The question of cost in producing the coal has no bearing on the matter, because they are limited to $2.00 as the charges that can be brought against them, but in spite both of their obligations and their protestations they have been deliberately exacting this enormous price from consumers, who were struggling to establish a new industry. Whilst not for a moment arguing that western prices can compare with eastern, it is evident that this figure is out of all proportion to what is reasonable, when it is known that contracts for Connellsville coke, produced under similar physical conditions and used for the same purpose, are now being made at $1.75 at the ovens, a figure which only allows 80 cents for the raw coal and 55 cents for manufacturing, interest on capital, outlay profit and every other charge.

The third and last matter upon which the country will certainly require some explanation is possibly the most serious of all, and is certainly so if we regard its ultimate result, because there is little doubt that the company can be compelled to live up to their contract in respect of selling price and probably to reimburse the amount illegally over-charged. But whether or not they can be compelled to retreat from coal areas, which they have occupied in breach of their charter to the detriment of the country is another matter and at any rate a much more difficult one to deal with. On referring to the Act of Parliament under which they were granted a charter, 60 to 61 Victoria, Chapter 5, under section I, we find the following clause, "That if the company or any other company with whom it shall have any other arrangement on the subject shall, by constructing the said railway on any part of it as stipulated for in the said agreement, become entitled to and shall get any lands as a subsidy from the Government of British Columbia, which in the opinion of the director of the geological Survey of Canada (expressed in writing) are coal bearing lands, then the company will cause to be conveyed to the Crown, in the interest of Canada a portion thereof, to the extent of fifty thousand acres, the same to be of equal value per acre as coal lands, with the residue of such lands, the said fifty thousand acres to be selected by the government in such fair and equitable manner as may be determined by the Governor-in-Council for the purpose of securing a sufficient and suitable supply of coal to the public at reasonable prices, not exceeding $2.00 per ton of 2,000 pounds, free on board cars at the mines." In due course, as a matter of fact in 1899, the Crow's Nest Pass Coal Company did receive a grant of coal lands estimated at 250,000 acres, and they also acquired in connection with the same deal, 10,000 acres of freehold coal lands, the property of the British Columbia Southern Railway Company. These latter had been most carefully selected by someone who had made a survey of the property and was thoroughly awake as to the important stragetic positions. I have before me a map of these areas, showing the exact location of the 10,000 acres, and I notice that they cover access to the coal areas on Morrissey creek, Coal creek, and Martin creek. Now to make clear to your readers the importance of this point it is only necessary to remind them that the geological formation of the Crow's Nest Pass Coal Field is such, that the seams can only be advantageously approached in the creeks, which gully their way through the mountains and flow down to the rivers. Along these creeks the mountain sides have been eroded and the outcrops of the coal are easily accessible, elsewhere, that is along the mountain sides the outcrops are as high up as 3,000, 4,000 and in one instance nearly 5,000 feet, and it is not economically possible to work them in that position. One cannot blame the Coal Company for looking after their interests, nor can they be blamed for the fact that their predecessors had so judiciously selected the 10,000 acres of freehold, but it is clear that under the clause cited there was a "bona fide" intention on the part of the government, to which the Coal Company agreed, to cede 50,000 acres of coal lands, such portions ceded to be of equal value in every respect to the residue. Now this equal value could not merely mean equal value as to the quality of the coal or even as to its continuity and regular occurrence of the seams, it must also to be reasonable have equal facility of access and convenient position for working. However good the quality of the coal might be and however large the area, if the 50,000 acres were located at an elevation of from 3,000 to 5,000 feet, with no level land around for surface workings, they could hardly be considered of "equal value" to the residue of the property which could be approached by simply walking up a creek and commencing to work upon a coal seam without the slightest delay or expense. In addition to the three creeks already mentioned there is only one other which comes within this denomination—Michael creek, and down this the main line of the Crow's Nest Railway passes. Upon this creek the coal company had no areas and obviously as the most favourable outcrops were known to exist here, it would seem to be not merely the most reasonable, but as a matter of fact the only position where the government areas could be selected in a spirit of compliance with the clause of the agreement. What has happened? Have the areas been so selected? Does the government find itself to-day in possession of 50,000 acres of coal lands of equal value to the residue and with easy access from Michel, or any other Creek? No, up to date the government has no coal areas. The five years since the passing of the Act and the two years since the earning of the land grant have not been sufficient apparently for the necessary steps to be taken to pre-empt these areas, but they have been sufficient for the coal company, in its patriotic zeal for the welfare of Canada, and Canadian industries, to carefully prospect the whole of the coal areas and to seize upon this last remaining stragetic position; whether with the consent of the government I know not, I cannot believe it. They have taken possession of two square miles in the lower part of Michel creek, which entirely cover the surface outcrops of coal on this creek and have commenced mining operations on each side of the railway. This action, if permitted, excludes the government from securing any location on Michel creek which gives them direct access to the coal areas, and I feel sure that they will be so advised by any competent expert whom they may consult.

I forbear to say more as to the action of the coal company in terms in which such action deserves to be reprobated, I am simply concerned in setting forth what I believe to be a fair statement of what has actually been done and of its obvious effect upon the interests of the country; and I venture to think that a "prima facie" case has been made out for an investigation. It should be prompt and thorough and should

precede the consideration of any application for further privileges, whether railway or mining, sought by any parties, who are allied with a concern which has shown itself so regardless of the welfare of the country and of their clearly specified legal obligations. Yours faithfully, B.

An interesting plan introducing important "Improvements in Apparatus for Supplying Furnaces with Pulverulent Fuel" has been called to notice. The arrangement was introduced by H. Buderus Hirzenhain of the Grand Duchy of Hesse and relates to the class of furnaces in which coal dust or other pulverulent fuel is forced into the combustion chamber by injected air. The object of the invention is to secure an intimate mixture of fuel and air before the fuel is forced by the air issuing from the compressed air pipe or nozzle into the combustion chamber and prior to the admission of a further supply of air. The fuel in a finely-divided condition is driven downwards by a device consisting of a wheel provided with blades or vanes. At the back of the fuel hopper there is a channel which communicates with the atmosphere and the lower end of which opens into the air-blast chamber tangentially to the device here described. Compressed air is forced through the nozzle. By reason of the suction exercised at the nozzle air is drawn in through the channel and mixes thoroughly with the fuel as it is fed forward. In the rear of the nozzle a pipe leads from an air heater and opens into the pipe or channel in which the nozzle is situated, so that in consequence of the vacuum created by the nozzle hot air may be caused to pass into the mixture of fuel and air. The pipe leading from the air heater is fitted with a valve to regulate the quantity of hot air thus admitted.

The average rate for land transportation paid in Great Britain is more than 2¼ cents a ton mile. The average on the continent, outside of Russia, is from 2 to 2.1 cents per ton mile. In Russia it is about 1.8 cents. In the United States about 7 mills is the average rate, or less than one-third of the average rate charged throughout Europe.

In the last few years the use of compressed air as a motive power for machinery has wonderfully increased, especially for portable tools, and this is mainly due to advantages over steam, the principal of which are:

First. Stability, or, in other words, non-condensation, permitting it to be stored indefinitely, or to be transported long distances without loss of pressure, other than due to leakage and friction of the conduit.

Second. Low temperature at which it can be used in hand tools. Such tools could be run by steam, but they would become so hot that a man could not hold them in the naked hand.

Third. The exhaust consists of fresh cool air, adding to the ventilation and comfort of the workroom or mine, whereas the exhaust from steam motors has to be disposed of outside, and is a nuisance, and with hydraulic systems, the waste water must be carried away in pipes.

Fourth. It can be used at any pressure and is easily produced, and its expansive qualities, while not on a par with steam, owing to the absence of heat, yet can be utilized with good results, a feature entirely absent in hydraulic systems.

Against these advantages are opposed some few disadvantages, such as the losses of power in the compression of air, due to the absorption of energy in the generation of heat, and the subsequent loss of pressure in the compressed air, as it cools down to the temperature of the surrounding atmosphere. The losses of the steam end of the compressor are similar to those of any steam engine.

The absorption of heat from surrounding media, caused by the sudden expansion of compressed air, often to such an extent as to freeze any moisture in the air or immediate neighborhood, will often prevent the use of high pressure air extensively unless the air be reheated. This reheating of compressed air can be done at very small fuel cost for the benefits attained, and is used in many places.

THE MONTH'S MINING.

SLOCAN.

(From Our Own Correspondent.)

THE last month has witnessed an almost alarming change in the smelting conditions as applied to this district. Apparently the worst has happened, for both the American and local smelters have raised the rates considerably on the product of some mines and refused steadily to bid at all for that of others. With the market thus practically cut off, even temporarily, and the prospects of reduced profits or in many cases an absolute loss staring them in the face, it is not surprising that many of the better known mines are already closed down or seriously contemplating such a step. The reason for this action on the part of the smelters admits of various explanations, the most probable, and the one which seems to find general acceptance, being that it is an attempt on the part of the powerful American combine to secure entire control of the British Columbia industry by freezing out the Canadian concerns, and then diverting production to their own works. When we recollect that it is not so very long since these conditions actually existed and that even now it is simply a matter of cutting off the fuel supply, an attempt at which is now being made on behalf of the trust, to revert back to the old state of affairs, the practical feasibility of the scheme is amply demonstrated. It is due perhaps to the smelters to state that their explanation of the cause of the difficulty has at least some foundation in fact, it being argued by them that on account of warlike operations in China and other disturbing influences the supply of lead is now largely in excess of the demand and consequently they are just at present greatly overstocked with this commodity.

It is difficult, of course, to forecast accurately the eventual outcome, but it may be said with certainty that in the present condition of affairs, a continuation of the discouragements of the past will not only effectually prevent fresh capital from seeking investment in the silver-lead industry, but will result in an almost entire suspension of operations now carried on with such difficulty.

One might almost imagine that had it been pre-ordained that the mines of the Slocan, the richest in the whole province, should bear the brunt of all the disasters with which it is possible to inflict a budding mining industry. What with the fall in the price of silver, the diversion of capital to Rossland and the Klondike, just when a successful start was being made, the increased duty on lead, the eight hour law, the two per cent tax on ore, the miners' strike, and added to an already ridiculously high freight and treatment charge the present smelter difficulty, it speaks volumes for the district that it has been able to pull through at all. It is well to remember, however, that the last straw breaks the camel's back, and if something is not done, and that soon, to alleviate the present burdensome conditions under which mining is here carried on, the province may awake some morning to the consciousness that the silver-lead mining has ceased to exist as a factor in the prosperity of the country.

Those who have followed my articles in the "Record" from month to month will know that least of all am I a pessimist, but when plain facts which cannot be controverted are staring us right in the face, no useful object is to be served by apologizing and mincing matters.

The Slocan is all right; it has the mineral and it has the men to mine it, but it must also have fair treatment at the hands of outsiders, or the dreams in which we have been indulging, for years past, will never be realized.

A word to the wise is sufficient, and if the smelters refuse to take warning in time they will find when it is too late that they have killed the goose which lays the silver egg, to vary the simile somewhat.

REVELSTOKE.

(From Our Own Correspondent.)

There is very little to report from this district this month;

the Big Bend is practically idle, excepting for a small force engaged on the Standard Basin claims, and a few individual prospectors who are putting in the winter doing such assessment work as they can. Next summer it is expected that with the assistance of the Provincial Government, something like adequate transportation facilities to this locality will be arranged for, at any rate the minister who attends to such matters has expressed himself very favourably towards some practical arrangement. It has been expected long enough, and with the very large known mineral deposits that are there, it seems time that the expectations were realised. There is a great deal of odd assessment work being done in the Fish creek district, but as a rule by very small forces which are necessarily much scattered, but the coming season will find that camp an exceedingly lively one. Near Trout Lake and Ferguson the only mine that is working anything like full blast, is the Nettie L., and while sleighing is so good every effort is being made to get ore to the water ready for shipment when the ice breaks up in the arm. The property known as the Black Warrior group is reported as looking exceedingly well, the mineral being as usual in that district highly argentiferous galena, and a very large amount of work has been done on the ledge, so this property will probably be heard from in the near future.

It is most sincerely to be hoped that a rumour which has been extensively circulated, that the Crow's Nest Coal fields might pass into the hands of the Great Northern Railway, is not correct, for the immediate prosperity of British Columbia depends on our being able to treat our ores at home; and in the case of the coal fields being controlled by the United States it is only reasonable to suppose that our raw material would go across the line for smelting—at any rate to a very great extent. It is only those who are engaged in smelting that fully realize what a very profitable undertaking it is when scientifically conducted, and our neighbors understand the process remarkably well.

ROSSLAND.

(From Our Own Correspondent.)

The fifth furnace of the Northport smelter was blown in February, bringing the nominal capacity of the works up to 1,250 tons daily. The situation, however, as regards increased facilities for the treatment of the Le Roi ore remains for the present unaltered, as the No. 4 furnace is undergoing repair

An important strike is reported as having been made on the Homestake, of which the Rossland Miner speaks as follows:

A feature of the strike is that the pay shoot is solid and unbroken and is strongly mineralized throughout. The gangue is a white quartz carrying gold, silver, lead and copper. From the face of the drift to the like, towards which the drift is being driven, the distance is about 87 feet. Should the shoot continue that far, and it is almost certain that it will, it will be over 100 feet in length. The dike, which is to be met 87 feet from the present breast of the tunnel, is only 12 feet in width and it is more likely that the pay ore shoot will be picked up on the west side of it, the present drift tunnel being to the east of the dike. There is a very strong surface showing east of the dike and the probability is that the ledge will be richer and wider west of the dike than it is east of it. After the connection is made by the upraise with the shaft and the shaft is deepened another 100 ft. below the floor of the present drive, which will give a depth of from 400 to 500 feet on account of sloping nature of the hill included in the Homestake ground, still richer ore should be found. Altogether, the outlook on the Homestake is most encouraging and there is reason to believe that it will make a valuable mine, when the work of drifting along the ledge for 200 feet and the upraise has been made connecting the tunnel with the shaft has been completed. This work will occupy about ten weeks.

There is a movement here, and in good hands, to tunnel the "O. K." mountain which carries some very valuable properties and prospects, amongst which is the "I. X. L.", on which there are now employed about eleven men, and from which they ship a carload of very high grade ore about every ten days; the surface claims, making a complete chain over the whole mountain, have been nearly all secured; the preliminary development is proposed to be by diamond drilling. This mountain is held in great favour by all the old mining men in this camp, and it is expected that large bodies of the richest ore in this district will yet be found in this mountain.

A good strike has recently been made on the "Evening Star," on Monte Christo mountain, in exposing, at the 300 foot level, seven feet of ore running in value from $26 to $34 a ton. The company are now exploring the ore body thus exposed.

On the Queen Mountain ledge 20 feet in width has been encountered by the diamond drill on the 350 foot level. After the ledge has been crosscut there came such a rush of water from the drill hole that operations had to be suspended on that level. On the 250 feet level the same body of ore has been encountered. This will be drifted on to determine its width, value and extent.

The "Spitzee" is doing steady development work, and shipping an occasional car of ore; the property, generally, is looking well.

The "Velvet," which is undoubtedly one of the big mines, will become a large shipper just so soon as the present arrangments for shipping and smelting are completed.

At the Le Roi operations are being now conducted through the new shaft. The closing down of the old shaft practically cuts off the whole of the eastern workings of the mine from shipment. There is no thorough system of connection between the two workings. Hence, until such time as the old shaft has been put into thorough order the shipments of the Le Roi will be considerably curtailed. Drifts run from the old shaft naturally were made with a grade running to the shaft so that the transportation of ore on the loaded trucks could be performed with facility. As the drifts from the new shaft was made on the same principle it follows that wherever the workings are connected a carload of ore from the eastern end of the mine would have to be pushed up hill in order to get into the western end. All the new workings will in future be run from the new shaft but the old workings will first have to be cleaned out. This will be done from the old shaft. As there is much ore in the stopes referred to the old shaft will be in work for many months to come. What is to be done at the present moment is the taking out of the hump in the middle of the old shaft, which interferes with the working of the mine and also to a serious degree endangers the life of those using the old shaft. Proper guides will be put in and skips which latter will be entirely renewed.

There is very little work being done in the No. 1 with the exception of the sinking of the shaft which is making fair progress. There is only one drill at work stoping and the only reason for its presence is that a certain amount of ore must be sent down from the No. 1, situated higher up the hillsides than the Josie, in order that the Josie may be better able to send down its ore over the flatter grade of the gravity tramway, existing between the latter mine and the ore bins on the railway track. The work on the Josie is principally on the Poorman shaft at its various levels, in the sinking of the shaft and in the continuation of the upraise into the Annie shaft. The Annie vein has been discovered to possess the same values at the depth now being worked at as on the surface and the possession of a new and well provided oreshoot is added to the wealth of this promising mine.

The shaft of the Rossland Great Western is well nigh completed. Work is in progress cutting out the station at the 800-foot level. No ore has been shipped yet and owing to the smelter having had to repair a furnace it is probable that the expected first shipment will be delayed for a while. The work of assembling the machinery for the motor for the 40-drill electric compressor has been started. The huge bedplate of the motor was lately placed in position. The concrete foundations are thought to be sufficiently settled to permit of the dead weight of the machinery being placed upon them. No turning over will be possible for several weeks as the setting will hardly be solid enough to permit of any jarring.

On the New St. Elmo, the north drift is in 123 feet from the north crosscut and the ledge is five feet wide near the footwall

there is two and a half feet of ore that will average $18.50 to the ton. This shoot of pay ore is about 25 feet in length and still continues in the face of the drift. The ore taken from the pay shoot is being saved and will be shipped later on. The south drift is in 325 feet from the south crosscut.

At the Centre Star shipments are being continued on a steady basis. The development work is steadily in hand and the mine is now well abreast all round in its work. The surface buildings are practically completed and nothing more will be done with the yard until the snow disappears from the ground.

There is every expedition used to hasten shipments from the War Eagle mine, which are expected because of the better showing at the lower levels than that which obtained in the middle workings of the mine may be made. The exploration of the level of the two lower floors is being continued.

BOUNDARY DISTRICT.

(From Our Own Correspondent.)

Ore stoping rather than development work continues to have chief attention at the Old Ironsides and Knob Hill group of mines, at Phoenix, and a daily output of between 600 and 700 tons is steadily maintained. Other properties at work in the same neighbourhood are the Brooklyn and Stemwinder group and the Snowshoe. The former owned by the Dominion Copper Company of Toronto, Ontario, now has more than 100 men on its payroll and has, it is announced, ordered much larger power plants than those now in use on the two claims named.

The Snowshoe group, situate near Phoenix is owned by the British Columbia (Rossland and Slocan) Syndicate, Ltd., of London, England. The Snowshoe claim is being developed by both shaft and tunnel workings. An incline shaft has been sunk 200 feet and crosscuts and drifts have been run at both 100 and 200 foot levels. These developments have opened up a body of ore that will pay to send to the smelter. From the 200 level a diamond drill hole has been put down 500 feet.

The crosscut tunnel is in about 500 feet. It has encountered one body of ore and is now being driven ahead in the hope of another payshoot being met with. A winze in the tunnel has been sunk 100 feet and a crosscut in the bottom of it has shown that the ore continues at that depth and is of good grade. This ore body, as developed by the tunnel and winze, has been shown to have an average dip of about 45 degrees northerly, that is, into the Snowshoe property. A raise from the tunnel, at the westerly extremity of this shoot of ore, now up about 80 feet, is in ore also of good grade. The main object in view in making this raise is to improve the ventilation of these workings, but it is at the same time good development work since it is proving the ore to be continuous. The Snowshoe ore is generally similar to that on the neighbouring Old Ironsides and Knob Hill group.

The Snowshoe group comprises the Snowshoe, Pheasant, Fairplay Fraction and Alma Fraction. A prospect shaft sunk 35 feet on the Fairplay Fraction shows at the present time a large deposit of iron pyrites carrying values in gold and silver. Altogether some 4,000 feet of work in shafts, drifts, crosscuts, etc., have been done on the group.

A spur has been put in from the Phoenix branch of the Columbia and Western Railway, for loading ore. Although there is a large quantity of ore blocked out ready for extraction the mine is not yet equipped for maintaining regular shipments. From time to time one or two carloads of ore have been sent to the smelter for test purposes and in this way 14 carloads in all have been shipped.

The plant on the property includes a 70 horse-power horizontal return tubular boiler, a 40 horse-power locomotive boiler, a 12x18 straight line Rand air compressor, a 28x10 air receiver, half a dozen machine drills, two hoisting engines—one 6¼x8 and the other 5x8—and a No. 5 Cameron sinking pump.

In Deadwood camp the Mother Lode, Crown Silver, Morrison, Marguerite, Greyhound, Ah There and Great Hopes are working.

On Saturday morning February 16th, the 35-drill air compressor recently installed at the Mother Lode mine, near Greenwood, was started. The compressor is the largest that the James Cooper Manufacturing Company has yet supplied for use in British Columbia. It is a cross compound condensing Corliss-valve, Ingersoll-Sergeant engine, with compound air end and inter cooler; high and low pressure steam cylinders, 22-inch and 40-inch respectively, air cylinders of the piston inlet type, high and low pressure, 19¼ inch and 32¼ in respectively, and 48-inch stroke, the machine having a capacity of 30 to 40 drills and weighing 166,000 pounds. Steam is supplied by two 66x16 horizontal return tubular boilers, each 100-horse power, for 125 pounds working pressure, and having horizontal smoke connection and one stack. There are at present only three air compressors of larger capacity than the above described engine at work in the province, two of these being at the British America Corporation's Black Bear mine, and one at the Centre Star, all at Rossland.

Other plant and machinery now being installed at the Mother Lode mine includes the largest hoisting engine yet brought into the district, an ore sorting plant and additional electric light machinery and appliances. The hoisting engine was made by the Jenckes Machine Company, of Sherbrooke, Quebec. It is a double cylinder Corliss-valve first motion hoist, cylinders 20 inches by 42 inches, diameter of drums 6 feet. Two 80-horse power boilers will supply the power. At present there is but one cage in the main shaft of the mine, but two platform cages with safety clutches and shield roof have been purchased and will shortly be put in.

The ore sorting plant includes a 36-inch picking belt, 111 feet long, with return conveyor 41 feet long; a 12-inch fine-ore conveyor, 110 feet long (all lengths centre to centre), and all requisite shafts, pulleys, supports, etc. A No. 5 Gates' crusher, with a capacity of 40 tons per hour, and a 70-horse power Nagle engine make up this equipment, which is the only one of its kind in the province. The electric light plant now in use being insufficient for increasing needs, a 250-light Westinghouse dynamo with a full completement of arc and incandescent lights, and a 25-horse power Armington & Sims' engine to run the dynamo, have been purchased and will shortly be in use.

With the foregoing additions to plant and machinery at its Mother Lode mine the British Columbia Copper Company now has about the best equipped mine in the Boundary district.

No development has been done on the Mother Lode lately, but a lot of ore has been broken down, so as to have a reserve on hand ahead of the immediate requirements of the smelter at Greenwood. It is intended to increase the daily output to at least 300 tons on March 1st and to thereafter maintain shipments at that rate until after the furnace capacity of the smelter shall have been increased, when the mine output will be enlarged accordingly. The annual meeting of the British Columbia Copper Company, New York, owning the Mother Lode and the smelter at Greenwood, has been postponed to March 14th, by which date the management will be in a position to give the shareholders some information respecting the operation of the smelter, which started February 18th, and the values obtained from ore treated to that date.

A contract has been entered into by the manager of the Morrison Mines, Ltd., to supply the Standard Pyritic Smelting Company, Boundary Falls, with 3,000 tons of ore per month for twelve months from the time the railway spur shortly to be built to the mine, shall be completed. It is reported that the workings of the Crown Silver, which is one of the Sunset group, now owned by the Montreal-Boston Mining Company, are at between 200 and 300 feet in depth, in ore of good grade. The Marguerite and Greyhound are both looking well and it is expected that both will soon be sending ore regularly to the Standard Company's smelter.

The Winnipeg has now paid off the debts of the old company and development work, resumed after re-organization, is proceeding. It is thought probable that the management will soon be in a position to announce encouraging results from the work now in progress. Nothing has lately been heard of Golden Crown or Athabasca, which for a time with the Winnipeg, kept Wellington camp before the public.

The B. C. in Summit camp, is doing development work at the 400 ft. level and deeper, at the same time keeping its output of ore up to about 100 tons daily. As the reported sale of this mine was promptly contradicted, it may be assumed that those responsible for the statement of its alleged sale were misinformed. The R. Bell is still at work and it is expected that later results will amply warrant the confidence felt in this property. Ore is being sent to the Standard Company's smelter from a big open cut on the Emma. The Mountain View has not yet made the frequently announced but elusive strike of ore, but its neighbour the Blue Bell, has a nice showing of ore in which a prospect shaft is now down about 100 feet. There are no other claims in Summit camp calling for present notice.

The Rambler, near Eholt is reported to at least be looking better than at any time in its previous history of plucky perseverance. It is to be hoped that the persistence of those who have so long struggled to prove this claim will shortly be rewarded. Mr. Gilbert Mahon, manager of the Jewel, who left on Feoruary 25th for England, expects to, whilst in London, receive instructions from his directors to go ahead with further development and the installation of plant suitable for the treatment of the gold quartz etc, of which there is a large quantity in sight at the mine. Operations will probably be resumed in the early summer. The City of Paris, in Central Camp, has for the time dropped out of notice, but the No. 7, which is owned by a company organized in New York by some of the large shareholders in the British Columbia Copper Company, is at work. The plant for this mine has all been hauled up the mountain to the mine and the work of installation is being proceeded with. It consists of a Class "A" Ingersoll-Sergeant straight line air compressor capable of running from three to four "E" 24 drills, two machine drills, an air receiver, a 100-horse power horizontal return tubular boiler, a Lidgerwood hoisting engine with 32-inch drum and cylinders 8¼x10, a No. 5 Cameron sinking pump, A Northey tank pump, Northey duplex boiler, feed pump, feed water heater, shaft skip, four ore cars, 500 feet steel rope, 1,500 feet pipe, 1,000 fet steel rails and a lot of sundries. The main shaft is being enlarged and re-timbered down to its present depth of 139 feet preliminary to resuming sinking. Some very nice ore is being stoped at the 60 foot level and sent to the Greenwood smelter.

Mention has already been made of the Greenwood and Boundary Falls smelters. The latter will most likely blow in its furnace early in March being now about completed and having sufficient ore and coke on hand to enable it to make an early start. Mr. E. J. Wilson, until lately metallurgist, in charge of the blast furnaces at Great Falls smelter, Montana, who resigned that position to become Superintendent of the Standard Pyritic Smelting Company's smelter, has arrived. Mr. Thos. Anderson, accountant, lately assistant secretary-treasurer of the King Mining Company, Rossland, has been appointed accountant of the same company. Mr. A. B. W. Hodges, superintendent of the Granby Smelter, Grand Forks, has gone east in connection with the intended purchase of two additional furnaces and a copper converter, for that smelter. Mr. L. M. Rice, who had charge of the C. P. R. survey parties in the Boundary district during the construction of the Columbia & Western Railway, is making arrangements to commence the survey of a route for the Greenwood-Phoenix tramway, which will it is stated, be commenced during the ensuing spring. Mr. C. A. R. Shaw, C.E., is examining the country lying between the West Fork of Kettle River and Mission Valley, near Kelowna, with the object of finding a suitable route for a railway to commence at Midway or Rock creek and go via the West Fork and Mission Valley to Vernon. Messrs. Robert Wood, Jas. Ker and others are seeking to obtain a charter for this project.

NORTH FORK OF KETTLE RIVER.

(From Our Own Correspondent.)

The shipment of a little ore during the past six months from two or three mining properties stituate on the North Fork of Kettle river, has had the effect of once more directing attention to several groups of claims distant 10 to 15 miles from Grand Forks. The best known of these are the Earthquake, Golden Eagle, Volcanic, Pathfinder and Little Bertha, on the eastern side of the river, and the Seattle, Humming Bird and Strawberry on the western side. Quite recently a short switch was put in on the Columbia & Western Railway, its location being on the Grand Forks side of Eholt and between the latter place and Fisherman station. As there is only room for three or four cars at a time on the switch it is evident that it is not expected that immediate shipments will be large. However, it is the intention to send ore to one or other of the smelters from the Humming Bird—which has already made several small shipments to the Granby smelter at Grand Forks—and after a bridge shall have been built across the river, from the Golden Eagle, Pathfinder, and Little Bertha. Of these the Humming Bird and Pathfinder appear likely to make the best showing as regards early output. Of the former, which has reported to have shipped 600 or 700 tons of ore, only this passing mention will at present be made, no reliable particulars of it being just now available to the writer. The Pathfinder lately resumed work. There are two double compartment shafts on this property respectively, 135 feet and 125 feet in depth, and about 700 feet of crosscutting and drifting. It is reported that there are three main ore bodies, of a somewhat irregular character, partially developed by these workings, and that these ore bodies are large low grade masses of pyrrhotite, carrying gold, silver, and copper and running about $15 to the ton. The formation is porphyry and a diabasic rock, the ore occurring seemingly at or near a contact, in a quartzose gangue. The general indications were some time since regarded by the Provincial Mineralogist, some of whose comments are given above, as favourable to the finding of considerable bodies of ore. The manager of the company when recently in Greenwood intimated his intention to shortly ship ore to the Standard Company's Pyritic smelter, near Boundary Falls. The power plant on the property consists of a 50 horse-power horizontal tubular boiler, a 16x24 straight line Rand air compressor, a 42x10 air receiver, two Little Giant drills, a 6x8 hoisting engine, a No. 5 Cameron sinking pump and a 3x2x3 boiler feed pump. The mine buildings are good offices, manager's house, bunk and boarding houses, stables, etc.

FRANKLIN CAMP.

(From Our Own Correspondent.)

Up the east fork of the north fork there is a very promising mineral country known as Franklin Camp, which for size of ore bodies, so far as shown by the very limited amount of development work done, and specimen assay values compares very favourably with what was known of the older camps at a similarly early stage. It is not to be expected though that operations will be undertaken in this outlying district before it is given wagon road connection. A trail was cut out last year to connect with the wagon road from Grand Forks, but the construction of a wagon road is an urgent necessity for the getting in of mine suplies and machinery, otherwise the mineral resources of Franklin Camp must remain undeveloped. Numerous mineral claims have been located and of these the best known at the present time are the Banner, McKinley, Glouster and Polard. No doubt strong representations will be made to the government so as if possible to secure this session an appropriation for construction of the much-needed road.

WEST FORK OF LITTLE RIVER.

(From Our Own Correspondent.)

Among many mineral claims located on the West Fork and its tributary creeks the Carvin, Saily, Washington and Idaho are the best known. Purchase of the Carvin was completed last year after development work for several months having been carried on, and a contract was entered into to deliver 1,500 tons of ore to the Standard Company's smelter near Boundary Falls. Notwithstanding that this ore had to be hauled 50 miles, first for nearly 20 miles over a rough winter

road and then about 30 miles farther to Midway, to be there loaded on railway cars, a determined effort is being made to carry out this undertaking and it is stated that most of the ore is past the first 20-mile stage and that nearly half of it has reached Midway. A 60 horse-power horizontal return tubular boiler, a 20 horse-power hoisting engine, a sinking pump and two machine drills have been taken up to the claim, and arrangements have been made to put in a saw-mill nearby so that a good supply of mine timbers will shortly be obtainable. Development will, doubtless, be more rapid ere long and the district will derive benefit from having more extensive mining work in progress than has hitherto been practicable in the absence of road connection.

The Sally is one of a group of seven claims owned by the Vancouver and Boundary Creek Development and Mining Company, Ltd., and situate on Beaver creek. This company has acquired numerous mineral claims, most of them in the Boundary country, and heretofore has done most work on one at Princeton, but now the Sally group offers most encouragement so it is having attention accordingly. It is stated that there are five distinct leads occurring on this group, these varying in width from six inches to four feet. On one lead a tunnel has been driven 190 feet and from this a carload of ore that a careful sampling indicates will run $150 to the ton, is being hauled to Midway to go thence to the Hall Mines Smelter at Nelson. Another lead has been stripped for 100 feet and a tunnel now in 30 feet, has been started on it. The conformation of the ground is such that should the leads continue into the hill it will be practicable to attain a depth of 800 to 1,000 feet by tunnelling. The work has lately been done on the Washington and Idaho claims, a controlling interest in which was last year acquired by Mr. R. E. L. Brown, (Barbarian Brown). Values were reported to be high in the ore got out some time since, but it remains to be proved whether early promise will be redeemed at a depth. A small engine and boiler was obtained for use on these claims, but there was so much unavoidable delay in getting this plant up to the property, there being nothing but a trail part of the way in, that work was suspended before it reached its destination.

UPPER MAIN KETTLE RIVER.

(From Our Own Correspondent.)

There are several camps on creeks running into the main Kettle river above Rock Creek, but practically no work outside of assessments is being done in them just now. These include the Crown Point and Barrett's groups on James creek; Perkins, Douglas and Atwood's groups below West bridge and Canyon and other creeks above it. On the Montana, Colorado and Fourth of July claims on Canyon creek good showings of copper-gold ore are to be found, with fair assay values. Some $2,000 have been spent here on development work. On the Silver Dollar and Barnato claims on Horshoe Mountain there are large bodies of quartz and arsenical iron carrying gold. The O. K. and Fletcher's groups have large iron cap showings with streaks of high grade quartz and traces of telluride. A lot of surface work has been done on the Mogul, Riverside, Hackla and other claims, but in no instance sufficient to prove permanence.

GREENWOOD, B. C., LOOKING TOWARD ANACONDA,
The Site of New Smelter Blown in Last Month.

One of the largest generators in Canada has just been installed by the Cataract Power Company, at Decew Falls, Ont., for light and power purposes. It is believed to be the largest in North America, having a capacity of 2,000 kilowatts normal, and ability to take care of a heavy overload, weighing complete 220,000 pounds or about 110 tons. This addition to the company's plant makes its complete energy over 10,000 horsepower.

The Norrie mine in the Gogebic Range in the northern Peninsula of Michigan has produced during the year just closed over 1,000,000 tons of iron ore, or an average of nearly 3,000 tons per day. As it is really a mine and not a quarry, and is regularly worked by shafts, levels and stopes, it probably is the most notable underground excavation in the world at the present time.

A FACTOR IN TRANSPORTATION.*

THE development of the electric railway has been so largely in the cities and more important towns, and to so great an extent along lines parallel to those followed in street railway traffic, that its possibilities in a wider field have received but scant attention. It has not been regarded as a factor in transportation, chiefly, perhaps, because its earliest, and for the time its best, opportunity did not lie in this direction. While there was so much to be done in applying the electric power to the street railway systems of the country, and in building the new ones which it has made possible, but little could be accomplished in its development in a larger way. In consequence many have come to look upon it as having little opportunity beyond the service it already has practically monopolized—that of urban transportation.

The idea that the electric roads, which are even now stretching out rapidly between cities and towns not more than twenty-five to fifty miles apart, are likely to develop into important agencies for the movement of passengers and merchandise, does not seem to strike the average observer very forcibly, while to the steam railway people it evidently appears a mere chimera unworthy of serious consideration. The latter, indeed, manifest a disposition to belittle the progress that has been made in this direction, it being apparently their policy to destroy what little chance this rival may possess by the masterly plan of ignoring its existence and denying that it has any possibility of growth. Yet strange to say, this eminently progressive and broad-minded course is not producing the effect desired, for it cannot be denied that inter-urban electric traction lines are building in all directions, or that the success of those in operation justifies the expectation that their construction will continue until they will be found upon nearly every country road, and until they come near duplicating in their extent the present network of steam railway lines. It is a notable fact that these inter-urban lines are not, as a rule, built where there is no communication between the towns by rail, but are constructed practically as parallel roads, becoming therefore competitors for the same business. The contention of the steam railway people that the electric lines would find their field in feeding the steam roads, seems not to be borne out by the present experience, which appears to show that their true function is to exercise a modifying, if not a controlling, influence, upon transportation generally. Evidence of this is found in some results already noted. In several instances within the writer's knowledge the building operation of electric lines has brought about radical changes in both the service and rates offered by the steam roads. Where trains are run at infrequent intervals, and the regular traffic of three cents a mile was insisted upon, since the electric service became available, more trains are run and the rates are reduced to a reasonable figure. The uniformity of this result in every instance wherever competition of the traction lines has developed seems to fully warrant the conclusion that the same effect will be produced generally, and the ultimate result will be a substantial reduction in the cost of passenger transportation. If the few electric roads built and in operation up to this time have had this effect, it is idle to question their importance as a factor in the transportation question.

Their influence upon the cost of freight service is, of course, yet to be determined; but it is far from impossible that it should in a few years prove to be as important as it is now in respect to the passenger traffic. The electric roads have not yet undertaken much in the way of handling freight, though some of the inter-urban lines are beginning to offer facilities for local work in this line. Nothing is more likely than that this end of their business will develop steadily, or that the steam railway people should awake some morning to find that in that field as well as in other they have a full-fledged and exceedingly lusty competitor to deal with.

The success of any system of transportation is mainly a matter of cost, and experience seems to show that either a road may be operated electrically cheaper than with steam locomotives, or that the expense of running the latter has been greatly exaggerated. Whichever may be the case, there can be no doubt that the more economical of the two systems will survive, and that the final outcome will include cheaper as well as better service for the public. This is true of freight as well as passenger traffic, the cost of both being controlled by conditions that are substantially similar. Hence the probability that the further building of electric lines will help both travellers and shippers, by bringing nearer such an increase in transportation facilities as will compel existing lines to meet the competition by improving the character of their service, and by modifying the excessive charges which they often make for it.

Doubtless it will be some time yet before the electric road becomes an active competitor for the business of handling bulky and heavy commodities like lumber, coal and similar products, but it may not be necessary to wait long until they actually begin to handle such before feeling the beneficial effect of their competition. While the conservative policy of the steam railroad people sometimes carries them to extreme lengths, they can scarcely fail to perceive after a little more experience that their salvation lies in meeting the threatened competition before it developes. They will see that the thing for them to do is to make the service so good, and their rates and regulations so reasonable, that the public will be satisfied. If they wait to do this until they are compelled to their tardy action will not avail anything.

The importance of the electric road as a means of delivery direct to the buyer in many cases, is also worthy of notice. Operating single cars rather than long and heavy trains, and traversing country roads to a great extent, the electric carrier can deliver merchandise at the consignee's door more quickly and more easily than the steam road can land it in the freight house, a consideration that would control the choice of most shippers in favour of the former. Where no competition exists this feature of the service would still be valuable as tending generally to facilitate the easy and prompt movement of merchandise, the greatest factor in the development of business. In whatever light the electric railway is viewed, it seems bound to accomplish much in this direction, and therefore to prove a transportation factor of prime importance wherever it is introduced.

*Age of Steel.

WHAT CONSTITUTES ORE.

THE Engineering and Mining Journal has an interesting editorial by Mr. Rothwell, the editor-in-chief, dealing with the question of what constitutes "ore." After stating that the word is derived from one which in various languages means brass or bronze, Mr. Rothwell gives a number of definitions concluding with his own, viz.: "A natural compound of the elements of which one, at least, is a metal."

As a scientific definition this, perhaps, is as good as any, although Mr. Rothwell intimates that the word can scarcely be considered as a strictly scientific one. In popular usage the meaning is rather loose and indefinite. In practical mining the term is generally employed to designate mineral bearing rock that is of commercial value—that will pay for working—in contradistinction to waste. But it easily can be seen that this, itself, involves much of uncertainty, and makes the question of whether a certain rock is "ore" dependent on commercial and metallurgical conditions at a given place, rather than on the mineral composition of the rock. Millions of tons of mineral-bearing rock are now being profitably treated and are called "ore" which a few years ago would have been thrown away as waste—this owing to the improvement in the methods of treatment.

Even now much depends on facilities for treatment and the quantities in which the mineral compound may exist in a given mine. At Mercur, Utah, rock containing only about two dollars in value to the ton is now profitably worked, while in the most of places it would be cast aside as worthless and designated as "waste." The Mercur mines are made profitable by the peculiar skill with which vast quantities of the low grade material are treated. The same is true of the great Homestake mine in Deadwood.

In brief, when the miner speaks of "ore" he generally means mineral bearing rock that contains enough of the mineral to make it commercially valuable. But this is true only when

he is dealing with the simple question of extraction for treatment. When he is endeavouring to prove the continuation of his ledge or lode, he will not hesitate to characterize as "ore" any rock of the same general kind that contains the smallest trace of the same mineral or minerals. Thus, while it may require three per cent. of copper in rock to make a milling or smelting ore, a tenth per cent. of copper in the same kind of rock may—in his judgment—constitute an "ore" connection between more valuable deposits and "prove" that they are parts of one lode. On the other hand, those who are interested in disproving the connection of the two recognized ore bodies will not as a rule, hesitate to deny that the practically worthless stuff forming the connection can with any propriety be termed "ore."

All seem to agree that a mineral compound that is commercially valuable is "ore" but beyond that the meaning can scarcely be considered as fixed and settled.

A HYDRO-MAGNETIC SEPARATOR.

Prof. Elmer Gates, of Washington, D.C., who as will be recalled claimed some years ago to have invented a method of utilizing the sun's heat for power purposes, has recently taken out patents on a so-called hydro-magnetic separator, by means of which he proposes to separate gold from magnetic iron or magnetite.

There is nothing specially new or startling in a magnetic separator, as a number have been invented. Mr. Thomas A. Edison brought out one several years ago, which has been made use of to a limited extent with excellent results, so it is claimed. Prof. Gates' apparatus, however, differs somewhat from those already in existence, and a few words regarding it will therefore be in place.

As already stated the object of Prof. Gates' device is to remove from the gold bearing sand the magnetic iron which such stuff always contains, as a preliminary to separating the gold as in the ordinary way, either by washing or by amalgamation. The apparatus consists of a copper drum, inside of which is an electro-magnet. The core of the magnet is made up of a number of iron plates with fluted edges on the pole face of one end, likewise within the drum, but which approach their fluted edges close to the inside of the copper perephery of the latter. Above is a hopper through which the sand is poured. As the gold, silica and magnetite pass through the hopper it necessarily touches the side of the drum, which is kept revolving by means of an electric motor. The drum, owing to the magnet inside it, draws the particles of magnetic iron out of the sand which naturally adhere to its surface while the sand drops into a receptacle below the machine. The particles of iron while magnetically held against the drum are moved downward by it over the wavy lines of force of the fluted magnet face and vigorously shaken so as to detach all foreign matter.

In practical mining work the gold would be left in with the silicious sand, which would subsequently to put through one of the ordinary processes, with a view to separating it from the precious metal. The magnetite once removed, the separation of the gold becomes comparatively easy, so much so that it is claimed that from two to five times as much of the yellow metal is derived from a given quantity of the raw material. The inventor states that his method is simplicity itself, and further that it costs but three cents for each ton of sand treated.

Another advantage pointed by the Washington professor is that the iron removed from the sand in the manner just described is an exceedingly valuable product. At an expense of eighty-five cents a ton it is proposed to reduce it by means of the electric current into lumps, in which form it may be sent to any smelting works.

As to whether the optimistic views of the inventor of this process will be fully realized in practice remains of course to be seen, but it certainly seems more plausible than the scheme suggested some time ago by Prof. Gates for utilizing the energy of the sun.—Electricity.

MINING AND SCIENTIFIC NEWS.

The Coeur d'Alene district of Idaho produces 48 per cent, of the lead used in the United States.

Of dividends from mining companies in the United States copper mines contribute 62.4 per cent.

The United States has not a single ship capable of being used in the installation of a sub-marine cable.

Three thousand tons of steel plates and angles for ship building were exported from the United States to the Clyde in December.

Ore is defined by the Engineering and Mining Journal as "a natural mineral compound of the elements of which one at least is a metal."

In New York city the manufacturers of electric automobiles have large and powerful trucks which are used for hauling disabled vehicles to the repair shop.

W. A. Clark is reported by a Boston paper to have been offered $55,000,000 for the United Verde mine, in Arizona, by the Amalgamated Copper Company.

From present indications it looks as though the production of gold in Nova Scotia during the past year would fall considerably below that of the previous year.

During the present session the United States will appropriate $480,000 as a beginning of annual grants to States and Territories for the establishment and maintenance of schools of mining.

The kingdom of Italy is known as one of the leading manufacturing countries in the world for the production of electrical machinery and kindred apparatus; it also supports a very heavy import trade.

Michael G. Mulhall, the famous statistician in an article contributed to the North American Review in July predicted that the United States census would show a population of 76,200,000. The count enumerated 76,295,000.

The demand for cement is increasing very rapidly all over the world and particularly in new countries. South Africa imported last year nearly 64,000 tons. England used to be the principal producer of the article, but Germany now does a larger business.

The value of gold and silver consumed in the industrial arts by the United States during the calendar year 1899 was: Gold $17,847,178; silver, coining value, $15,677,663; a total of $33,524,841.

The bullion value of the United States standard dollar, as the highest price from 30th June, 1899, to 30th June, 1900, was $0,48426, and the lowest $0,45141, and at the average price $0,46419.

In British Columbia the total amount of timber cut for the year ening June 30, 1900 is placed at 254,000,000 feet, of which 162,000,000 feet was exported over sea, 34,000,000 feet by rail eastward and 58,000,000 used locally in railway construction, mines and buildings.

The total length of all railways in Japan at the end of March 1900, was 3,635 miles, of which 832 miles belonged to the government and 2,802 miles to the private companies, showing increases of 64 miles in the government railways and 159 miles in the private railways, a total of 223 miles compared with the figures of the preceding fiscal year.

In transmitting power by wire rope, the load stress or working tension should not exceed the difference between the maximum safe stress and the bending stress. The load stress may be greater therefore as the bending stress is less, but to avoid slipping a certain ration must exist between the tensions in taut and slack portions of the rope when running.

So great is becoming the stock of gold coin and bullion in the possession or care of the United States Treasury that it has become necessary to order the construction of a new burglar-proof vaults at Washington for its storage. At the present moment, the Government has on hand something like 800 tons of the yellow metal and the stock is growing at the rate of a ton or so every few days.

To make a test of coal, take a fragment and chip it till its weight is reduced to a pound. Place this in a glazed assayer's crucible and weigh the two together. The addition in weight will, of course, be the weight of the crucible. Place the latter, with its contents, in a vessel of boiling water shallow enough so that the water does not have any access to the coal, and maintain the water at a boiling temperature for four to six hours. Set aside the crucible and contents to dry, and then weigh. The loss in weight will represent the natural moisture in the coal. Then place the crucible with its coal in the muffle of an assay furnace, or, if that is not available, in a forge, and heat gently till all gas and smoke has been driven off. During this operation the top of the crucible should be nearly covered so that little if any air is admitted. A piece of brick or sheet metal will suffice. Then cool off and weigh again. The loss in weight will represent the volatile ingredients of the mineral. Finally, place the crucible back in the fire and heat strongly, but gently at first, and with the top open, till the coal is burned up. Then cool and weigh again. The loss in weight from the preceeding operation will represent the fixed carbon of the coal, and the final weight, less the weight of the crucible will represent the ash. A good bituminous coal should show about five per cent. of moisture, twelve per cent, volatile ingredients, eighty per cent. of fixed carbon and three per cent. of ash.

TRADE NOTICES.

We understand that Mr. Francis T. Peacock, mechanical engineer of Montreal, has furnished both the Broad Cove Mines and the Port Hood Mines, Cape Breton, N.S., with No. 14-6, Hedley Dials, fitted with the "Heffman" patent joint, Anemometers, manufactured by John Davis & Son, Ltd., of Derby, England. A large number of these instruments are in use in the mines of Nova Scotia, where they are generally used for mining purposes. Mr. Peacock is carrying a stock of these instruments in Montreal, and we understand that the prices compare very favourably with similar instruments coming from the United States.

Messrs. Watson, Jack & Co., of Montreal, have been appointed agents for the well known German mining machinery manufacturers, Messrs. Felten & Guilleaurne, Carlswerk Actien-Gesellschaft, in succession to Messrs. Jack & Robertson, who recently dissolved partnership.

We are in receipt of an extremely well got up pamphlet, entitled "Operation of Electric Mining Plants," published from the power and mining department of the General Electric Company. This pamphlet which is handsomely illustrated from photographs, contains much information of practical value regarding costs of electric haulage, pumping, etc., from mine superintendents and others, besides descriptions of plants now in use at collieries and mines in the United States. The Canadian General Electric Co. have also forwarded copies of the following descriptive catalogues, entitled: No. 1022, Electric Hoists; No. 4230, List of Polyphase Power Plants; No. 4209, Induction Motors; No. 1026, Industrial Applications of Electricity; No. 1030, Electric Mine Locomotives.

The Trent Engineering and Machinery Co., of Salt Lake City, Utah, have issued a descriptive catalouge of ore cars manufactured by them. These cars are built with a special view to strength and durability.

ROSSLAND IN 1900.

MR. JOHN KIRKUP, gold commissioner of the Trail creek mining division, has submitted to the Minister of Mines the following report on the condition of the mines and mining properties of the Rossland district for the year ending December 31st, 1900:

The ore shipments were as follows:

	Tons.
Le Roi	159,734
Le Roi No. 2.	3,013
War Eagle	9,886
Centre Star	40,875
Iron Mask	2,765
Evening Star	348
Giant	506
I. X. L.	500
Spitzee	155
Total	217,782
Gross Value	$2,333,125

DETAILED STATEMENT.

Le Roi Mine.

Tons of ore shipped (dry) 159,734, gross value, $1,437,726; average number of men employed, 655.25; underground 435.85; surface, 219.4.

Development. Shafting, 900 feet; driving, 2,061 feet; raising, 379 feet; crosscutting, 1,085 feet.

Additions to plant: Total value of plant and surface improvements, $3,782,407.90.

Additions for this year consist of: One 40-drill air compressor, one hoist engine, steam operating; one electric hoist engine, nine boilers, crushing and sampling machinery.

Additions to compressor building: New boiler house for 12 boilers, 38x140 feet; three new ore bins, 1,000 tons holding capacity; aerial tramway, capacity, 100 tons per hour; new head frame, 100 feet high; hoist engine room; crushing and sampling mill, 100 tons per hour; timber and timber framing shed and carpenter shop; blacksmith and machine shops and storehouse.

Nickel Plate Mine.

Tons of ore shipped, nil; average number of men employed, 113; underground, 82; surface employees 31.

Development. Shafting (raising third compartment alongside working shaft, making it a three compartment shaft), 268 feet; sinking shaft, three compartments, 218 feet; driving, 1,900 feet; raising, 59 feet; crosscutting, 1,131 feet. Total value of plant and surface improvements, $61,319.66.

A new hoist engine has been added to the plant and the surface improvements have had the following additions made: New hoist engine building; head frace and ore bins; new brick compressor building.

Kootenay Mine.

Tons of ore shipped, nil; average number of men employed, 35; underground, 26.33; surface, 8.67.

Development. Shafting, 466 feet; driving, 474 feet; tunnelling, 68 feet; winzing, 80 feet; raising, 299 feet; crosscutting, 829 feet. Total value of plant, $22,066.62. Additions consist of new compressor building and foundations.

Josie Mine.

Tons of ore shipped (dry), Josie and No. 1 combined, 3,013.43;

gross value, $46,239.06; average number of men, 47; underground, 11; surface, 36.

Development. Raising third compartment alongside working shaft, 447 feet; sinking shaft, 45 feet; sinking shaft on "Annie," 120 feet; driving, 1,940 feet; raising, 107 feet; winzing, 141 feet; crosscutting, 917 feet.

Additions to plant consist of electric hoist engine. Surface improvements consist of gravity tramway to railway and ore bins in connection with No. 1 mine.

No. 1 Mine.

Tons of ore shipped, see Josie; average number of men, 45; underground, 30.59; surface employees, 14.41.

Development. Sinking, 120 feet; driving, 1,532 feet; raising, 249 feet; winzing, 86 feet; crosscutting, 251 feet.

Total value of surface improvements and plant for Josie and No. 1 mine, $53,778.05.

Additions to plant consist of an electric hoist engine.

Surface improvements: New head frame, hoist, engine room, ore bins and gravity tramway in conjunction with the Josie mine.

War Eagle Mine.

Tons of ore shipped, year ending December 31, 1901, 9,886; gross value, $142,282.98; average number of men employed, 166; development work, 4,428 feet; value of machinery, buildings, etc., increase during year 1900, $80,000.

Centre Star.

Tons of ore shipped, 40,875; gross value, $609,359.75; average number of men employed, 240; development, 3,525 feet; increase of value of buildings during 1900, $190,000.

Iron Mask Mine.

Tons of ore shipped, 2,737; gross value, $43,177.61; average number of men employed, 33; development work, 2,124 feet.

New St. Elmo.

Tons of ore shipped, nil; number of men employed, 6 to 12; development work, 1,912 feet.

California.

Average number of men employed, 25; development, drifting, 825 feet; development, sinking, 168 feet; new machinery, building, etc., $21,150.

Sunset No. 2.

Average number of men employed, 15, development during 1900, 450 feet.

Homestake.

Average number of men employed, 15; development, shaft, 210 feet; development, tunnel, 1,200 feet; development, crosscutting, 900 feet.

Velvet.

Tons of ore shipped, nil; average number of surface men, 20; development work, shafts, drifts and crosscuts, 1,000 feet; plant, two 7-inch Knowles pumps, one 1,500 feet sawmill.

Evening Star.

Number of men employed below surface, 16; number of men employed above surface, 9; tons shipped, 348; gross value, $4,385.50; development, sinking, 250 feet; development, drifting, 475 feet; cost of machinery, $1,800.

Green Mountain.

Number of men employed, 15; development, sinking, 100 feet; development, crosscutting, 400 feet. Machinery added, 20 h.p. hoist, 5-drill compressor, two No. 7 sinking pumps.

I. X. L.

Number of men employed, 11; ore shipped, 500 tons; gross value, $39,800; tunnels and raises, 480 feet.

Spitzee.

Ore shipped, 155 tons; gross value, $2,635; average number of men employed, 6; shaft, 50 feet.

Douglas.

Average number of men employed, 4; tunnelling, 480 feet.

Northern Belle.

Number of men employed, 5. Development: Crosscutting, 315 feet; drifting, 158 feet; sinking, 30 feet; tunnelling, 50 feet.

Giant.

Ore shipped, 506 tons; gross value, $6,986; average number of men, 9; development work, 300 feet. Machinery, consisting of an air compressor, 50 h. p. electric motor, hoisting engine, two pumps, three machine drills, 50-ton ore bins. Cost of plant detailed, $10,000.

Big Four Group.

Consists of a group of crown granted claims, situated on Little Sheep Creek. The work done during the past year consists of 300 feet of tunnel and shaft, five men being employed.

Gertrude.

This property was worked for a short time during the early part of the year. No returns of amount of work done.

Bonanza Group.

Consisting of the Bonanza No. 3, Our Hope, Bonanza No. 3 Fraction and Our Hope Fraction mineral claims. A very promising group, situate on Iron Creek in the Norway Mountain camp. This property is being worked by the Rossland Bonanza Gold Mining & Milling Company, Ltd., non-personal liability, and during the latter part of the year 75 feet of tunnel work has been done on the Bonanza No. 3.

Cascade Group.

This is also a very promising group of claims, comprising the Cascade, California and Royal Kangaroo, situate on Grenville Mountain, to the southwest of Norway Mountain. During the past year 130 feet of tunnel work was done. The property is being operated by the Cascade Gold Mining & Milling Company, Limited, of Rossland.

OFFICIAL STATISTICS.

Trail Creek Division.

Mineral claims recorded	228
Placer claims recorded	1
Certificates of work	520
Money paid in lieu of work	4
Certificates of improvements	58
Bills of sale, transfers, etc.	127
Abandonments	4
Water grants	7
Miner's Certificates, personal	1,337
Miner's Certificates, companies	60
Miner's Certificates, special	39

MINING RETURNS AND STATISTICS.

ROSSLAND.

	TONS.		
	1901	1900	Increase
Shipments for February	27,635	6,960	20735
Shipments for January	28,000	24,933	3,067
Total	55,635	31,893	23,802

To 26th March shipments for 1901 are as follows:—

	Tons.
Le Roi	29,123
Centre Star	18,420
War Eagle	6,530
Le Roi No. 2	1,512
Iron Mask	1,276
Rossland Great Western	540
Velvet	500
I. X. L.	70
Evening Star	70
Spitzee	6

	Tons
Grant	60
Portland	27
	57,695

SLOCAN.

Since January 1st, to February 23rd, 1901, the shipments from Slocan and Slocan City mining divisions have been as follows:

	Week.	Total.
Payne	180	1112
Last Chance	75	330
Slocan Star		120
Ruth		151
Bosun	20	160
Hewett	30	160
American Boy	41	420
Ivanhoe	60	300
Trade Dollar	21	84
Sovereign	27	108
Wonderful		4
Arlington	60	600
Two Friends		40
Enterprise		80
Hartney		80
Black Prince	20	40
Goodenough	25	70
Miller Creek		20
Reco		38
Sunset		21
Queen Bess		283
Monitor		77
Coriath		24
Bondholder		20
Rambler		150
Surprise		20
Kaslo Group		10
Chaplean		15
Speculator	10	10
Total tons	569	4,704

Shipments of ore from Slocan Lake points during 1900 totalled 4,930 tons. From January 1st 1901, to March 2nd, they were:

From New Denver	
Hartney	100
From Bosun Landing	
Bosun	180
From Silverton	
Hewett	450
From Enterprise Landing	
Enterprise	80
From Slocan City	
Arlington	660
Two Friends	40
Black Prince	60
Bondholder	20
Chaplean	15
Speculator	20
Total tons	1625

THE COAST.

During the month of February 1,011 tons of ore were shipped from the Lenora mine, Mount Sicker.

PROFITS PAID BY B.C. and KLONDIKE MINES.

The following table from the B. C. Review is the only statement which has ever been published in which the profits distributed by both English and Canadian companies are shown. The table has been brought up to date.

MINING COMPANIES.

Name.	Nominal Capital.	Amount of Capital Issued	Total Dividends
Canadian Goldfields	$1,000,000		$ 30,000
Cariboo (McKinney	$1,250,000	$1,250,000	$ 478,087
Centre Star	$3,300,000	$3,300,000	$ 105,000
Fern	$ 200,000	$ 187,500	$ 10,000
Idaho, B. C.	$ 100,000		$ 292,000
Last Chance, B. C.	$ 100,000		$ 140,000
Noble Five	$1,200,000		$ 43,000
North Star	$1,500,000	$1,250,000	$ 75,000
Payne	$3,000,000	$3,000,000	$1,115,000
Rambler Cariboo	$1,250,000		$ 105,000
Reco	$1,000,000		$ 297,000
Slocan Star	$ 500,000		$ 400,000
War Eagle	$2,000,000	$1,750,000	$ 545,250
Le Roi	£1,000,000	£1,000,000	$1,305,000
Whitewater	£ 125,000	£ 125,000	$ 194,532
Ymir	£ 200,000	£ 200,000	£ 20,000
Hall Mines (old Co)	£ 350,000	£ 275,000	£ 46,250
Queen Bess	£ 120,000	£ 100,000	£ 5,000
Athabasca	£ 100,000	£ 93,460	£ 4,850
Ruth	£ 120,000	£ 115,000	$ 165,000
Klondyke Bonanza	£ 150,000	£ 55,250	£ 2,500
McDonald's Bonanza	£ 450,000	£ 433,465	£ 17,233
Yukon Goldfields	£ 100,000	£ 47,986	£ 5,000
Klondike Consols	£ 250,000	£ 250,000	£ 37,500
Alaska Goldfields	£ 300,000	£ 250,000	£ 54,166
B.C. Development Asso.	£ 20,000	£ 20,000	£ 21,000
British America Corp	[1,500,000	£1,500,00	£ 150,000
Dominion Mining	£ 100,000	£ 62,000*	£ 31,150
London, B.C. Goldfields	£ 200,000	£ 140,000**	£ 61,000
London and Van. F. D.	£ 100,250	£ 12,660	£ 2,539
New Goldfields of B.C.	£ 250,000	£ 62,143	£ 17,286
Nimrod Syndicate	£ 25,250	£ 12,700	£ 2,490

*Dividends consisted of cash and shares.

**Dividend paid in shares.

COAL EXPORTATIONS.

The exports of coal from Vancouver for January were as follows:

	Tons.
New Vancouver Coal Company	49,744
Ladysmith	18,041
Union	19,842
Total	87,627

For February the returns are:	Tons.
New Vancouver Coal Company	39,710
Union	21,145
Ladysmith	30,992
Total	91,847

The output of the Crow's Nest Collieries, East Kootenay, is at present at the rate of 1,400 tons daily.

THE METAL MARKET.—FEBRUARY.

SILVER.

Since the close of last month there has been little change in the selling price of silver, although a slight improvement is reported from London. The latest New York quotation is 61/2. The average price last month was 63.12.

SPELTER.

The market for spelter is decidedly active with 3 7/8 quoted for St. Louis delivery and 4.05, New York.

COPPER.

The New York market is rather firmer and some activity is reported. On the other hand the European market is apathetic. Lake copper is quoted at 16 3/4; electrolytic in cakes, wirbars and ingots at 16.40 and 16.50; in calliodes at 16.15 and 16.25; coating copper at 16 7/8 and 16 1/2.

LEAD.

Business continues active at stationary prices; 4.17 1/2 and 4.32 1/2; St. Louis; 4.32 1/2 and 4.37 1/2, New York.