

The Mining Record

VCL. IX.

AUGUST, 1902.

No. 8

BRITISH COLUMBIA MINING RECORD

Devoted to the Mining Interests of the Pacific Northwest.

PUBLISHED BY

THE BRITISH COLUMBIA RECORD, LIMITED

H. MORTIMER LAMB, Managing Editor.

Victoria, B. C., Office, Province Building.
London Office: 24 Coleman Street, E. C.
Toronto: T. Simpson Jones, 77 Victoria Street.
Denver, Col.: National Advertising Co.
San Francisco: Duke's Agency.

SUBSCRIPTION TERMS:

Canada and the United States, one year - - \$2.00
Great Britain and Foreign, one year - - - \$2.50

Advertising Rates on Application.

Address all communications to

THE MANAGING EDITOR, B. C. RECORD, LTD.,
P. O. Drawer 645, Victoria, B. C.

THE MINES REPORT, 1901.

THE Annual Report of the Minister of Mines for the year 1901 has at length been issued. The work itself is more interesting and fuller than usual, but it loses greatly in value and utility by reason of the tardiness in its appearance. The explanation is given that the Report went to press on March 11th last, but that its publication was delayed until the latter part of June in consequence of stress of sessional work in the Government Printing Department. Such an excuse is hardly satisfactory. Mining is our most important industry, and official information respecting it, to be of more than academic interest or value, requires to be not only definite, specific and accurate, but also prompt. Although it may certainly be conceded that the Mines Department renders excellent service to the country, there are nevertheless many ways in which that service might be vastly and advantageously improved. Under Government the post of Provincial Mineralogist is now occupied by a gentleman of eminent professional attainments, those of a highly trained metallurgical specialist, possessing also an extensive knowledge of all branches of mining. It is questionable, however, whether Mr. Robertson's special qualifications and talents are turned to the best account

in the performance during a greater portion of the year of office detail work, which might equally well be left to the care of subordinates. To our mind, and we merely represent views held by a large number of our constituents, the Provincial Mineralogist should spend at least nine instead of perhaps four or five months in the field. He should be ready to visit, or be in a position to engage a suitable substitute to visit in his stead, any new mining territory of promise and prominence. And the result of these investigations should be published with as little delay as possible after the necessary information has been secured. This system was to some extent followed by Mr. Carlyle, Mr. Robertson's predecessor, and during one year three or four bulletins of the greatest possible interest and utility were issued by the Department at regular intervals during the year, Mr. Carlyle occupied the office of Provincial Mineralogist, dealing with the Trail Creek district, which was then attracting much attention, and also with the Slocan districts and the mining camps of Vancouver Island. Last year, it is true, the Department recognized public requirements in this respect by issuing a bulletin on the new Horsefly placer fields, but the information was not supplied by the Provincial Mineralogist or other equally qualified authority, which would have rendered such a report so much more valuable. Again, as yet, no efforts appear to have been made to put in force the Act passed over a year ago by the Provincial Legislature, authorising the official publication of mining returns and statistics at more frequent periods. A step in the right direction was, however, taken by the publication in January last of advance estimates of mineral production during 1901, and the corrected returns now published show how close that approximation was to the actual figures. But even this does not go far enough. The public should not be asked to wait twelve months before any official information of the progress of our mining industry, as afforded by statistics of mineral output, is available. That this should have been the case heretofore, is so far as we can ascertain, not altogether a result of neglect on the part of the Department, but to the objection raised by mine-managers to make such returns every month as the Act calls for. This objection is to some extent valid, as much of the information the mine-owner is required by law to furnish is unnecessary in character and could only be supplied at the expenditure of much time and trouble. This defect in the Act might, however, be quite early remedied if mine-owners were but asked

to send in quarterly returns of tonnage and values. We are satisfied that then no reasons for non-compliance would be advanced; but in such an event compulsory measures should be resorted to. The Mines Report as at present constituted has little practical value beyond that attaching to historical records, and the files of some newspapers published in the Province not only serve that purpose, but also contain information that is not only more original, but also possibly more accurate. If we except the really reliable and useful data, such as the statistical tables, special reports of the Provincial Mineralogist and the Mine Inspectors, which represent a relatively small proportion of the work, nothing remains, as we have previously pointed out, but reports by Gold Commissioners and Mining Recorders, who in general have themselves no actual mining experience or knowledge, and the information supplied to the Government from this source is therefore nothing much better than mining camp gossip officially served. In justice to the mining district officials it should, however, be mentioned that they represent an extremely capable and hard-working branch of the civil service; but their duties are chiefly clerical, and it is hardly fair to expect them to go outside of those duties. If this feature were eliminated from the Mines' Report altogether, and the reports from Mining Recorders were confined to office statistics from each district only, the Province would certainly not suffer any greater inconvenience or loss thereby. On the other hand, the King's Printer would be saved much useless labour. The work of preparing the annual report is, we understand, not commenced until a month or so prior to the date of proposed publication, or at a time when the House is sitting and the Government Printing Office is taxed to its fullest capacity. Thus, as on this occasion, the publication of the work is unduly delayed. If the Department would act upon our suggestions in respect to the periodical publication of mine statistics, and in the issuing from time to time of bulletins prepared by the Provincial Mineralogist, dealing with progress and developments in various sections of the country, little more would be required in the preparation of an annual report than the compilation and arrangement of the material already thus available, together with the addition, of course, of the Mine Inspectors' and district office reports. The printing of the Annual Report would, if this plan were adopted, not only be very considerably facilitated, with the result that it would appear in proper season, but the work itself would be infinitely more serviceable than it is at present. The Hon. the Minister of Mines, in Mr. Dunsmuir's Government, Lt.-Col. Prior, assumed office but a few months ago, and he has hardly had time as yet to introduce departmental reforms of so radical a description as those we advocate, but as he, unlike his predecessors, has the advantage of a practical mining knowledge, and is, moreover, ac-

quainted with the conditions and requirements of the industry in British Columbia, he may well be trusted to take such measures as are necessary to increase the serviceability and efficiency of the Department over which he presides.



THE STRIKE OF COAL MINERS AT FERNIE.

THE coal miners' strike at Fernie was an event of far-reaching importance, because it affected not only the four hundred men, directly concerned in it, the Crow's Nest Pass Company and their employees, but the operations of the smelters depending upon Fernie for their supply of coke; and anything curtailing the capacity of smelters must inevitably, after a time, reduce the output of the mines, which send ore to them. Thus the whole metalliferous mining industry of the Boundary district was injuriously affected, and in the event of a prolonged strike might be paralyzed and all its business interests greatly injured by such action as that of the coal miners. So interwoven are the various mining interests, and so fundamental to their prosperity is the production of coal for coking purposes, that nothing of a business nature would have so disastrous a result, so far as Southern British Columbia is concerned, as a prolonged strike of coal miners. It appears that the Boundary smelters, the largest consumers of Fernie coke, were able after some delay to secure a partial supply of coke, but this is a detail only, and does not affect the great principle involved in such a strike as that now under consideration. The following extract from the *Phoenix Pioneer* of July 12 states this aspect of the case clearly and forcibly, and is the more valuable because it is from a paper published in the heart of the copper mining district:

The chief industry of the Boundary—that of mining—which gives employment to a thousand men, and support to five thousand more, is in a crisis. The men are not dissatisfied with the wages paid, nor the hours of work nor the way in which they are treated. There is plenty of ore, and capital stands ready to do business. Three smelters are prepared to handle from 2,500 to 3,000 tons of ore daily. There is no strike, no trouble here of any kind. And yet the mining business is temporarily at a standstill, because a few men, some 300 miles from here, with whom we have nothing to do, and over whom we have no control, have seen fit to so decree.

* * * * *

Let us review the situation, which we hope will be in process of adjustment before these lines are before our readers. Boundary smelters require about 350 tons of coke per day for fluxing purposes. This coke must come from the Crow's Nest collieries, where we were told not long ago there are illimitable quantities of suitable coal. Boundary ores are of such low grade that the coke must be laid down at the lowest possible rate to admit of the ores being smelted at a small profit. Therefore, only Crow's Nest coke can be used to advantage.

* * * * *

Millions of dollars are invested here, and thousands of persons are dependent on the mining industry for a living—none too good a living at the best. Even the C.P.R., great

as it is, cannot but lose heavily by such a strike—probably \$2,000 or \$3,000 per day, to say nothing of the large number of men it gives employment to in the ore and coke carrying traffic. All of these immense interests are dependent upon the whims of a few shareholders or a few employees in the Crow's Nest. This is certainly not as it should be.

The cause of the coal miners' strike was a regulation put in force by Mr. J. H. Tonkin, the new General Manager of the Crow's Nest Pass Coal Co., requiring the men to remain underground eight and a half hours, instead of eight hours as formerly. Against this order the miners protested, claiming that "eight hours per day from pit's mouth to pit's mouth was a just and satisfactory day's work under ground," and had so been found by the company. Replying to this protest: Mr. Tonkin said that all the company wanted was eight hours work for eight hours pay, and he subsequently gave out for publication a statement of the company's position. In this he disavowed any intention of antagonizing the men, and denied that the new regulation is the entering wedge of a ten-hours system. He stated the position of miners in relation to the company to be as follows:

This single shift plan would be a great benefit to every miner in Coal Creek mines; he would get more coal, his room would be kept in far better and safer condition, and he would not be haunted by the fear that if he left a little coal at night the man who cross-shifted him would reap the benefit of some of his labour. The miner, as everyone is aware, is a contractor, inasmuch as he works on a basis of coal tonnage, yardage, etc., and is therefore largely his own boss. His earnings are entirely dependent upon the amount of labour he daily devotes to his work. He regulates his hours of work largely by the conditions of his room, and may labour six, seven or eight hours daily, and no objections are raised to his so doing, the only requirement being that he does not fall too much behind the turn of the miners in his division or district of the work—on the other hand no limit is placed on the amount of work he may do if he pleases, the company taking from him all the coal he may load.

Mr. Tonkin pointed out also that it is absolutely necessary in order to secure the best results "for the men, the community and the company," that there should be continuous work, both above and below ground, but as eight hours is too long a period for men to labour without rest, the company proposes that all work by day men shall cease for half an hour during the middle shift. He says the system which he has inaugurated is precisely the same as that demanded by the strikers in the Pennsylvania anthracite mines. The miners simply reply that they have been accustomed to have "eight hours from bank to bank" and are not willing to put in eight hours at the "coal face." They claim that under the new regulation some of the men would be nine hours from bank to bank. The case between the company and the miners seems in brief to be that the company proposes to suspend work for half an hour to give its day men a little time for rest and food. The day men will work eight full hours. It therefore requires that the miners shall put in eight full hours at the "coal face." The miners want their eight hours to begin when they enter the pit and to leave the coal face in time to get

out of the pit at the expiration of eight hours. Under the statement of the case, as made by the miners themselves, it is clear that under the arrangement in force before the new regulation the men were at the coal face from seven to seven and a half hours, while the day men dependent upon them for a supply of coal worked eight hours.

It is not intended in this article to inquire into the merits of the question between the management and the miners, further than has been done above, nor to express any opinion except to say that the position of the management seems a reasonable one. Indeed, the miners do not dispute his reasoning, but content themselves with saying that the new regulation is "an encroachment upon the rights of labouring men." They call upon the representative of South Kootenay to secure the passage of a law making eight hours from bank to bank a working day in coal mines. Thus we find the coal miners of Fernie "appealing unto Caesar," and as they have done so it is proper to inquire how the legislature should deal with the whole subject matter, including strikes and the remedy for them.

At a mass meeting of miners held at Michel on July 2nd a proposal to inaugurate a strike in sympathy with the Fernie miners was voted down by a ballot of 56 to 12; nevertheless the secretary of the union posted up a notice declaring that the men should not work. Of itself this is not a very serious matter, but it illustrates a principle. The miners have seen fit to subject themselves to an arbitrary authority, which would not be tolerated for one moment in the government of the country. A short time ago the president of the Chicago Teamsters' Union—we are not sure that the name is absolutely correct—stated that he could at any moment order twenty thousand men to quit work, and this led one of the newspapers of that city to remark that this was a greater power than was possessed by the President of the United States or even by Congress. So we see at Michel an absolutely irresponsible individual ordering a strike. Whether few or many of the miners obeyed the order is neither here nor there. The assumption by any one of the right to exercise such a power is dangerous to the community. It is said that the Fernie strike was ordered by the Western Federation of Miners, an organization formed in the United States and controlled there. Thus British Columbia industries are at the mercy of an organization, the managers of which have no interest in this Province, and may be hostile to its progress, who are not amenable to the laws of this country and whose opinions have been formed from conditions, which happily do not exist in this Dominion. The men constituting the Western Federation of Miners in the United States have lost confidence in the institutions of their country, and have set up an *imperium in imperio*. It is intol-

erable that such an organization should be able to blight the prosperity of this Province. In their published appeal the Fernie miners say: "Autocracy has reigned too long in this fair land. We love our freedom and appreciate equal rights." What greater or more mischievous autocracy can be imagined than that which places the industries of this Province under the control of an alien organization? What a fallacy it is to talk of freedom while owning blind and unreasoning obedience to an absolutely irresponsible authority? It is said that the British Columbian miners contemplate severing their connection with the Western Federation. They will be wise if they do so, for they have sufficient protection under the laws of this country without resorting to methods which have been adopted in the United States to secure common justice, and they are surely competent to decide for themselves what their interests call for without extraneous interference.

That some remedy must, if possible, be devised for this state of things will be admitted without argument. What that remedy should be and how it can be brought about are more difficult questions. Compulsory arbitration appears to be the most reasonable, although it is not a perfect method; but it is to be borne in mind that no remedy for the prevention of evils operates wholly satisfactory. There are laws to prevent smuggling, yet people smuggle and would probably continue to do so under any system of legislation that can be devised. There are laws for the suppression of nuisances and crimes, yet nuisances and crimes are by no means rare. But no one argues that, because these laws do not secure implicit respect, they are useless. If they fail in accomplishing their purposes, we seek, if we are wise, to secure their better enforcement. Or take a class of laws which are more nearly akin to measures that may be adopted for the prevention of labour troubles, such, for example, as those for the control of railway companies and coming within the jurisdiction of the Railway Committee of the Privy Council in Canada and of the Inter-state Commerce Commission in the United States. No one pretends that these laws are absolutely effectual to prevent the evils against which they are directed; yet it cannot be denied that they are productive of great benefit, and a proposal to repeal them would be resisted by all classes of the community. Why should we approach the settlement of labour troubles and the overthrow of the tyranny of labour unions in any different spirit from that in which the settlement of transportation problems and the overthrow of the tyranny of railway corporations were dealt with?

We concede that in the case of the great corporations franchises exist, which can be rescinded, and there are properties of immense value, which can be attached, if the orders made by constituted authority

are not regarded, while in the case of labour unions the subject matter to be dealt with is the right of individuals to labour, and this we all thought, until union tyranny became a feature of the community, was something which the law had no right to touch. But this difference does not affect the argument for the enactment of remedial legislation. The partial success attending the efforts to control the corporations is an encouragement to attempt the control of the workingmen, within such limits as are consistent with the exercise of individual liberty, and the fact that no one will pretend that such control will be absolutely effectual in all cases is no reason why the attempt should not be made.

We would not be understood as suggesting the enactment of a law compelling any man to work for any one else under any conditions whatever: at the same time we object to any man being prevented from working for any other on the terms satisfactory to himself. Perfect freedom of an individual to place his services at the disposal of another for any legitimate purpose upon terms satisfactory to them both should be secured by law. Nevertheless there is no valid reason why working men should not form unions and co-operate within reasonable limits to secure better wages and better conditions of employment. On the whole the application of arbitration to the disputes arising between working men and their employers has been satisfactory, and we are strongly of the opinion that the time has come for the enforcement of this method in British Columbia by the strong arm of the law.

Compulsory arbitration is not by any means objectionable to the majority of workingmen, although they would probably all object to any compulsory steps to enforce the decrees of the Court of Arbitration. An argument, which meets with approval among some workingmen, is that the unions depend upon public opinion for their influence, and that while cases may be cited where unions have resisted it, in the majority of instances it will be found that they will not stand out when their case is not supported by the general sense of the community. The strike of the anthracite miners in Pennsylvania, it is claimed, derives its whole force from the fact that the miners have a good case. This aspect of the question is worthy of very serious consideration, and a system of compulsory arbitration depending for its force upon the coercive influence of public opinion might be worth trying. To get the best out of such a system it would be necessary to provide a full measure of protection for individuals, who might submit to the terms of the award, and of enforcing its observance by employers. By this it is not meant that if the Board of Arbitration should decide that a certain wage was reasonable and proper, that employers should operate their undertakings and pay that wage,

or that employees should be compelled to go to work for such a wage. This would have to be left to the parties concerned to decide for themselves. The question will bear further discussion as to the practical details, for the time has come in this Province when the relations between employer and employed should be placed upon a better basis than they now are.

THE IRON INDUSTRY.

MUCH attention has been given during the last few months to the possibility of establishing in British Columbia iron smelters and kindred industries. While nothing definite has been yet accomplished, nor is indeed to be expected, from public discussion, a great deal of good has been done, for much information bearing upon the question has been brought out and the Department of Mines has promised to do all in its power to supplement information at present available by official investigation. The great benefit of the academic treatment of this industry is that the facts elicited will hardly fail to attract the attention of possible investors, for there never was a time in the history of the world when iron, in one form or another, was in anything like as great demand as it is to-day. In the building trade, for example, the consumption of this metal far exceeds anything contemplated not very long ago. Most of us can remember when in the construction of even the largest buildings iron played a very subordinate part, while in structures of the ordinary class it was scarcely ever employed except in the form of nails. Nowadays the concentration of business in the larger cities has led to the erection of buildings of a class calling for great quantities of steel, and even in smaller structures iron is being employed to a much larger extent than ever before. Within comparatively recent years there has been an active demand for steel for bridge purposes, and it is only a matter of a comparatively short time when the majority of the larger wooden highway bridges in North America will be replaced with steel. The same is true of the railways. In thousands of instances wood has been employed in the construction of railway bridges, with a full knowledge that they would later be replaced by steel structures. This has been the case with so many roads that it is needless to particularize any one of them. At the time of construction motives of economy led the companies to employ the material which was the cheapest at the moment, with the intention of substituting permanent structures when traffic warranted. A heavier volume of traffic likewise calls for heavier rails over many miles of railway every year, in addition to the demand made by ordinary wear and tear. A steady increase in railway mileage means not only a demand for rails for

new lines, but an increase in the annual demand for renewals. The volume of commerce is steadily growing, and this means a vast addition annually to the quantity of iron used in ship-building. In short, the demands of transportation, including ships, railways and bridges, call for a supply of iron which not only immensely surpasses that of a comparatively short time ago, but is expanding every year. It is not necessary to mention the other industrial uses to which iron is put, for nothing is clearer than that with the increasing complexity of our civilization the number of the purposes for which it is employed and the quantity required is steadily expanding.

It is open to doubt if the discovery of new deposits of high-class iron ore is keeping pace with the expansion of the market. Though very widely distributed the ores of iron are not very often found of such quality as to warrant their employment economically at present prices and under existing methods of treatment. Every deposit of iron ore is not a mine of economic value, as a good many people in this Province have learned to their cost. Many things enter into consideration, when one endeavours to pronounce upon the value of an iron deposit. There is the quality of the ore itself, the availability of fluxes when necessary, the cost of fuel, the convenience and cost of grouping together the materials necessary in successful smelting operations, the cost of labour, the accessibility of a market and so on. In addition to these what may be called natural considerations, there is the artificial consideration which may or may not arise from the fact that a great combination of capital dominates the iron market. These are matters into which intending investors will look, and the most that those who are unable to take up the industry in a practical way can hope to do is to cast as much light as possible upon them. We repeat that what has been done in this direction in Victoria recently has been of very great value, and those who have been instrumental in accomplishing it should persevere along the lines of investigation that may open up.

Some things have been established beyond question. There are numerous deposits of iron ore in British Columbia, some of them being apparently of great magnitude, although few, if any, have been fully proved. The magnetite ores are of high quality as a rule, but will be expensive to handle without a flux. The hematite deposits are not as well known, and are not as a rule as well situated in respect to water transportation as the magnetite, many of these latter being upon salt water and accessible by the largest ships. There are some deposits of bog iron, but very little has been ascertained about their extent. There are apparently extensive deposits of iron clay. Speaking conservatively, it may be said that, so far as the ore is concerned, a good *prima facie* case has been made out, and one may feel safe in recommend-

ing capitalists, desiring a field for investment in the iron industry, to give the Coast section of this Province careful and exhaustive examination. So far as fuel is concerned there need be no question. If the object is to produce charcoal iron, there is abundant wood for the manufacture of charcoal. If coke is needed there is an abundance of excellent coking coal, which can be secured by any one who might wish to be independent of the present colliery companies. The transportation of ores and fuel to the point of assembly for smelting would be almost wholly by water in land-locked seas. It is not probable that the cost of labour would materially handicap the industry in British Columbia. It does not in the State of Washington. The exceedingly favourable character of the climate on the Coast of the Province is an element that must be taken into account, because the absence of extremes of temperature and the almost entire absence of snowfalls over the greater part of the area contribute largely to the successful employment of labour in any industry. The local market is necessarily limited, but there is a growing demand in the interior of Canada, while the industry would be established on the ocean and hence all foreign countries would be accessible at a minimum cost. The claim is made by those, who have given the subject some investigation, that iron can be manufactured in British Columbia and exported to the Pacific Coast States at a profit. We do not vouch for the accuracy of this.

On the whole the advantages which British Columbia offers as the seat of a great iron industry are well worth very careful investigation by persons contemplating an investment of that character.

YUKON GOLD AND B. C. CITIES.

LAST year the Boards of Trade of Victoria and Vancouver made a praiseworthy and not unsuccessful effort to divert a part of the flood of Yukon gold from Seattle to these British Columbian cities. Funds were subscribed in Victoria and Vancouver last year to make good any charges in the transmission of bullion from those cities to the mints, so that miners could obtain a full price for their bullion, and a rebate on account of the royalty on gold sold at the B. C. assay offices was allowed by the Dominion Government. The benefit of this policy was felt to a very considerable extent almost immediately, but for some reason that has not been made public, the rebate has been abandoned, and at present no inducements are offered to miners to bring their dust to Canadian cities, so that it now practically all goes to Seattle. This is a great disappointment to the business men of Victoria and Vancouver, who hoped that their efforts last year would have produced lasting results.

The present system of handling Yukon gold is not a good one, and perhaps the interests of all concerned would be best served by the establishment at Dawson of an assay office, where the gold could be purchased by the Dominion Government, cash or drafts on Canadian banks being given for it. Those who are familiar with business conditions in Dawson state that the use of gold dust as a medium of exchange is attended with considerable loss, especially to the retailer. It would be better for the miner and trader if dust went out of circulation in Dawson, and this can only be completely brought about when the Government provides a means whereby miners can realize upon their bullion on the spot. Not many men wish to bring their gold dust out of the country, the greater number of the miners preferring to carry either bank notes or bills of exchange. If such bills of exchange were made payable at par at Canadian banks, their holders would in many cases present them in the British Columbia cities. Probably at least as many of them would do so as would bring bullion to those cities to have it assayed, under any system of assaying that could be adopted. The claim of the British Columbian cities, that steps should be taken so as to attract to them the largest possible share of the Yukon trade, is a reasonable one. They have been much handicapped in the past. Vexatious administration of the customs laws at Skagway, the exceptional treatment accorded by the Canadian Government to United States coasting vessels in the Northwest trade, the fact that a majority of the Yukon miners came from the United States, and the constant and powerful, if intangible, influence of the largest centre of population in the Pacific Northwest drew and continues to draw away from those cities a large part of the business, which under other conditions would have found its way there. If the Government can devise any means of overcoming these handicaps and enabling British Columbian business communities to compete on an equal footing with the United States-cities for the Yukon trade, if, indeed, the Government can discover any reasonable way in which our cities can be given an advantage in this regard, it would be an act of prudent statesmanship to take the necessary steps.

The attention of our readers is directed to an advertisement appearing in this issue announcing that a meeting of the Canadian Mining Institute will be held in Nelson on September the 11th and 12th next for the purpose of organizing a branch in British Columbia. We feel confident that mining engineers and managers in the country will approve of this movement and afford it hearty support. As is of course known, British Columbia of all the Provinces of the Dominion occupies the leading position in point of metalliferous mine output, and it is therefore but right and fitting that this important industry

should be represented in the Province by an organization comprising those chiefly interested in and responsible for its promotion and welfare. Meanwhile we desire to express our appreciation of the excellent work done by Mr. B. T. A. Bell, the society's capable and energetic secretary, by whose efforts largely the Institute has been placed in its present position of usefulness and influence. The Canadian Mining Institute, previously known as the Federated Mining Institute, was incorporated by Act of Parliament of Canada in 1898, its objects being to promote the science and practice of mining and metallurgy in Canada, and to advance the development of the mineral resources of the Dominion. The membership to-day numbers about four hundred,—exclusive of mining students, of which over one hundred names are entered on the Institute's list under this heading—and is thoroughly representative of the best elements of the mining profession and industry in Canada, from Newfoundland in the East to the Yukon Territory in the Far West. The proceedings are published in volume form annually, and the growing importance of the Institute may be tolerably well gauged by the fact that Vol. V., now in the press, will, we understand, contain over 800 pages and 200 engravings, and include something like forty papers contributed by the most eminent Canadian mining authorities on subjects applicable to mining and metallurgical practice in this country. The Institute offers every year two gold medals for competition, one being given for the most meritorious paper contributed by any member during the year, and a second, in addition to money prizes, for the best original papers sent in by students. Among papers promised for the Nelson meeting are the following: "Coarse Concentration in the Nelson District," by S. S. Fowler; "Mine Timbering by the Square Set System at Rossland," by Bernard McDonald; "Comparison of Costs of Compressed Air by Steam and Electric Power at Rossland," by William Thompson; "Mine Signalling by Compressed Air," by Bernard McDonald and W. Thompson, and "Mineral Resources of Vancouver Island," by W. M. Brewer.

The report of the committee appointed by the shareholders to investigate the position of the Le Roi mine scarcely casts much new light on the situation, and although the outlook is said to be less gloomy than was originally supposed, we are inclined to agree up to a certain point with the conclusions arrived at by Mr. C. Williamson Milne, a member of the committee, who in a minority report recommends the reconstruction of the company as the best means of getting rid of the large indebtedness to the Bank of Montreal. This indebtedness amounted at the beginning of May to approximately a million and a half

dollars, and the interest on this enormous sum alone would be sufficient to pay a dividend of over 1½ per cent. on the present excessive capitalization. The affairs of the concern are seemingly in such a hopeless muddle that some scheme—not by any means necessarily Mr. Milne's—whereby the tangle might be unravelled and a fresh start under more favourable conditions made, should have been if possible devised and adopted in preference to a *laissez faire* policy, they the shareholders apparently desire. If, however, they and the Bank of Montreal are satisfied there is nothing more to be said. Meanwhile the company suffers a loss in the resignation of Mr. Mackenzie from the mine management, while the acceptance by Sir Henry Tyler and Mr. A. J. Macmillan of directorate positions is a distinct gain. Had these gentlemen joined the Board earlier, it is very probable that Mr. Mackenzie would have had no special cause for abandoning his post. Be that as it may we cordially agree with the *London Critic* that "with straightforward management at the mine, and an honest Board of business men in London, the shareholders may yet see a very good return upon their investment; but if they will again hand over the undertaking to a group of company-mongers, the probability is that their last state will be very much worse than it is at present."

A very interesting rock drilling contest with air drills recently took place in Denver, Colorado. The rock selected for this test was a schist of more than ordinary hardness for drill work, and the competition included setting up the machine, and after drilling two holes taking to pieces and replacing it in the original position. In drilling, one hole was above the horizontal and the other below, with the stipulation that the angle was not to exceed 25° in either case. The depth of hole was nine feet and gauge of finishing drill 1½; size of drilling machine not over three inches air cylinder, and the air pressure was to be maintained at 110 pounds. Any make of machine was allowed. There were twenty-three team entries, the winners making the following record: Time of setting up, 3½ min.; time, 1st hole, 17½ min.; back, time, 1st to 2nd hole, 30 sec.; time, 2nd hole, 17 min. 50 sec.; down, 2 min. 55 sec.; time tearing down, 2 min. 55 sec.; total time, 42 min. 15 sec. The makes of drills used by the several competitors were those manufactured by the Ingersoll, Sullivan and Leyner companies, the latter make of machine in this particular instance proving the most serviceable for rapid work, it being employed by the winners of both the first and second prizes. Unfortunately, we have not by us at the moment any catalogue or other means of informing ourselves of the special merits of the Leyner machine, although we observe that the machine is listed by the Hendrie & Bolthoff Manufacturing &

Supply Co., of Denver, Colorado, an establishment, of course, well known to our readers.

We print elsewhere in this issue a letter from Mr. J. R. Crossan, local manager of the McCrossan undertakings in the Lardeau, replying to an article entitled "Preacher and Promoter," which appeared in the June issue of the *MINING RECORD*. Mr. McCrossan states that he has not read the article itself, but draws his own conclusions of its tenour from extracts published therefrom by the *Monetary Times* (Toronto). In only one particular does our correspondent challenge the accuracy of our statements, and that is in respect to the establishment of the Vulcan Furnace at Ferguson before it had been ascertained that suitable fluxes were obtainable in the immediate vicinity. He states that the company was perfectly well aware that the material was available, but as last winter the snow covered the ground to a depth of five feet or over, operations were delayed. But this does not tally with the assertions made by the "Rev." C. W. McCrossan in his bulletins to shareholders. If, however, the managements of these concerns will drop romancing and other stock-booming methods, and devote their energies instead to legitimate mining work, there will be no further grounds for criticism. The Triune, at any rate, is an exceedingly promising claim, and should yield good profits if operations are directed in anything like a competent manner.

Our contemporary the *New Denver Ledger*, is generally conceded to be one of the wittiest and most original weeklies published in British Columbia. Yet in a recent issue it does not hesitate to crib *hokus bolus* a leading article from last month's *MINING RECORD* on the subject of our iron resources. Several other local papers have been guilty of the same offence of late. Not that this sort of thing really matters to us, but there is a journalistic etiquette which, we think, should be observed in British Columbia as elsewhere. A newspaper is perfectly warranted in extracting news of a certain kind after it has thus become public property from the columns of a contemporary without crediting the source from whence this information originated, but original editorial comment does not come under the category of "stealable" matter, and in all fairness proper credit should be given for it when it is considered of sufficient interest and value to be republished by another journal. Some of the technical periodicals published in the States, as for example the *Mining Reporter* (Denver) in self protection, even go the length of copyrighting the complete contents of each of their issues.

It is gratifying to learn that at length better results

appear this season to be attending gold dredging effort, both in British Columbia and in the Yukon. The dredge at Lytton is said to be now operating successfully, and reports of operations at the mouth of Tranquille Creek, near Kamloops, are also distinctly more encouraging. In the Yukon, dredging is being prosecuted on Bonanza Creek and on Stewart River. Somewhat novel measures, it is learned, are employed in the former case, bedrock ground ahead being drilled and blasted, the material being afterwards taken up by buckets attached to the arm of the dredge. The direction of work on the Stewart River has been assumed by Mr. William Ogilvie, formerly Commissioner of the Yukon Territory, who having thoroughly investigated conditions in that locality is satisfied of the existence there of gold in payable quantities, which he believes is easily recoverable.

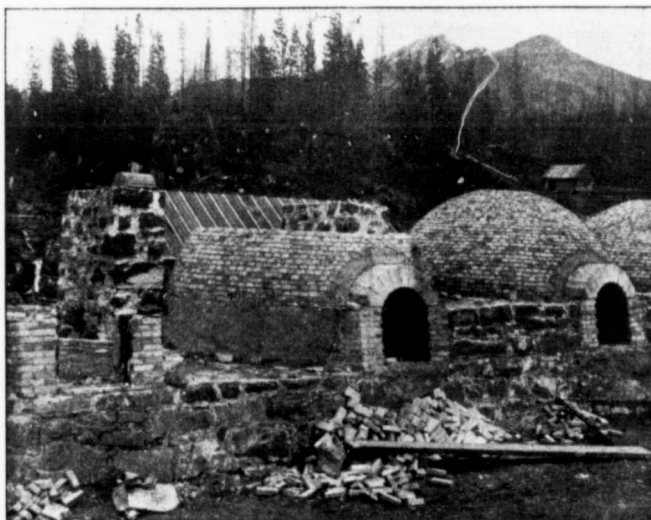
It is with the deepest regret that we learn of the sudden death from drowning of Mr. Howard West, A. R. S. M., who for many years practiced as an assayer in the Slocan. Mr. West at one time acted as special correspondent of the *MINING RECORD* and contributed many valuable articles on the subject of silver-lead mining in the Slocan district to our columns. He graduated from the Royal School of Mines with honours at the early age of seventeen, and was generally regarded as an exceptionally clever and rising member of his profession. A most promising career has been suddenly cut short by his untimely death.

Mineral discoveries of more than usual interest have been recently made in British Columbia. Thus, for instance, the recent discovery in several sections of the Similkameen district of ores carrying platinum, specimens recently assayed by Messrs. Baker & Co., of Newark, N. J., being found to contain 60 oz. of this metal to the ton, in addition to gold and copper values. On Whitewater Creek, too, near Kaslo, asbestos occurrences are being developed by a Montreal syndicate, while in East Kootenay much attention has of late been directed to the large surface indications denoting the presence of mineral oil there.

We have had this month somewhat tangible proof of the increased interest that is now being manifested by Americans and others in the East in respect to mining development in British Columbia. Thus since July 1st, no less than a hundred and forty-three applications have been made to us for specimen copies of the *MINING RECORD*, while quite a respectable number of new subscriptions have also been received from the same quarters.

Cretaceous rocks occurring in the basin. Toward the end of the season, a section was measured on the front of the escarpment, about three miles north of Morrissey siding. A steel tape was used and slopes were measured with a hand-level. The results should be fairly reliable. It is only in the adjustment necessary where there was a local twisting of the beds, that there is room for any appreciable error. The site selected for the section was on a small spur from the escarpment, where, some years ago, Mr. Fernie had excavations made on the outcrop of the coal seams. The crest of the spur has an average slope of nearly thirty degrees, and affords the exceptional opportunity of getting an unbroken section of almost 5,000 feet. Dr. Selwyn, then Director of the Survey, pub-

14	Black shale	11	0
15	Conglomerate and gritty sandstone	25	0
16	Black shale	4	0
17	Coal	2	6
18	Black shale	20	0
19	Conglomerate	85	0
20	Black and brown shale with one layer carbonaceous shale	72	0
21	Hard gray sandstone	11	0
22	Conglomerate	20	0
23	Hard gray sandstone	65	0
24	Carbonaceous shale. (Some coal?).	8	0
25	Black shale	6	0
26	Brownish shale	27	0
27	Fine-grained gray sandstone	34	0



Coke Ovens at Fernie in Course of Construction.

lished in the Summary Report for 1891 a list of the seams then measured. The section which follows is given in the natural order, beginning at the top of the escarpment and running downward.

	Feet.	Inches.
1	Hard conglomerate	6 0
2	Gray nodular limestone in soft brown shale	3 0
3	Hard, coarse conglomerate with layers of sandstone	38 0
4	Brown shale and brown soft nodular sandstone	48
5	Hard conglomerate with layers of gritty sandstone	50 0
6	Covered	33 0
7	Gritty sandstone	16 0
8	Brown shale	35 0
9	Gritty sandstone and conglomerate	13 0
10	Bluish, thinly bedded sandstone ..	41 0
11	Brownish, shaly sandstone	30 0
12	Black shale	14 0
13	Gritty sandstone	22 0

28	Brownish shale; some beds of soft sandstone	84	0
29	Bluish hard sandstone	10	0
30	Black shale	8	0
31	Coal	1	0
32	Brown and black shale	57	0
33	Gray sandstone	96	0
34	Black and gray shale	34	0
35	Coal	1	0
36	Brown shale	3	0
37	Coal	1	0
38	Thinly-bedded bluish sandstone ..	14	0
39	Hard gray sandstone	133	0
40	Coal, including some carbonaceous shale	5	0
41	Black and brown shale	20	0
42	Hard gray sandstone with three irregular layers of conglomerate ..	175	0
43	Black shale	27	0
44	Coal (upper foot impure)	4	0
45	Black shale	38	0
46	Hard gray sandstone	55	0

	Feet	Inches
47 Deeply covered	100	0
48 Shale, probably including some coal	107	0
49 Carbonaceous shale	8	0
50 Coal	7	0
51 Carbonaceous shale and coal	2	0
52 Black shale and carbonaceous shale	33	0
53 Coal (impure)	3	0
54 Shale and soft sandstone	6	0
55 Coal	5	0
56 Carbonaceous shale	4	0
57 Black shale, including some carbonaceous shale and possibly some coal	150	0
58 Coal	3	0
59 Black shale and carbonaceous shale	100	0
60 Carbonaceous shale and coal	20	0
61 Coal	10	0
62 Black and brown shale and carbonaceous shale with thin seams of coal	140	0
63 Coal (upper ten feet impure)	37	0
64 Brown and black shale	134	0
65 Hard sandstone	56	0
66 Black shale	4	0
67 Coal	1	4
68 Shale	0	5
69 Coal	0	9
70 Shale	0	10
71 Coal	6	0
72 Shale and shaly sandstone	208	0
73 Coal (upper foot impure)	2	6
74 Bluish shaly sandstone	2	0
75 Coal	2	6
76 Black shale	65	0
77 Coal	4	0
78 Shale	1	7
79 Coal	4	9
80 Shale	6	0
81 Coal (bottom two feet impure)	19	0
82 Bluish black shale	10	0
83 " sandstone	35	0
84 Black shale	125	0
85 Coal	2	6
86 Chiefly black shale, partly covered.	364	0
87 Coal	1	4
88 Shale	1	3
89 Coal	46	0
90 Black shale	16	0
91 Hard gray sandstone	60	0
92 Black shale	110	0
93 Coal	46	0
94 Black shale	10	0
95 Hard gray sandstone	100	0
96 Black and brownish shale	1,060	0
Total	4,736	3
Total thickness of coal	216	2

Of the above thickness of coal, the greater part, 198 feet, occurs in a thickness of measures of 1,847 feet. Besides the parts of the coal mentioned in the section as impure, there are some irregular layers of shaly material and nodular iron-stone in the larger seams. Making allowance for these, and deducting some of the smaller seams that could not be profitably mined, say three feet or under, it may be safely

concluded that there is a total thickness of workable coal of at least 100 feet.

Below the base of the section the rocks are disturbed and broken, but the black shales last mentioned appear to continue for some distance farther. These are succeeded by 500 feet or more of soft gray sandy argillites, fairly calcareous and occurring in thick beds. Below the argillites, comes an uncertain thickness, possibly, 1,000 feet, of thin shaly limestone and calcareous shales. Although not seen in this place, a band of rather coarse grained fragmental limestone belongs to this horizon. The lowest beds of the series are not exposed here, but where seen



elsewhere, consist of black shales with two or more layers of hard fine-grained dark-coloured dolomitic limestone. Their thickness has not yet been ascertained, but they appear to be several hundred feet at least.

Toward the top of the section, it will be noted that the beds largely consist of conglomerate and gritty sandstone. The conglomerate especially is very hard. Its pebbles are principally of black and gray chert, imbedded in a matrix so silicified that cleavage-planes cut both pebbles and matrix as if the rock were of homogeneous texture. The preservation of the coal measures is in a great degree due to the presence of these hard beds, which prevented erosion, and by their great strength saved the more

yielding beds of the underlying coal measures from crushing and folding. The conglomerates and sandstones are false-bedded and of irregular thickness, and individual beds cannot be expected to be continuous over very large areas. The beds consisting chiefly of nodular limestone, near the top of the section, and another similar bed occurring a few feet higher up in the series, have been recognized in several places in the same relative position to the conglomerates, and may be regarded as a definite horizon for the correlation of the strata at widely separated points.

Above the top of the measured section, the overlying rocks are seen northward along the escarpment, the first succeeding bed being ten feet of soft brown



General View of Coking Plant at Fernie, B. C.

shale, then the second band of nodular limestone in brown shale already mentioned, followed by 200 feet or more of alternating layers of brown shale and sandstone, in beds of six to fifty feet thickness. Above this, although partial sections were obtained here and there, the continuity is broken. There appears to be altogether a development of 4,000 to 5,000 feet of measures above the top of the section just given. In contrast to the lower part of the series, black shales are rarely found here. Brown colours prevail throughout. The principal rocks are: soft brown friable shale decomposing easily into brown sand, brown shale weathering into angular blocks, soft gray, greenish and yellowish sandstone, weathering brown and reddish, frequently unequally and nodularly hardened. There are some beds of harder gray sandstone and conglomerate.

Dark gray, friable shale forms an appreciable part of the series, and an occasional band of black shale is to be seen. Toward the top of the series there is a notable bed of conglomerate, composed of well-rounded dark, cherty quartzite pebbles up to six inches in diameter, loosely held together by a matrix of soft gray sandstone. It decomposes readily, the pebbles being found in abundance in stream-beds and strewn along the hill-sides, while the rock in place, like the outcrop of coal-seams, is only to be found in certain favourable locations.

The total thickness of Cretaceous rocks deposited in the area, according to the above estimate, is from 12,000 to 13,000 feet.

It is not at all probable that a section could be found in any other part of the area that would exactly, or even closely, correspond to the one just given. A comparison of a part of this section with the beds at the mines on Coal Creek, shows that there is a great difference in thickness between the measures at the two places. The coal seams numbered 61, 63, and 71, in the section, correspond to the three seams which up to the present have been chiefly worked at the mines as shown in the following table. The distance between the two places is about seven miles

	On Near Morrissey, Coal Creek.	
Coal	10 feet.	10 feet.
Intervening beds	140 "	60 "
Coal	36 "	30 "
Intervening beds	197 "	42 "
Coal	6 "	6 "

It will be seen that while there is a great diminution of the intervening beds, the coal seams are fairly persistent. This may not be the case throughout the whole of the area, but whatever change may take place, is as likely to be favourable as otherwise. The openings at Michel, sixteen miles north of the mines on Coal Creek, expose three seams of coal, fifteen to seventeen feet in thickness, but there is not yet sufficient evidence to correlate them with the seams at Coal Creek. What there is, however, tends to show that some of the seams at least have a greater thickness here than they have to the south.

The coal seams near Marten Creek were not examined in detail, as the excavations made there, about the same time as those near Morrissey, have caved in, and re-excavation would be necessary to expose the seams. Measurements were made at this place also by Mr. Frank B. Smith, engineer for the Crow's Nest Pass Coal Co., and the results are given in Dr. A. R. C. Selwyn's Summary Report for 1891. A part of this list of seams agrees fairly well with the Morrissey section, but in other parts there is a marked difference. It appears likely that the four lowest seams there given, are a repetition of some of the upper ones, and are placed at the bottom, either by attempting to compile partial sections at two or more places, or because the excavations were continued downward across a line of fault which runs north-and-south, near the outcrop of the lower seams. The lowest of the large seams was not fully exposed when the list was published, and further work showed a much greater thickness of coal than was then estimated. Apart altogether from any success in correlating the individual seams in this section at Marten

Creek with those in the Morrissey section, there is abundant evidence to show that they are of the same horizon, and that there is only one set of coal measures to be found in the area.

The Kootenie series of Dr. Dawson comprises the lower and middle beds of the section just given. Their age has been established as Lower Cretaceous, chiefly by the determination by Sir J. William Dawson of fossil plants contained in the beds of the coal-bearing horizon. It was remarked in this connection that the list of plants included "some forms usually regarded as Jurassic, but that the greater number have the facies of the Lower Cretaceous."* There is, however, in this section at least 3,000 feet, and probably a much greater thickness, of beds underlying the horizon from which these plants were taken. This year two specimens of Ammonites and several specimens of a Belemnite were discovered in these lower beds.

tween Coal Creek and Marten Creek, where the dips begin to be reversed. A short distance beyond, to the north-east of the summit, these dips are greatly increased and the successive beds are rapidly brought to the surface till the coal measures again appear at the crossing of Marten Creek.

Marten Creek is one of the sources of the south branch of Michel Creek, which occupies a wide low valley running northward to the "loop" on the railway. The erosion of this valley has carried away the coal measures from a wide strip of country. The valley follows the line of what was, at one time, probably a broken anticline caused by the uplifting of the limestone floor of the basin. Two faults resulting from this movement are to be seen running parallel to the valley, one on each side. The uplift was greatest to the north where there is a protruding hummock of the limestone near the junction of the west branch.



Weighing and Screening Building.

They have not yet been determined, however. The rocks of the upper part of the section probably extend into the upper division of the Cretaceous representing the Dakota group or even higher members. No fossils have yet been found in these beds.

Without the assistance of a map, the work not yet being compiled it is difficult to give a clearly intelligible description of the outcrop and attitude of the coal seams, but by omitting detailed statements of distances and elevations, something further may be said. Along the front of the escarpment facing the Elk River, the coal seams begin to outcrop at elevations of 1,500 to 2,000 feet above the river. The dips are uniformly to the east at angles of 20° to 40°. Going eastward up Coal Creek, these dips are seen to flatten out, until at a distance of about five miles from the Elk the beds are almost horizontal. They continue thus with slight undulations nearly to the summit be-

Toward the south, evidence of this movement gradually dies out, extending only a few miles to the south-east of the mouth of Marten Creek.

Beyond the valley of the south branch of Michel Creek, the coal measures outcrop well up the mountain side in the same attitude and relative position to the stream that the beds on the front of the escarpment bear to the Elk River. The measures continue eastward forming another syncline, narrower than that first described, on the west side of the valley, and should outcrop again on the mountains near the edge of the Cretaceous area. Further information is, however, wanting at this point.

North of Coal Creek, in the area lying between the south branch of Michel Creek and the Elk River, the beds do not long continue to hold the same regular form that they exhibit along Coal Creek itself. A few miles north of the creek, the transition from the steep dips at the front to the horizontal position farther back is more abrupt; and a short distance far-

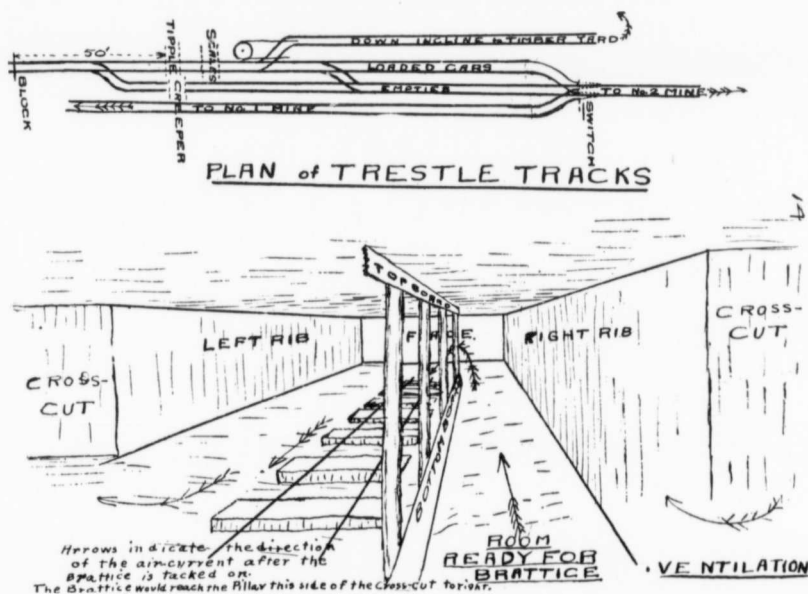
*Trans Royal Soc. Canada, Vol. X., Sec. IV.

ther northward, becomes a sharp break with more or less faulting. This fault continues northward to opposite a point between Hosmer and Sparwood stations. Beyond that the beds resume a more normal attitude, such as they have near Coal Creek. On the east side of the fault the rocks dip to the south, at angles of 10° to 15° . The result of this is that the coal measures are brought nearer to the surface, and they are found outcropping on the side of a deep gash in the hills made by a small stream emptying into the south branch of Michel Creek, below the junction of the east fork. This stream thus causes another bay in the outline. In the upper part, of the coal measures. East of this place, the beds bend around gradually, and the measures at Marten Creek, without any further serious dislocation. The fault above mentioned generally lies behind the front

rocks occupy the bottom of the Elk River valley for some distance, there is no sign of any coal measures for fully twenty-five miles. For several miles of this length the Cretaceous rocks are altogether wanting and the Carboniferous limestones and quartzites are exposed to view.

On the hills to the east of the "loop" on the railway at the forks of Michel Creek, thin remnants of the Cretaceous rocks are left in patches, and parts of the two lowest coal seams still remain, but for the most part the measures have been worn away.

The narrower syncline of coal measures on the east side of the south branch of Michel Creek, continues northward beyond the interruption caused by the east branch and extends for a short distance across the main watershed into the district of Alberta. The coal measures in this extension occur in a long spur



of the escarpment, but for a few miles northward from a point opposite Hosmer it cuts across the face of the hills some distance below the summit. This gives a complicated appearance which is the only exception to uniformity along the entire front.

Where Michel Creek cuts through the northern part of the area, the basin is narrow, and the upper part of the coal measures has been eroded away in the valley. The bottom of the syncline is probably a short distance to the east of Michel station, and it appears to rise gradually both to the north and south, with the lowest point of the basin, or trough, situated a little to the south of the stream.

There are minor folds and irregularities in the rocks, and even with the help of the knowledge gained by the Coal Company in its operations at this place the situation is not entirely clear.

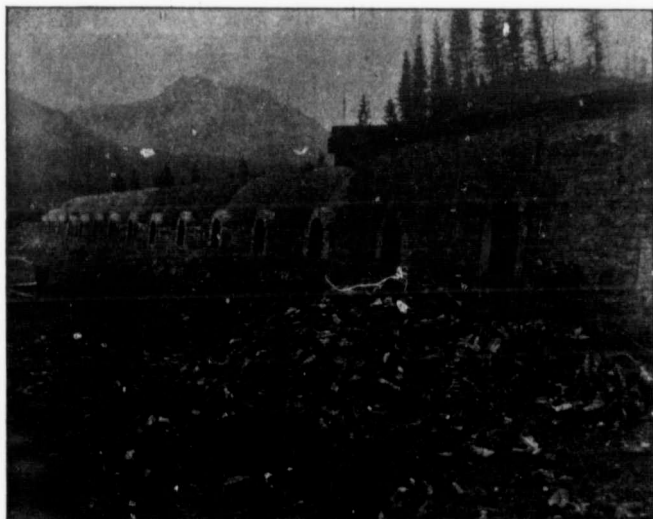
To the north of the stream the beds continue in the form of a gradually rising syncline for a distance of about six miles. Beyond this, although Cretaceous

rocks occupy the bottom of the Elk River valley for some distance, there is no sign of any coal measures for fully twenty-five miles. They are fairly flat-lying for the greater part, but on the west side of the spur, facing the old pack trail, a sharp fold or fault has given the rocks a dip of 60° to 70° to the north-east. Hereabouts, especially on the coal seams occurring in the steeply-dipped part of the rocks, the British American Coal Company has done a good deal of prospecting. The seams have been exposed at the surface in many places, and during the last season a tunnel was commenced with the object of tapping the seams some distance below their outcrop. The point at which the tunnel is driven is 600 feet up the hill, but the seams are exposed lower down, and can no doubt be found near the base of the hill in a convenient place for shipping the coal.

In the part of the coal lands thus far described, there is no very great area intact, and as there are several points from which the measures may be con-

veniently attacked, no excessive underground haulage will be necessary. The coal seams do not reach any great depth, being almost entirely above the level of the Elk River.

tion in their outline and affords a good site for mining operations. Southward from Morrissey Creek, the escarpment or rim of the basin begins to bend to the east and continues curving around along the south-



Coke Ovens at Fernie.

The measures lying south of Coal Creek occupy a practically unbroken block of country twelve miles or more in width and of somewhat greater length. Along the front by the Elk River, the beds continue

ern limit of the measures by Lodge-pole Creek, finally turning northward as far as the Flathead River at the south-eastern corner of the area. Here the escarpment ends. The rocks all the way around dip



Slack Bin at Fernie.

to hold uniform easterly dips and behave in the same way that they do at Coal Creek. Morrissey Creek, ten miles south of Coal Creek, makes a slight indenta-

regularly inward. They gradually flatten out to a more or less horizontal position a few miles from the edge, without any noticeable fractures, but in so do-

ing, in this southern part of the area, they are carried to a greater depth than they are to the north. A section eastward from Morrissey Creek would show that the coal measures, after first bending to a horizontal position, rise a little in a gently swelling anticline and then slope steadily downward till they reach the lowest depth in the whole area. This point of greatest depth is only three or four miles from the eastern edge of the basin. The rocks at the surface are the highest beds of the section previously given and they still dip to the east. A low drift-covered valley lies between this point and the eastern edge, where the lowest beds of the series are upturned against the limestone mountains. It is probable that this rapid transition has been assisted by faulting. Owing to the depth of the measures in this eastern interior part, it is doubtful whether the coal can be profitably extracted. For the greater part, however, the conditions for mining are favourable enough. Coal Creek, Morrissey Creek and Lodge-pole Creek are all suitable places to commence operations, and a part of the area can be reached from the south branch of Michel Creek.

The mines of the Crow's Nest Pass Coal Company at Coal Creek, already referred to, were started when the Crow's Nest branch of the Canadian Pacific Railway was built. On this line, near the crossing of Coal Creek, the town of Fernie has sprung up. It is a good example of rapid western growth. The mines are reached from Fernie by a spur from the main line running four and a-half miles up the creek. The good quality of the coal is now so well established that further mention in that respect is unnecessary. The output is increasing rapidly of late and is now well over 1,000 tons a day. About one-half of this is converted into coke, 360 bee-hive ovens being in constant operation at Fernie. The coke produced is of superior quality and preparations are being made to increase the number of ovens.

In addition to the mining on Coal Creek the company has recently commenced work on the seams at Michel and is already turning out coal for shipment. Material is on the ground for the construction of coke ovens and this point promises shortly to equal Fernie in importance.

Although the extent of the coal lands in the area can as yet be only somewhat roughly estimated, the estimate (230 sq. miles) should be near enough to the truth to be used as an argument for the calculation of the total available coal supply. The thickness used in the calculation is the minimum already given of 100 feet of workable coal.

Total area of coal lands 230 square miles.
= 147,200 acres.

One acre with 100 feet of coal would yield	153,480 tons of 2,240 lbs.
50,000 acres would yield	7,674,000,000 " "
147,200 acres would yield	22,505,200,000 " "

PYRITES MINE, RED GULCH CREEK, SKEENA DIVISION.

By W. F. Best.

ON A BRANCH of the Skeena River, the Oxstall (Indian name 'Xstall, meaning "beyond"), i.e., the river beyond the Skeena, there is a remarkable deposit of iron pyrites, which probably has



Falls at the Pyrites Mine, Oxstall, Skeena River.

no counterpart in the known world.

The mine is situated at Red Gulch Creek, 27 miles east of Port Essington.



Ore outcropping below falls.

The tide water from the Skeena reaches almost to the mouth of Red Gulch, and there is sufficient water

at any time for floating large scows. The mine buildings are well built, and the property, under the management of Mr. J. W. Brydon, is being placed in excellent shape for the economical mining and shipment of ore.

which forms the walls of the deposit, gold and silver exists in greatly increased quantity. It is extremely probable that as the work of development progresses, there will be discoveries of gold and silver concentration at certain points adjacent to the main ore



Main outcrop of ore above falls, Pyrites mine.

There are five Crown granted claims in the group, covering an ore body of great size, the exploration of which has only just begun. The ore is a granular pyrites, consisting of crystals of iron bi-sulphide, mixed with about 5 per cent. crystalline quartz.

found that at certain points adjacent to the schist, body. An assay plant lately installed at the mine is being utilized for the systematic study of the ore in various parts of the deposit, and already some important results have been obtained.



A large exposure of pyrites near tunnel, from which ore has been shipped for sulphuric acid manufacture.



Stream cutting the formation.

Chemical examination of samples from the mine shows about 50 per cent. sulphur, with gold, silver and sometimes copper.

While the great bulk of the ore appears to carry rather low values in the precious metals, it has been

As regards the extent of the pyrites deposit on this property, it is at present quite impossible to make any definite statement. Surface showings of great size are visible at a number of points, but thus far development work has only been done at those places

most favourably situated for the immediate production of ore for shipment.

A huge mass of the ore marked (A) in one of the cuts, has not yet been touched, because it happens to be above the falls, and not so near the river as other parts of the deposit.

The frontage of this mass of ore on Red Gulch Creek is about 300 feet in width, and can be traced for a long distance.

The ore bodies thus far examined, on these claims are enclosed between walls of compact blue schist. Part of the schist near the pyrites deposit is more or less impregnated with ore, carrying higher gold values than the main ore body.



The Upper Falls, source of power for Pyrites mine.

From present indications it would appear that as the nature of the deposit becomes better understood, special methods will have to be devised for the mining and treatment of this ore. Unless present methods are greatly modified there is likely to be a great loss of the precious metals.

Samples of the ore obtained during a recent visit to the mine show from 40 to 52.5 per cent. sulphur, 30 to 45 per cent. iron, copper from a "trace" up to 2.5 per cent, and gold and silver from \$1.00 to \$20.00 per ton of ore.

A three-track gravity tramway with turn-out is about completed from the ore bins to the wharf, and the shipment of ore will begin at once.

Close to the mine there is a water fall over 100 feet high, which can be utilized for generating all the power that would be requisite for electric plant.

While the main portion of the pyrites is only suitable for the manufacture of sulphuric acid, pulp bleaching and the manufacture of fertilizers. Other parts of the ore will doubtless be reserved for special

treatment, for the recovery of the gold, silver and copper values. It is safe to predict that at no distant day the property of the B. C. Pyrites Co. will be more widely known than it is at present.

THE KLONDIKE—A FOUR YEARS' RETROSPECT.

IN a paper recently read before the Royal Colonial Institute, the author, Mr. F. C. Wade, K.C., said that the Klondike was not altogether a new subject for the consideration of that body. It had been introduced to them on January 31, 1899, in a paper read by Miss Flora L. Shaw, who had visited the country in the summer of 1898 in the interests of the *London Times*. Mr. Wade, in the same month and year, had lectured on the Klondike at the University of Toronto.

Lectures dealing with the pioneer stage of a mining camp or of a country are naturally taken up with what is startling, romantic or picturesque, as of necessity there is little of development to record. At the time of Miss Shaw's visit the White Pass Railway had not been constructed over the mountains and onward to White Horse; some little steamers had been whip-sawed out of spruce timber at Bennett and "did all they were expected to do when they proved themselves capable of floating on the river" as far as White Horse; "there was no fresh meat, nor vegetables, nor milk, nor wine. Nothing had ever been grown in the country for human food."

Miss Shaw herself lived in a tent. Dawson was a collection of tents and huts. The mining methods were crude. There was little material development that would be perceptible to a stranger, however considerable it appeared to those who had grown up with the camp from the beginning.

The object of the lecturer was to dwell no longer on the romantic and pioneer stage of the country than might be necessary to contrast the conditions then prevailing with the marvellous transformations which have since occurred in all branches of its development. This he proceeded to do, illustrating the position, area, and topography of the district by maps, and the remarkable changes which have occurred in methods of travel, transport, commerce, mining, agriculture, education, and the social life of Dawson City and the mines by a series of strikingly beautiful lantern pictures.

The Yukon, he said, is one of that long procession of mining camps, paralleling the Rocky Mountains, which extends through the United States, British Columbia, the Yukon and Alaska to the Arctic Ocean. In the United States the series includes the mines of New Mexico, Colorado, Idaho, and Montana; in British Columbia, the Slocan, Rossland, the Kootenay, the famous old camps of Omineca, Caribou, and Cassiar, and in the North, Atlin; in the Yukon, Cassiar Bar, the Salmon Country, the Stewart and Henderson district, the Klondike, and the Sixty-mile district; in Alaska, the auriferous deposits of Cripple River, the Nome region, the Krubzgamepa Valley and the basins of the Solomon and Niul

luk rivers constituting the Southern belt, the placers of the Bluestone, the Agiapuk and Kugrouk in the Northern belt, the Bendelben group in the centre, and the placers of the York region, the relations of which to the others have not yet been determined.

Some idea of the enormous extent of this pay streak can be gathered from the fact that the Canadian section alone is 1,650 miles in extent—equal to the entire length of Europe.

The Klondike, the subject in hand, is but a fragment of the Yukon. The great Yukon river unrolls its magnificent length of 2,200 miles from the mountain passes near Skagway to the Behring Sea. The Yukon Territory is 198,300 square miles in extent, or 77,000 square miles greater in area than England, Wales, Scotland and Ireland put together, and is watered by 7,000 miles of rivers and creeks. Of this vast area of territory the Klondike occupies but 800 square miles, and the total area of creeks which are being worked for gold is estimated at fifty miles.

Illustrating with maps as he went on the lecturer next called attention to the peculiar topography of the Klondike gold fields, the central position of the Great Dome (elevation above sea level 4,250 feet) in their midst; the gold creeks falling away from the dome on all sides like spokes from the hub of a wheel, into the Klondike river to the North and Indian river to the South, the combined waters of all finally reaching the Yukon at elevations of 1,200 and 1,233 feet. He also gave the names and lengths of the principal creeks, and distinguished between rivers, creeks, gulches, and "pups" as understood by placer miners, and from the point of view of the mining regulations.

It was to this country that the attention of the whole world was turned when George Carmack staked Discovery claim on Bonanza Creek on August 16, 1896. It was through the narrow defiles of the White and Chilcoot passes that the terrible stampedes of 1897-8 in search of gold were directed with such fatal consequences that 3,700 horses lay dead on the White Pass trail after the autumn rush of 1897, and the whole district had the appearance of a battlefield. That it justified all the hopes that were entertained of it, the lecturer then gave figures to demonstrate. The total gold product of Canada for 40 years (from 1862 to 1902) exclusive of the Yukon had been 84,093.81. The Klondike alone produced \$10,000,000 in 1898, and by the time the present clean up is completed her total output will in all likelihood equal the \$84,093.81, the total product of Canada in forty years—an equal amount in one-tenth of the time.

Transportation was the first subject which Mr. Wade took up and illustrated by lantern views. First he showed photographs of the Chilcoot and White Passes in 1897, with the long streams of men laboriously carrying goods over by hand; then he showed the steel bridges, solid road-bed and locomotives of the White Pass Railway of to-day. Similarly, he showed the wild rapids and the open skiffs of the miners used in making the anxious journey down them in 1898, and the present water fronts of White Horse and Dawson, with their clusters of steamers. Four years ago it was the open three-ton skiff; to-day there are fleets of steamers whose value he esti-

mated at \$2,500,000. Then he showed the Dawson of 1898, a vast huddle of dishevelled tents, and the Dawson of to-day a town whose assessment in personality and realty is \$12,000,000. Outside of Dawson there is an assessment of \$5,000,000; add the steamers already mentioned, the railway, &c., and there was property worth \$20,000,000, in addition to the \$80,000,000 odd of gold output, a total of more than \$100,000,000 of product and improvements—nearly all since Miss Shaw's visit four years ago!

Another phase of the means of transport existing which Mr. Wade illustrated were the dog teams, which, in 1898, were the sole means of transportation. To the dog he awarded high praise as the miner's best friend, and he added some curious details as to the respect in which the dog is held in the Yukon—qualifying his remarks by the addition that the bigger the dog the more respect he got. To-day there are 1,500 horses in the country, in addition to about 3,500 dogs. Even cows have made their appearance, and now number about 250. Not only had the bicycle established itself, but the automobile had made its appearance.

Progress in administration formed the next topic. First, he showed the post office of 1898, the heap of letters on the ground sorted over by anxious men, then the commodious and comfortable post office of to-day. The tent of Commissioner Walsh as compared with the big office and residence of to-day, the heap of bags of gold-dust, guarded by a file of mounted policemen, which represented banking in 1898, and the Bank of Commerce building of 1902; all these were rapidly shown; the slight foot and horse bridge of 1898 and the Ogilvie bridge of to-day; the miry track which passed for a street in 1898, and the many well-kept streets of 1902; in 1898 the miners had to make their way as best they could over the country as nature left it; to-day there are 243 miles of road, while 350 more are in contemplation.

The changes in mining methods next occupied Mr. Wade. By a series of illustrations and explanations he showed how the gold-bearing creeks form almost a street of cabins. Dawson and the creeks together include a population of 27,000. He illustrated the old crude and sometimes dangerous methods of thawing the soil by fires of cordwood and showed the newer method of thawing by steam, which has so cheapened production as to enlarge the area of production. One striking fact he related in this connection was that when this steam method came in, great scarcity prevailed of "thaw points," iron or steel tubes thrust into the frozen earth through which the steam was forced into the ground. The original miners almost all came armed, the Englishmen because of the national sporting habit of carrying a small arsenal for game destruction, the Americans partly for the same reason and partly because of the lawlessness of American mining camps. In a short time the second-hand shops were filled with rifles and when thaw points were needed they were improvised out of rifle barrels—a new method of beating swords into ploughshares. In this connection Mr. Wade observed that during the first five years of the gold fields in California, 4,200 homicides occurred; in the first five years of the Yukon gold fields, fifteen.

One feature of the progress of mining to which Mr. Wade drew attention was the presence of quartz in the country. He showed a photographic view of a large piece of quartz, and stated that there were two customs quartz mills in Dawson; that they were overworked, and that, instead of making a fixed charge per ton, the proprietors are confident enough in the industry to prefer to do the work for half the proceeds.

After a series of views showing the success with which other potatoes, cabbages, cauliflower and almost all other vegetables can be grown in the Klondike, Mr. Wade proceeded to illustrate the social advancement. He showed the first church, the only permanent part of which was the bell, the rest consisting of canvas and wood, and went on to tell of the several fine structures now erected. At Skagway, he remarked, the church people staked out a site, and to prevent it being jumped left on the ground a reasonably eminent and reformed pugilist; the emblem left on the ground to indicate the nature of the intended edifice was a plate. The Salvation Army, Mr. Wade observed, conduct an excellent work in addition to their religious services. In 1898 there was only one white child in the country, and Mr. Wade showed a view of the big school of to-day, which has nearly 200 pupils. Hospitals, theatres, barracks, court-houses, administration building, all showed the advance in the four years, while pictures of the interiors of cabins, of church bazaars, balls, banquets, of the triumphal arches erected for the reception of the Governor-General of Canada and Lady Minto, and of wonderful floral displays, proved that the gentlest natures even will have much to enjoy and little to fear under the improved conditions prevailing in the Klondike.

THE CONCENTRATION OF ORES BY MEANS OF OIL.

By H. E. T. Haultain.

ON LOOKING over the weekly list of United States patents published in the technical mining press, one cannot but be struck with the very large number dealing with the various problems of ore treatment.

New forms of concentrators are patented at the rate of one a day, and of lixiviation and chemical processes generally there are as many more. Many, very many, of these are the inventions of inexperienced, impractical men, and bear on their faces evidence of their uselessness. Not a few of them are very palpably fakes.

The extraction-of-gold-from-sea-water processes that we heard so much of a year or two ago belong to this order, and a process in some form or other guaranteed to extract the impossible is continually being exploited with the gullible public. All mining men have experienced the man with a process, and in general he is shunned and avoided as a nuisance.

But of all the improbable and impossible processes the concentration of ores by means of oil appears at

first glance the worst. That oil, common every day oil, should have the power of selecting and carrying off valuable minerals and leaving valueless minerals severely alone, regardless of specific gravity, seems unreasonable. That heavy mineral oils, the most adhesively sticky of all the oils, should not stick to rusty quartz though violently agitated with it seems absurd, and that at the same time it should firmly adhere to smooth, shiny, slippery galena seems too absurd for further consideration. And when we are told that this is due to static electricity and that also these results are accomplished in the presence of an excess of water, the fake seems complete.

So completely against it are its general appearances that although a commercially successful process for the concentration of ores by oil was invented more than three years ago, and has been in successful operation for more than two years and although these facts have been prominently before the notice of the mining public for a like period, yet until quite recently it attracted little or no attention.

Before, however, discussing the use of the oil process it would be well to consider the needs of such a process. According to the text books, minerals are classified according to their colour and lustre, hardness, specific gravity, form of crystallization, chemical composition and magnetic permeability. In hand sorting difference in colour and lustre is the guide, but in mechanical separation and concentration specific gravity, magnetic permeability and difference in hardness are the only characteristics of which advantage can be taken. The two latter can be used only to a very limited extent, and practically all mechanical concentration depends on the variations in the specific gravity of minerals and by means of jigs, vanners, tables, buddles and other variously named appliances the lighter minerals are separated from the heavier.

The run-of-mine ore consists of the various minerals in all sizes down to the infinitely small compactly bound together, and before any process of concentration can be applied these minerals must be freed by crushing.

In most commercial concentrating ores, most of the particles of valuable mineral are of an appreciable size, that is they are larger than grains of sand, and if the ore could be broken down to this size and no smaller then the only loss in concentration would be those small particles of valuable mineral enclosed in waste mineral. But in practice it is impossible to crush ore to a certain size without much of it being reduced to smaller sizes. We cannot crush ore to the size of a walnut without some of it being reduced to impalpable powder, and in general practice ore cannot be crushed to pass through a 30-mesh screen without 25 to 50 per cent. of it being fine enough to pass a 100-mesh screen.

In practice we find it as a general rule that the smaller the particles dealt with in any specific gravity machine the more difficult is it to effect a clean separation, and when we come to particles passing a 100-mesh the difficulty increases rapidly till we find that with fine slimes there has been really no satisfactory commercial solution of the problem.

Thus we find in a concentrating plant that the losses are two forms, viz., the small particles of valuable mineral that are locked up in larger particles

of waste mineral and the small particles that are free, but are too small for ordinary specific gravity machines to have any saving effect on. In good milling practice these losses amount to from 15 to 25 per cent., and sometimes even more of the total values in the ore. Besides this direct loss there is an indirect loss. It is impossible to make a sharp line of demarcation between the concentrates and tailings, and to prevent too much recrushing and to keep the tailings low, considerable waste material goes into the concentrates, and on this there is the loss of freight and smelting charges.

So it occurs that in good milling practice with what are known as good concentrating ores there is a considerable loss, directly and indirectly, due to the impossibility of saving the very fine particles of valuable mineral.

But there are many ores in which the valuable mineral is softer or more friable than the accompanying waste minerals, and such ores cannot be crushed without reducing practically all the valuable mineral to so fine a state that any attempt to mill it would result in its more or less complete loss.

The antimonial silver ores are particularly friable and difficult on that account to mill, and to a large extent this is also true of copper pyrites. Any method therefore that would successfully concentrate fine slimes would not only very materially increase the saving in the milling of good concentrating ores, but would also permit of the successful milling of ores, which by the present methods cannot be commercially treated.

The use of oil promises a most successful solution of the problem.

In September, 1878, John Tunbridge, of Newark, N.J., was granted U. S. letters patent for a process of separating precious metals from watery solutions by adding oil or hydrocarbon liquid. This is mentioned as being particularly applicable to jeweler's wash water. Tunbridge passed his watery solution through a layer of floating oil, and seemed to think that the presence of soapy matter and "suds" in his watery solution was essential to success.

In August, 1886, Carrie J. Everson, of Chicago, was granted U. S. Letters Patent for a process of concentrating ores by means of a compound of oil and acid. In her specifications she (if Carrie J. Everson was a man I beg his pardon) states:

"The discovery which forms the basis of my invention is that metals and metallic substances in a comminuted state will unite with compounds of fats or oils and acids, and that such compounds will not unite with comminuted quartz or other rocky gangue." In her process she mixes her crushed ore in a dry state with her oil and acid compound, and afterward washes away the quartz or rocky gangue with water, and finally burns off her compound from the concentrates. She considered the presence of an acid as essential to her process.

In 1894 Letters Patent in England, Transvaal and other countries were granted to George Robson, of Dolgelly, England, and in January, 1898, U. S. Letters Patent for a process based simply on the use of oils or fats, without admixtures of alkali or acid.

His most general claim is: "The method of recovering metals and metallic compounds from finely di-

vided substances, which consists in thoroughly and mechanically agitating and mixing a fatty oil with said substances while the same are in a moist or plastic state, due to admixture of water therewith, then drawing off the fatty oil carrying the metal particles and metallic compounds from said substances, and then separating the metals and metallic compounds from the oil." His means of agitation were somewhat complex, and his method of separating the metals from the oil consisted in simply settling by gravitation. He seemed to think that the admixture of a fat and a lighter oil was essential.

In July, 1900, U. S. Letters Patent were granted to Frances E. Elmore, of Leeds, England, for his apparatus, and in June, 1901, for his process. The apparatus patent covers the combination of agitating drum, water subsiding vessel and centrifugal separator, as will be described later on.

In the process patent there are eight claims differing slightly in detail, the eighth being a "process for separating the metallic from the rocky constituents of ore which consists in first mixing pulverized ore with a large quantity of water to maintain the mixture in a freely flowing condition, then adding to this mixture of water and ore a thick oil of the character set forth, which oil will adhere to the metallic constituents, but not to the wet rocky constituents, then subsiding the water and rocky material and causing the oil carrying the metallic constituents to float off over the body of water, and finally separating said oil from said metallic constituents by centrifugal action."

In December, 1901, U. S. Letters Patent were granted to Alexander S. Elmore for the process of adding an acid to the ordinary Elmore process.

The processes of both Tunbridge and Everson would certainly separate sulphides from silicates, but Tunbridge's apparatus was too crude and Everson's process was too expensive, chiefly on account of the loss of the oil which was burnt off the resulting concentrates.

To Hobson belongs the credit of first showing that plain oils had this important selective action, but his process failed apparently because he used a light, thin oil, and also for want of a satisfactory means of separating the oil from the concentrates. The loss of oil in his process is reported as being excessive.

Elmore's process consists of a combination of devices in themselves well known and effective.

The main points of difference between his process and those of previous inventors being the use of a thick oil, simple apparatus, and the final separation of the oil from the concentrates by means of centrifugal machines.

To Elmore is due the credit of simplifying the apparatus and reducing the oil loss, thus making the process commercially practicable.

In his process the pulp of ore and water and a cheap petroleum residuum are introduced into a drum revolving on its horizontal axis. This drum contains a helical pathway in which are baffle boards, and as the mixture travels this pathway it is continually agitated by means of these baffle boards. Out of the end of this drum the mixture passes to an ordinary spitzkasten or settling box, where the oil containing the concentrates floats and is drawn off at the top, and the rocky gangue and water are drawn off at the

bottom. In practice it is found advisable to subject the pulp a second and third time to this process, there being three revolving drums, one below the other. The oil drawn off from the top of the spitzkastens goes first to a centrifugal machine, where most of the oil is freed from the concentrates, and is ready for use again in the drums. The remaining oil and concentrates pass to a second centrifugal machine, where a final treatment reduces the oil present in the concentrates to something like one per cent. of the weight of the concentrates. These processes are continuous and nearly automatic.

These patents of Elmore are controlled by The Ore Concentration Syndicate, Ltd., of London, England, who have lately floated a subsidiary company to take over the Canadian patents. From a pamphlet by the present company and from a paper read before the Institute of Mining and Metallurgy by Charles M. Rolker, we learn that the process has been in successful use on a commercial scale in Wales. Early in 1900 a plant capable of treating 50 tons a week was installed at the Glasdir Copper Mines in Wales, and in treating 700 tons of ore an efficiency of extraction of 80.9 per cent. was achieved. The ratio of concentration was 8.3 to 1 and the concentrates assayed 10 per cent. in copper. This plant was subsequently enlarged, and has been in successful operation for a considerable time. Previous to these experiments over 52,000 tons of similar ore from the same mine had been treated by the ordinary method of concentration with an extraction of only 14.5 per cent. The company has been continually experimenting with small lots of ore from different parts of the world and publish results showing a high extraction efficiency, with a great variety of ores. Some of these results run up as high as 97 and 98 per cent., and most of them are well over 80 per cent., but they were made on a comparatively small scale, and the results are somewhat higher than what might be expected in regular work. But the results show that certain oils will adhere to practically all wetted sulphides, arsenides and tellurides, but not to wetted silicates or oxides. Elmore has suggested that these results might be due to static electricity, but the true explanation will probably be found in capillary attraction and surface tension.

In any case the results are wholly independent of specific gravity, and the process is applicable and successful with the finest slimes.

In connection with the results published by the company it is noteworthy that no particulars are given as to the percentage of silica remaining in the concentrates. As a general rule the values of concentrates as reported is low, and this may or may not be due to the presence of silica.

However, the important point is this, that a commercial plant working continuously succeeds in making an extraction of 80 per cent. of the values of an ore that with the ordinary methods of concentration yielded absolutely useless results. Further than this the process has been found applicable to a great variety of ores.

In regard to the ores of West Kootenay tests made by myself and others confirm the possibilities of the process. I have found the mill tailings, both from gold and from silver bearing ores, yield high grade concentrates with oil, and my experiments with Ross-

land ores point to the production of a higher grade concentrate than that claimed by the Elmore companies.

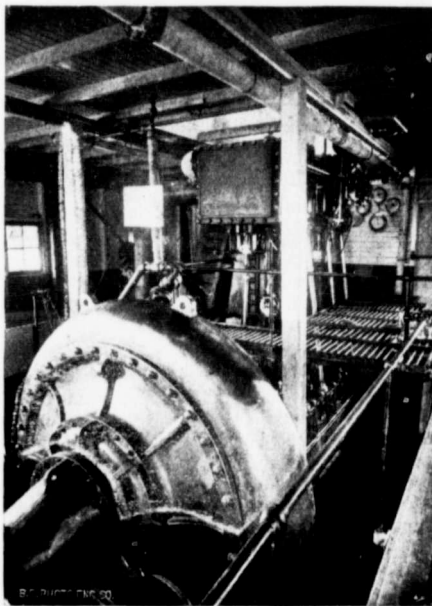
Qualitative tests can easily be made by anybody. The simple stirring of ordinary cylinder oil with freshly crushed ore and water demonstrates the method of the process and gives truly astonishing results. It is essential that the ore be either freshly crushed or have been kept wet subsequent to crushing, as the slightest trace of oxidation minimizes the results.

I have no interest, present or prospective, in the Ore Concentration Syndicate, Ltd., nor in its subsidiary company, but I have no hesitation in expressing the opinion that the concentration of ores by means of oil will permit of the commercial concentration of the low grade ores of the Rossland camp, and will very materially increase the efficiency in the milling of the Slocan ores.

A substantial increase in the prices of copper, lead and silver is very doubtful, but the oil process gives healthy promise of giving a greater net commercial value to our ores than any probable increase in the prices of metals.

A GOVERNMENT DREDGE.

A BY-LAW having been passed by the Victoria City Council authorising an expenditure of \$150,000 in the reclamation of certain lands adjacent to the harbour and known as the James Bay flats, op-

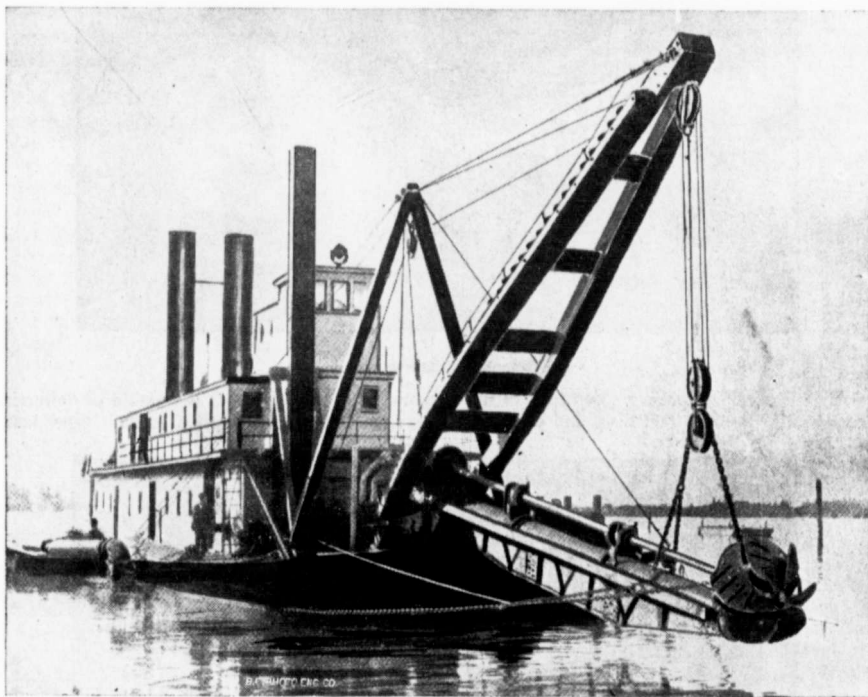


Pump and Engine.

erations were commenced in August of last year under the direction of the City Engineer, Mr. Topp. A coffer dam was first constructed across the harbour,

and after the water had been removed from the area it was proposed to reclaim, a stone retaining wall, the stones for which were laid by means of a travelling derrick, erected on the coffer dam, was built from shore to shore. This wall, which is 775 feet long and 28 feet high from low tide, is faced with granite and backed with sandstone. During the past month, the work of filling in the flats behind an embankment has been under way, the material for this purpose being obtained by dredging the harbour bottom, the silt therefrom being conveyed through large pipes and utilized in making the new ground. The harbour here is 16 feet deep at low and 28 feet at high tide, and an area of 900x1,000 feet was dredged.

The hull is composite, that is to say, built with a steel frame sheathed with wood. It is 125 feet long, 32 feet beam and 7.6 deep. The main deck is devoted to the machinery, while the upper deck contains commodious quarters for the officers and crew. A steel suction pipe extends over the bow of the dredge, capable of dredging to 40 feet depth, suspended from a strong boom 60 feet long. At the lower end of this suction pipe is a large steel rotary excavator fitted with spiral blades of peculiar shape, so as to dig or cut the material and feed it into the mouth of the suction pipe. This cutter is actuated by a double engine mounted on top of the pipe near the deck. These engines have great power and are connected to the cutter shaft by steel gearing. The cutter is



The Dominion Government Hydraulic Dredger, King Edward VII.

The dredge is commanded by Capt. De Beck, and her operator is Mr. Philpott. In addition she carries a crew of 17 men and a chief engineer and a second officer.

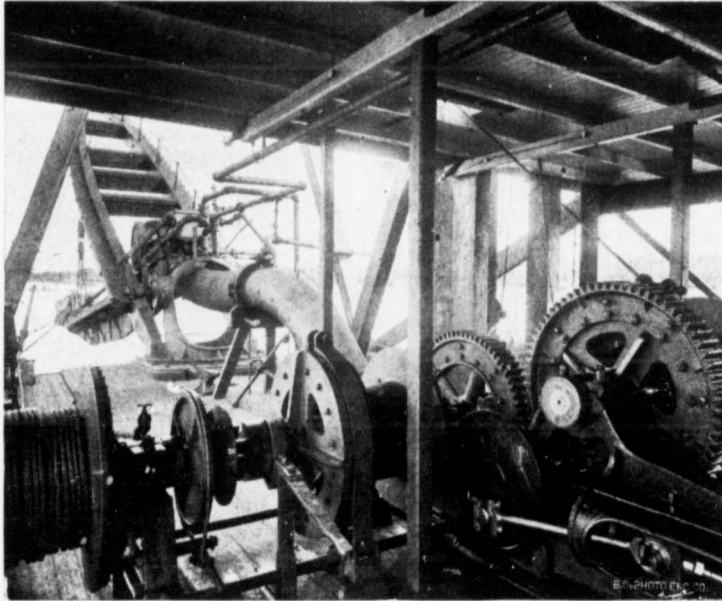
The dredge was built by the Polson Iron Works, of Toronto, for the Department of Public Works, and was originally intended for the improvement of the Fraser River, but being of large capacity and capable of going from place to place under her own steam, she will be used for general dredge work on the Pacific Coast of the Dominion. The machinery moves on an average rather over 1,000 yards per days of 9 hours, working continuously, but at Westminster a record run of 7,000 yards in a working day of 9 hours was accomplished, and on another occasion 15,000 yards of gravel was moved in three days.

sharp and powerful enough to cut up logs and snags, or any substance short of solid rock or boulders. Even when these are encountered no damage occurs, because the cutter with all its working parts are of steel, immensely strong in proportion to the power which drives them, so that they can stall the engine without risk of breaking. The suction pipe can swing on the dredge, making a cut 40 feet wide, or the whole dredge can swing on a stern spud, making a cut 150 feet wide. All the motions of the boom and feeding the dredge are performed by a separate winch, having five drums, placed on the forward deck.

The main pump is of the centrifugal type, 10 feet diameter, with 20-inch suction and discharge. It has a capacity of 15,000 gallons per minute, and is driven by a triple expansion engine of 600 indicated horse power. This is equivalent to 600 cubic yards of solid

material per hour, or 6,000 cubic yards for 10 hours. As a cubic yard is equal to about a ton and a half,

oped after long experience by A. W. Robinson, consulting engineer to the department, and has shown a



Winch and Suction Pipe.

this means that the dredge can dig 9,000 tons of material per 10 hours, from 40 feet deep and deliver it

marvellous efficiency. It is capable of delivering the dredged material through a 20-inch pipe 4,000 feet



Discharge Pipe—Showing work done by the dredge at New Westminster.

nearly a mile away.

This pump and engine is of the latest type, devel-

long, if required. The dredge will thus have a great sphere of usefulness in filling and reclaiming land, as

well as in deepening channels.

The two boilers are of the water tube type, adapted for 200 pounds pressure, and are large enough so that the dredge can work with one boiler if necessary while the other is being cleaned or repaired.

The dredge is propelled by a stern wheel and engines with cylinders 16 in. diameter by 6 feet stroke, and is in fact a complete steamboat, with pilot house and steering wheel, etc.

The dredge was designed by Mr. A. W. Robinson, M. Am. Soc., C. E., of Montreal, consulting engineer to the department. Mr. Robinson is a specialist in dredging machinery, having designed and built more than 124 dredges in all parts of the world, including a dozen very large ones for the Mississippi River. He is now completing two other large dredges for the Canadian Government, one of which is to work on the River St. Lawrence channel through Lake St. Peter, and which will have a 36-inch suction pipe, and the other in the Maritime Provinces. These will be of the largest capacity and the most modern type. This is true economy, for the reason that these modern high-powered dredges are so much more efficient than the older and smaller machines, that there is no comparison in the results accomplished.

Mr. Robinson has also designed a special dredge for the Arrow lakes channels, which are troublesome to steamers at low water. This dredge is now under construction by contract with the Polson Iron Works of Toronto, and will be available for service after this year's high water. Both of these dredges are under the charge of Mr. G. A. Keefer, resident engineer for British Columbia.

RECENT DEVELOPMENTS IN YMIR DISTRICT.

From our own Correspondent.

DURING the past month there has been considerable activity in the mines about Ymir, which in a measure compensates for the temporary reduction of the force in the Ymir mine. A number of miners have been laid off in the Ymir and the number of stamps in operation reduced to forty. The reason for this measure is the excess of water in the lower workings, which the present equipment of pumps is not competent to handle. Instead, however, of installing more pumps a more economical step has been decided upon. As soon as connection has been made between the drift which is now being run on the vein from the crosscut tunnel at the 1,000 foot level, and the main shaft, the mine will drain itself. The men have therefore been laid off from the lower workings until such time as this connection has been made. Mr. Hooper, the expert, who accompanied Mr. Popkiss, the managing director, in his visit of investigation here, finished his examination of the property last week.

At the Union Jack mine, operated by the Active Gold Mining Co., of Cincinnati, very satisfactory progress is being made. On the Queen vein the tunnel is in about 400 feet. At about 250 feet the vein was crosscut to the hanging wall, and across twelve feet assayed \$10.85 in gold. For a distance of 45 feet in this tunnel a rich shoot of galena ore is exposed,

averaging three and a half feet wide, and running \$40 per ton in all values. A lower level is now to be run a distance of 500 feet at a depth of 150 feet below the upper tunnel. For this purpose arrangements have been made for the installation of machine drills, which will be run by electric power instead of air or steam. On the Union Jack itself the tunnel which is following the cross vein is in about 275 feet and is expected to reach the main vein within a few days. In the cross vein a paystreak of steel galena has been exposed varying in width from 6 to 36 inches, and assaying as high as \$60 per ton.

The British Lion Development & Mining Syndicate have a force of men working on the Big Four Group on Porcupine Creek. The group is traversed by five veins, the principal of which are known as the Hercules and Big Four veins. The former is a very wide vein of sulphide ore, in which a shaft has been sunk 80 feet. This large body of ore has a general average of \$6.50 per ton, and is of a good concentrating character. The company have now under consideration the erection of a concentrating plant. On the Big Four proper the showing is a remarkable one for this section. For an area of about 150 square yards the surface consists of a calcite formation, which carries gold values to the extent of \$3.20. Interspersed in this immense deposit of low grade ore are rich streaks and pockets, from which assays away up in the hundreds are obtained. A tunnel is being run in such a direction as to tap some of these richer streaks at depth, and is now in about 100 feet.

The Wilcox mine on Wild Horse Creek, near the Ymir mine, will be a regular and considerable producer next winter. Some 2,000 feet of development work have been done on this property, every foot being done to great advantage, and showing up large shoots of exceptionally high grade ore. Several shipments of ore running \$70 per ton have been made the last carload alone returning a net profit of over \$50 per ton. Arrangements have now been made for the erection of a stamp mill, which is to be commenced at once, and which is expected to be in operation before the snow comes. Waggon roads and water flumes have already been built, and from the moment the stamps are ready to drop the mine is in a position to return profits. The ore on the dumps, removed in the course of necessary development work only, is conservatively estimated to be worth \$30,000.

LE ROI TROUBLES.

From our London Correspondent.

THERE is very little doing in the mining market, and prices have shown a reactionary disposition in all departments, the movement being especially noticeable in the South African and West African sections. Kaffirs are in a very disturbed state, and the market for Jungles is practically non-existent. West Australians have been a little steadier of late, but even here operators could not resist the temptation to snatch profits directly they were obtainable. British Columbians are dull and inanimate, and about the only shares to show any activity are the Le Roi group. Le Rois have recovered from their lowest figure owing to the more encouraging news from Rosslund, and Le Roi No. 2 have also im-

proved, being assisted by a long statement published by Mr. C. H. Mackintosh a few days ago. The committee of shareholders appointed to inquire into recent matters in connection with the Le Roi issued two reports: the minority document was presented by Mr. Williamson Milne and advocated reconstruction out and out. By this means Mr. Williamson Milne believed the company might be put in funds, the debt to the bank liquidated, and a fresh start made. The remainder of the committee recommended that things should go on as they were, and needless to say, the shareholders accepted the views put forward by the majority of the committee, and almost to a man rejected Mr. Williamson Milne's suggestions. Sometimes, however, it is as well to use drastic measures, and in many quarters it is thought that reconstruction would have been wisest. Of course shareholders naturally do not care to take a step which would mean a pretty heavy assessment on their shares, but it is difficult to see how the company can re-enter the dividend list with this weight of indebtedness attached to it. In commenting upon the decision of the shareholders the *Observer*, one of our oldest Sunday papers,—and one of the last of the two-penny organs—says:—

"The meeting received scornfully any idea of having to provide further funds for the establishment on a sound basis of the company's financial position, which, it has been repeatedly shown, is anything but satisfactory. Nevertheless, it was to be noted that Colonel Burton-Brown, who signed the report in which it was stated that 'it is neither necessary nor desirable to reconstruct the company,' himself observed that money might be raised by an issue of debentures or preference shares, thereby implying that more funds may have to be provided. The high-grade ore reserves are reported to have been increased to 'probably 50,000 tons,' and the chairman spoke of 'continued good developments in the mine.' With this better news the shareholders would have none of reconstruction; although the chairman seemed to favour one; on the contrary, they adopted the committee's report, and two of its members, Sir Henry Tyler and Mr. Macmillan, were nominated to the board. It would, therefore, appear that the management will have to continue picking out the eyes of the mine in order to reduce the indebtedness to the bank, an action which bids fair to leave the Le Roi— if, indeed, it has not already become—a large low-grade proposition, which may or may not be rendered a payable one by the adoption of the oil concentration process. 'Those who live the longest see the most.' It will be very interesting to see whether Le Roi will turn the corner and achieve success without the supply of further funds by its shareholders."

The *Westminster Gazette* (the leading Liberal evening journal published in London) in its note on "Le Roi Situation," remarks:—

"The shareholders of Le Roi mine, evidently relying upon the loyalty and good-will of the Bank of Montreal, have voted dead against reconstruction. We concede the case proved somewhat difficult to decide, but remembering the heavy debt owing to the Bank of Montreal, and to the fact that the mine is clearly one of varying grades of ore, there was much to be said for Mr. Williamson Milne's proposition. Money, it is clear, the board must obtain; it is to be wished that the company may escape from its trouble by the expedient of an issue of debenture or preference shares suggested by Colonel Burton-Brown."

Of course these meetings and committees of investigation in connection with what has always been regarded as the premier British Columbia mine, are not conducive to cheerfulness in the British Columbia market itself, nor are they likely to make the public any more kindly disposed towards the shares of mining companies operating in the Province. It is to be hoped that both Mr. Dunsmuir and Mr. Eberts, during their visit to this country, will have many opportunities of driving home the lesson that it is neither the country nor its mines that are at fault, but those rascally promoters, whose connection with it has done so much to damage both in the eyes of Europe. You will of course have heard that the liquidators of the London & Globe lost their action against the Stock Exchange "Syndicate," whose secession Mr. Whitaker Wright alleged brought down the whole inflated edifice. In view of the evidence and other circumstances the result did not surprise anyone; but it is a nasty obstacle cleared out of the way. Let us hope this is an end of Whitaker Wrightism, so far as British Columbia is concerned.

SLOCAN CITY MINING DIVISION.

A HALF-YEARLY REVIEW.

By W. D. McGregor.

THE weather, too little snow on the lower levels for rawhiding, followed by a very backward spring, has had a very perceptible effect on the ore production, which, however, stands at about 3,250 tons for the six months, showing a considerable increase over the same time last year, while more work and work of a better character is being prosecuted in the district. The Arlington and the Enterprise keep on the even tenor of their way, both keeping up a steady shipment of their higher grades of ore. Development on a large scale is being undertaken by a London Eng. company, under the management of Mr. Sandiford on the Neepawa group; by a Pittsburg company on the Iron Horse group and the Ottawa group on Springer; by strong Detroit companies on the Republic group near Slocan and the Champion group on 12-Mile Creek, and by a Spokane and Eastern syndicate, under the management of Mr. Sidney Norman, on the Transfer and Black Prince groups.

Besides these more or less development is being carried on in every direction. The tone of the camp is distinctly buoyant, and bar accidents, 1902 marks the longest step taken in the dry ore belt.

The demand for promising prospects and partially developed mines is very promising, largely from the American side.

The Slocan Republic Co. are putting in five miles of wagon road as an outlet for their property, and a strong Ontario company are planning to put a big sawmill plant into Slocan during the summer.

CORRESPONDENCE.

THE M'CROSSAN PROMOTIONS.

To the Editor:—I have not seen a copy of your June issue, but notice a clipping and comment in the *Monetary Times* on an article credited to your journal, and in reply I beg to say that you have been wholly,

and it appears from the tenor of the article, wilfully misled. I am manager of the Metropolitan Gold & Silver Mining Co., Ltd., and the Lardeau Smelting & Refining Co., Ltd., and re the former can say that the Metropolitan claim was examined and explored to some extent last season, but the transportation facilities then available did not warrant extensive work until such time as ore could be packed to a smelter at lesser cost. This we hope to have accomplished in erecting a smelter at Ferguson. I do not see any particular reason why under such circumstances it should place this company open to such a write-up as you appear to have given it. We have since then acquired the Triune, which is acknowledged to have the richest values of any mine in this region, and we are developing this mine, and taking out ore at a very good rate, considering the position of the mine and the local conditions, and I might add that so far as the work has gone since we started we have more than realized our expectation.

Regarding the smelter, this company knew there were plenty of fluxes in this vicinity, but could not get at them from under five or more feet of snow, and so did not operate last winter, but what they did know was that their machinery and smelter could be hauled in here at a lower figure in the winter than during this time of the year. The position we are in is simply this, we have men engaged taking out all the fluxes required, which we have found in almost unlimited quantities, and we are now repairing roads and trails, all of which delays us to some extent, but in spite of all these drawbacks, we are contemplating being ready to blow-in within the next three weeks, and as everything I say can be verified by any citizen here, it proves conclusively that your informant has been deliberately misleading you and misrepresenting the facts. I feel confident you only desire to publish what you know to be true, and I regret that in the present instance you have been led astray, and have certainly done an injustice to both these companies. In conclusion, I might add that the prospects of both companies looks exceedingly bright, and the operation of this smelter, which has not been untried by any means, will enable many mines or claims in the Lardeau now lying dormant to be operated. Trusting you will do what you can to rectify the injury you have, I feel sure, unwittingly done, I am

Yours respectfully,

J. N. M'CROSSAN,

Local Manager.

Ferguson, July 4, 1902.

TRAILS AND THE TIME OF YEAR TO BUILD THEM.

To the Editor:—I take this means of laying before the Government the mistake they made in building trails in the fall. Any one who has travelled over those innumerable mountain trails must have noticed this error in judgment.

Prospectors as a rule wish to get into the hills as early in the spring as possible. On the average trail he finds roaring torrents unbridged, quagmires and windfalls. This is accounted for by the fact of the work being done in the fall, just when the water is lowest and everything is practically dry, so that to all appearances very little is required in the way of

bridges and "corduroying." Then of course the winter storms bring down the trees and block the trail. Were this work done in the spring when the water is at its highest the trail builder would see where bridges were required and would be in a position to do more satisfactory work. The blame for bad trails lies not with the man in charge of construction, but on the Government entirely.

Another thing that would make matters easier for the prospector would be the sowing of grass and clover seed along the trails. The cost would be trifling and the benefit that would accrue to the Government would be inestimable.

I trust that I have made myself intelligible—no "kick" is intended—merely a suggestion that the Government may profitably act upon.

Yours respectfully,

"GOAT RIVER."

COMPANY MEETINGS AND REPORTS.

THE NORTH STAR MINE.

The Annual Report states: During the past year there has been driven 3,780 feet of drifting, cross-cutting, sinking and raising, both in rock and gravel work. In the former the contact of porphyry and the country rock has been followed, since apparently the porphyry is genetically related to the ore. The gravel work is also necessary, since the ore deposits already found have occurred near to the surface on the top of the country rock and embedded in gravel and porphyry.

This year two small ore chutes have been found by following in one case the contact mentioned above, and in the other case by crosscutting in the gravel across the direction of strike and keeping on top of the country rock. No bonanza shoot of ore has been found, although there is every prospect of more being discovered. The ore occurring in well-defined channels or routes, when found, is more difficult to locate when lost than would be imagined, but there are certain signs which if noticed carefully from day to day enable us to follow the ore channels even when there is no ore.

Owing to the fact of the area owned by this company being so large, it is difficult to cover this quickly; this is best realized when it is known that only 13 per cent. of the strike distances have been developed or even prospected. I refer to the strike distances of the ore channels, which to date are three in number. In view of this, there are very great possibilities ahead of this property. I think the old channels can be relied upon to yield more ore, and that others may be found.

The operations at the mine were interfered with for a period of about two months by a shut-down caused by a strike of the miners.

During the year 5,918 tons of ore have been shipped, the average assay value of which has been 25.4 ounces of silver, and 54.1 per cent. of lead.

After careful consideration, not of the moment, but of days, and after the experience of this property during the time I have been here, first as superintendent and now as manager, I consider the future prospects of this property as not being unfavourable.

J. L. PARKER.

WORKING ACCOUNT.

Receipts.

Proceeds of ore sales	\$164,838.72
Miscellaneous receipts	8,777.25
	<u>\$173,615.97</u>

Expenditure.

Cost of mining, development and prospecting	\$ 54,766.04
Freight and treatment	101,336.17
Ore tax	1,052.71
Maintenance	1,658.86
Depreciation on ore sacks	800.00
General expenses	2,054.35
Montreal office expenses	1,245.86
Directors' fees	2,000.00
	<u>\$164,914.93</u>
Balance transferred to profit and loss....	8,701.04
	<u>\$173,615.97</u>

Profit and Loss.

Balance at credit of profit and loss.....	\$156,796.51
Balance from working account	8,701.04
	<u>\$165,497.55</u>
Dividends 6 to 9, inclusive	\$ 97,500.00
Balance	<u>67,997.55</u>
	<u>\$165,497.55</u>

MINISTER OF MINES REPORT, 1901.

IN reviewing the progress of mining during 1901, the report states:

The mining industry has maintained that rapid growth which has characterized it since the inception of lode mining some ten years ago. It is all the more gratifying to be able to make this announcement again this year, inasmuch as reports to the contrary have been so widely circulated that the

The following table gives in detail the amount and value of the different mineral products for the years 1899, 1900 and 1901. As it has been impossible as yet to collect accurate statistics regarding building stone, lime, bricks, tiles, etc., these are estimated.

	Customary Measure	1899		1900		1901	
		Quantity	Value	Quantity	Value	Quantity	Value
Gold, placer	Ounces ..	67,245	\$ 1,344,900	63,936	\$ 1,278,724	48,505	\$ 970,100
Gold, lode	Ounces ..	138,315	2,857,573	167,153	3,453,381	210,384	4,348,603
Silver	Ounces ..	2,939,413	1,663,708	3,958,175	2,309,200	5,151,333	2,884,745
Copper.....	Pounds ..	7,722,591	1,351,453	9,997,080	1,615,289	27,603,746	4,446,963
Lead	Pounds ..	21,862,436	378,870	63,358,621	2,691,887	51,582,906	2,002,733
Coal.....	Tons, 2,240 lb.	1,306,324	3,918,972	1,439,595	4,318,785	1,460,331	4,380,993
Coke.....	Tons, 2,240 lb.	34,251	171,255	85,149	425,745	127,081	635,405
Other materials ..			206,400		251,740		417,238
			<u>\$12,393,131</u>		<u>\$16,344,751</u>		<u>\$20,086,780</u>

impression that 1901 has proved a disastrous year has gained much credence, not only abroad, but even within our own borders. Statistics are the best refutation of this impression, and it is with much gratification that attention is drawn to the preceding statistical tables. These show that the value of the mineral production of this Province for the past year is greater than that of the Yukon; that we have in our mineral deposits a "Klondike" of our own, and a permanent and growing one at that. The Yukon is credited with an

earned increment to the mineral wealth of the world. Gold still retains the first place in this list with a total production of \$63,554,543, coal and coke following with a total production of \$54,157,315.

Table II. shows the gross value of the mineral output for each year, and is particularly intended to illustrate the growth of the mining industry from year to year. From this it will be seen that in the last ten years the output has increased from \$2,078,530 in 1892 to \$20,086,780 in 1901, and this increase has been gradual and steady, the result of new properties added to the producing list each year, and the increasing development of the older properties.

The increases for each year from 1896 over that preceding are shown below:—

	Increase over preceding year.	Per cent. increase.
1896	\$1,864,914	33
1897	2,947,312	39
1898	451,593	4½
1899	1,486,270	13½
1900	3,951,620	31½
1901	3,742,029	23

The per capita mineral production of the Province for 1901 was \$134.

Table III. gives in detail the amount and value of the various mineral products for the past three years. As compared with 1900 the production for 1901 shows, for—

Placer gold	decrease of	27½%
Lode gold	increase of	26 %
Silver	"	25 %
Copper	"	175 %
Lead	decrease of	25½%
Coal	increase of	1½%
Coke	"	49 %
Other materials	"	22½%

Table IV. shows the gross value of the mineral products for the last three years produced by the various divisions and districts, and illustrates the growth of the productive mining in the various parts of the Province.

Table V. shows the yearly production of placer gold since 1858, showing a grand total to date of \$63,554,543. In this is included gold obtained by placer mining, hydraulic and dredging.

Table VI. shows the production of the lode mines of the Province since 1887, which is the earliest period in which any lode mining was carried on, although it never amounted to anything appreciable until 1892.

While coal mining and placer mining are undoubtedly just as truly mining as is "lode mining"—and the production therefrom is just as truly a part of the mineral output—still, in the popular sense, the term "mining" is confined to lode or metal mining, and for this reason this table is most interesting as indicating the growth of such "mining" in the Province.

That this growth has been phenomenal is shown by the following figures:—

In 1894 the product of the lode mines was valued at \$781,342, while in 1901 it has increased to \$13,683,044, or nearly 18 times as much in eight years.

The product of these mines in 1901 is valued at \$13,683,044, an increase over the previous year of \$3,613,287, or equal to 36%.

output of \$18,000,000, while British Columbia produced \$20,086,780.

Table I, gives the total values of the various mineral products of the Province up to and including the year 1901, showing the amount contributed by each mineral to make up the total of \$175,241,988, the grand total of the Province's

The tonnage of ore mined in 1897 was 169,362 tons; in 1898 it had increased to 215,944 tons, or about 27½% increase over the previous year. In 1899 it was 287,343 tons, or equal to 33% increase; in 1900 it was 554,796 tons, or 93% increase; in 1901 it was 920,416 tons, or about 66% increase over the previous year.

The following table shows the number of mines in each district which shipped during the past year:—

	No. of Mines Shipping	No. of mines shipped over 100 tons in 1901	Men Employed in these Mines.		
			Below	Above	Total
Cassiar—					
Atlin	1	1	1		1
East Kootenay—					
Fort Steele	4	4	173	63	236
Other Divisions	4	1	19	7	26
West Kootenay—					
Ainsworth	13	7	126	33	159
Nelson	11	8	282	211	493
Slocan	36	21	676	194	870
Trail	13	9	685	267	952
Others	8	2	39	27	66
Lillooet	3	3	29	14	43
Yale—					
Osoyoos, Grand Forks and Kettle River	17	14	501	227	728
Yale-Ashcroft-Kamloops	2	2	21	19	40
Coast	7	7	184	150	334
Total	119	78	2,736	1,212	3,948

Of the non-shipping mines the statistics are very incomplete, as very few of them report to the Department, and most of them are still in the "prospect stage." Returns have been received, however, from 47 mines in the Province which did not ship in 1901, and show that these mines employed 374 men; 227 below ground and 147 above ground.

Table VII, shows the product of the metalliferous mines of the Province, giving in detail the tonnage mined in each division, together with the quantities and values of each of the metals so produced.

Table VIII, gives the coal and coke production of the Province for each year from 1836 to date, showing a gross product of the value of \$54,157,315.

Tables IX, and X, show, graphically, the mineral production of British Columbia for 1900 and 1901, as compared with the combined product of all the other Provinces for the same minerals during these years.

This shows that, of the total combined output of the various Provinces of the Dominion during 1901 (excluding the Yukon Territory), British Columbia produced—

82% of the gold, 96% of the silver,
67% of the copper, 95% of the lead,
2% of the iron, none of the nickel,
30% of the coal, 50% of the coke,
and of the total of preceding minerals about 49½%.

Surely British Columbia is entitled to be called the "Mineral Province of Canada."

COAL.

The coal mines of the Province have, during the past year, made an output never before equalled in their history. The gross output of coal was 1,691,557 tons, of which 221,226 tons were used to make coke, so that the net output for the year was 1,460,331 tons of coal and 127,681 tons of coke. This is equivalent to an increased production over 1900 of coal 1¼%, and of coke 49%.

The sales of coal were as follows:—

Sold for consumption in Canada	413,705 tons.
" export to United States	895,197 "
" export to other countries	18,966 "

Total sales (2,240 lbs.) 1,327,868 tons.

The total sales of coke amounted to 127,533 tons, of which 80,154 tons were sold for consumption in Canada, and 47,379 tons were exported to the United States. This output has been made from the collieries on Vancouver Island and those near the Crow's Nest Pass. The detailed production of each colliery is shown in the reports of the Inspectors of Collieries. The coast collieries produced 1,261,744 tons of coal and 15,398 tons of coke. The Crow's Nest collieries pro-

duced 198,587 tons of coal and 111,683 tons of coke.

The conditions prevailing in these two districts are so different that they require to be noted separately.

In the coast collieries the output is limited by the market for the product, as these older collieries are better prepared to meet an increased demand. Of their product about 75% was exported, chiefly to California and mostly as coal. With the completion of the two smelters now under construction on the coast, the market for coke should be materially increased next year.

The Crow's Nest collieries are as yet new, and their output is limited, not by the market, which is unlimited, but by the undeveloped condition of the collieries and the limited transportation facilities, difficulties which are being removed with all possible speed, and next year will undoubtedly see an enormous increase in the output of these collieries. Of their product about 60% of the coal and 70% of the coke was consumed in Canada, the remainder going to the United States. It has been a constant struggle for these mines to meet the demands made on them for fuel, and every endeavour is being made to increase the output. There have been many complaints that the local demand for fuel was being neglected to supply the export trade. This difficulty will be obviated as the development and equipment of the collieries is increased. The figures show where the output was sold and it is certain that next year a far larger proportion of the coal produced will be exported, as it is evident from the demand that it is much better than any other that can be obtained in those States immediately to the southward of British Columbia.

It will be noted that while these collieries only turned out 198,587 tons of coal to be used as such, they converted 180,768 tons into 111,683 tons of coke, selling it as such, so that the actual amount of coal mined was 379,355 tons.

GOLD.

The statistics show that the gold production of the Province—including both placer and lode gold—for the past year

was of a value of \$5,318,703, which is an increase over that of 1900 of \$586,598, or equal to about 12% increase. This is the greatest gold production British Columbia has ever made. In 1900 the increase was 12½% over the previous year, and the increase this year over 1900 is 11½%, showing the growing importance of the gold output of the Province. This production is derived from placer mining, including ordinary placer work, hydraulic and dredging, and from lode mining.

PLACER GOLD MINING.

The placer gold output for the year 1901 was \$970,100—a decrease from the previous year of \$308,624. This is accounted for by the fact that the Atlin production has again suffered a serious diminution; the ordinary placers are mostly worked out, and the hydraulic companies, which should have been at work making an output have managed to get into litigation amongst themselves and with individual miners, so that the season was practically lost. It is hoped and expected that by next season the existing plants, and those now under construction, will be able to work and, if so, the output of the camp will certainly be doubled.

HYDRAULICING.

The Cariboo District shows a considerably decreased production, which is due almost entirely to the small output of the largest company in the district, the Cariboo Consolidated, which, through shortage of water, was only able to work a part of the season. This shortage of water was occasioned by the sudden melting of the snow in the spring, leaving insufficient water for the latter part of the season. The snow usually retained on the mountains is, as a rule, a sufficient reserve supply to last through the season, but last year this all melted at once causing spring freshets and a dry summer season. The smaller companies in the district did well, and with a normal snowfall and spring all should make a very good showing next season.

A small output has been made from the Liard Division, but as last year was the first year of the operations of the hydraulic companies there most of the work was preparatory and of the nature of development.

On the coast certain deposits of black sand have been worked to a profit, but have not made the output expected.

DREDGING.

Dredging for gold, although it continues to receive much attention and large amounts have been invested in capital, has not as yet yielded any very material return or output. That the gold exists in the beds of many of the rivers in considerable quantities has been conclusively proved many times, but the difficulty seems to be to save it.

It might be pointed out that in every instance, as far as is known, the dredges operating in British Columbia work up stream and it is very questionable if such a practice is best suited to the conditions here prevailing, or whether they should not, on the contrary, work down stream.

In most of our rivers dredging is done under the following conditions viz.: a swift current, numerous boulders, fine, flaky gold to be recovered and, finally, a hard, undredgable and uneven bedrock.

It is submitted that, under these conditions, a dredge working up stream can not be expected to save or take up all the gold. The agitation of the river bed by the buckets is great, and the gold will and is bound to settle into crevices in the bedrock. A very small crevice may hold the profits of a month, from which in a hard bedrock, it is impossible for a dredge to recover it. Any gold once raised and afterwards dropped is swept by the force of the current back of the dredge bucket and is consequently lost. On the other hand, in working down stream a "face" is formed, which will be more or less inclined; the gold is swept from the bedrock on to this inclined face of removable material, and would be taken up in a subsequent bucket load.

LODE GOLD MINING.

Placer mining is, of necessity, dependent on the weather, and is as variable in this Province as that commodity, but in lode gold mining, as the mines develop, the production becomes as regular as the output of a manufacturing business, and it is to lode mining that the Province is indebted for its ever-increasing gold production. In 1901 the lode mines of the Province produced \$4,348,603 in value of gold, an increase over the previous year of \$895,222, or 26%. When it is remembered that this increase follows an increase in

1899 of about 30%, and in 1900 of 21%, a fair idea may be formed of the development and growth of the industry. This great increase is due first and chiefly to the development of the Boundary District, but the increased tonnage of the Rossland and Nelson Districts has also had its effect. Approximately, this gold has been derived from—

Direct smelting of copper-gold ores	\$3,474,738
Combined amalgamation and concentration	873,865
Total	\$4,348,603

It may be said that no absolutely "free milling" gold property is working in the Province; they all carry sufficient values in sulphides to necessitate the saving of such.

SILVER.

The total amount of silver produced in 1901 was 5,151,333 ounces, valued at \$2,884,745. This is an increase over the previous year of \$575,545 in value. The silver production of British Columbia this past year has been affected in two ways and requires some explanation. Silver is derived from silver-lead ores and from copper ores carrying silver, with a small percentage of "dry" silver ores. In 1900 approximately 90% of the silver produced was derived from silver-lead ores, probably including most of the "dry" ores, as they were chiefly smelted together and are impossible to separate in the statistics. This year there has been a falling off in the production of lead ores, and a consequent diminution of the silver production, which has, however, been more than offset by the greatly increased tonnage of the copper-silver ores.

As near as can be estimated, the copper-silver ores have this year produced 30¼% of the silver output. The production from "dry" ores, although proportionately small, has greatly increased, but it would be difficult, as before stated, to separate, with any degree of accuracy, this source of production from the others.

LEAD.

The production of lead was this past year 51,582,906 lbs., worth \$2,002,733. This shows a decrease in value of \$689,154, or about 25% as compared with the production of 1900, but in fairness the comparison must not stop here; it must be remembered that in 1900 there was a phenomenal increase over 1899 of 206%. The figures show, therefore, that the lead production of 1901, although showing a decrease as compared with 1900, shows an increase over 1898 of 86%, and over 1899 of 128%, and is still 25% higher than the highest production of any year prior to 1900. The cause of the decrease is not attributable to the mines themselves, but to the condition of the market for lead ores—too large a question to go into here—which has temporarily rendered it unprofitable to mine large deposits of galena very low in silver. Reference is here made particularly to the lead ores of East Kootenay. The Slocan district has not been so seriously affected by the low price obtainable for lead ores, as the ores of this section carry much higher silver values, which has enabled them to be mined and marketed at a profit. As a matter of fact, the Slocan has this year just held its own as regards tonnage of ore mined and values produced.

COPPER.

Each year seems to present some particular feature of interest, and this year it is the greatly increased copper production of the Province. The copper production for the year has been 27,603,746 lbs. of "fine copper," valued at \$4,446,963, an increase of 17,666,665 lbs., and \$2,831,674 over that of the previous year, or about 175% increase in value.

It may here be noted that the recent "break" in the copper market did not occur until the last month in the year, and as, in estimating the values as above, the average price for the year is employed, the value of the product has not been seriously affected.

This copper has been derived as follows:—

Boundary district	14,511,787 lbs.
Trail (Rossland) "	8,333,446 "
Coast "	3,115,872 "
Nelson "	1,539,449 "
Other districts	43,192 "
Total	27,603,746 "

The great increase has been due to the working of the exceedingly large and notoriously low grade copper ores of

the "Boundary," which has been rendered possible by the material reduction made in the actual costs of smelting, which are authoritatively stated as having been reduced as low as \$1.35 to \$1.50 per ton, of ore. This low possible cost of the first smelting, now proven, has a wide effect on the future of the district and Province, as it brings within the limit of profitable ores many known deposits of great extent which it has been previously regarded as impossible to profitably treat.

IRON ORE.

It has to be recorded that, as yet, very little iron ore as such has been mined in the Province. There have been a few experimental shipments made and a considerable amount of development work carried on, but from the very nature of things iron ore to be handled at all necessitates an iron blast furnace to treat it, which is, as yet, not an accomplished fact in British Columbia, and will not be until a sufficient development has been done to fully establish both the quantity and quality of ore supply to justify its erection.

The statistics show that 5,746 tons of ore were shipped, which, as before stated, were used for experimental purposes, or as a flux in smelting other ores.

OTHER MINERALS.

PLATINUM.

There has been a small quantity of platinum produced this year, about \$457 worth, from the Similkameen District. This small output is occasioned by the fact that comparatively little placer gold mining has been going on in this district of late, and as the platinum is recovered with the placer gold, little has been produced. This metal has been again noted in the neighbourhood of Dease Lake and on the Thompson River in the placer workings, but no record has been obtainable of any quantity having been saved.

BUILDING MATERIALS.

No reliable returns are available as to the production of the various building materials, including lime, brick, fire-clay, building stone, cement and tile pipes, and the amount credited to these materials in the statistics has been estimated—the estimate erring on the conservative side.

Lime and brick are produced locally in almost every district for home consumption, while on the coast an excellent lime which has considerable sale abroad, is made from a marble. On the coast, too, a cement of very good quality is made and supplies much of the local market. On Kootenay Lake a coarsely crystalline marble quarry is being worked for building purposes. There are on the coast several first-class granite and sandstone quarries opened and doing a local trade. These quarries are so admirably situated as regards water transportation that there is a fair prospect of their becoming an important export industry. Fire-brick, drain pipes and tile are manufactured on Vancouver Island for home consumption.

MINING RETURNS AND STATISTICS.

ROSSLAND.

ORE shipments from the Rossland District for the seven months ending July 31 aggregate approximately 190,000 tons. Returns to July 19th were as follows:

Le Roi	129,336
Le Roi No. 2	37,107
Centre Star	4,310
War Eagle	420
Rossland G. W.	2,400
Giant	750
Cascade	300
Columbia-Kootenay	30
Bonanza	00
Velvet	250
Spitzee	20
Total	179,376

BOUNDARY DISTRICT.

The following table summarises ore production from this district for the seven months ending July 26th:

Phoenix—	
Granby Mines	190,364
Snowshoe	2,942

Deadwood—	
Mother Lode	70,032
Sunset	4,520
Summit—	
B. C. Mine	2,718
Emma	385
Wellington—	
Winnipeg	785
Golden Crown	625
Central—	
No. 7 Mine	482
Long Lake—	
Jewel	1,912
Total tons	275,465
Granby Smelter treatment, tons	172,719

SLOCAN.

Ore shipments from January 1st to July 29th have, according to a table prepared by the New Denver Ledger, been divided as follows:

Payne	630
Ivanhoe	295
Sunset (Jackson Basin)	661
Reco	322
American Boy	556
Arlington	2,200
Hewett	700
Bosun	670
Last Chance	150
Wonderful	151
Enterprise	860
Lavina	85
Bismarck	22
Queen Bess	160
Silver Giance	37
Whitewater	2,493
Ottawa	8
Slocan Boy	44
Neepawa	81
Hartney	25
Marion	80
May	5
Paystreak	7
Surprise	22
Monitor (for June)	645
Slocan Star	528
Duplex	7
Emily Edith	20
Wakefield	40
Prescott	4
Rambler	2,384
Molly Gibson (since last report)	1,500
Washington	30
Folliott	2
C. O. D.	2
London Hill	15
Ruth	166
Total tons	16,084

The Slocan Drill publishes the following returns of tonnage output from the Slocan City Division to July 26th:

Arlington	2,360
Enterprise	1,060
Ottawa	7
Neepawa	81
May	5
Paystreak	5
Duplex	7
Fourth of July	11
Total	3,536

YUKON.

The following statement represents the business done in the Gold Commissioner's office during the month of June: Miners' licenses issued, 630; claims renewed, 314; original locations, of which several were discoveries, 190; transfers, 1,316, which is the banner month's work of the office; water grants, 7; original quartz locations, 92; renewals, 69; quartz claims renewed on cash payment (\$100), 11; quartz transfers, 80.

CATALOGUES, CIRCULARS AND TRADE NOTICES

PELTON WATER WHEELS IN CALIFORNIA.

THE Pelton Water Wheel Company has just closed with the Bellevue Mining Co., of La Porte, Cal., for a power plant and pipe line. The water wheels will generate 200 h.p. to drive an air compressor, generator and blower for ventilating the mine.

Among some of the most recent orders under completion at the Pelton Company's works, might be mentioned: Salvador Mining Co., Rix Compressed Air & Drill Co., Pacific Portland Cement Co., Ledge Mining & Milling Co., Cumerama Mining & Milling Co., Mitchell Mine, Lahaina Plantation Co., Clark Electric Co., Ouray Electric Power & Light Co., Bishop Light & Power Co. The above orders call for water wheels to operate all classes of mining, plantation and electrical machinery, and illustrate the wide range of application of Pelton apparatus.

ALLIS-CHALMERS STAMP MILLS.

The Bear Gulch Mining Company, of Jardine, Mont., have placed an order with the Salt Lake Branch Office of the Allis-Chalmers Co. for a 40-stamp mill, complete with bin gates, feeders, high mortars, forged steel shoes and dies cast steel cams, tappets and 1 stamp heads copper plates and pulleys, pillow blocks shafting, etc. Also for No. 5 style "D" Gates crusher, with manganese heads and concaves. The Salt Lake Branch of the Allis-Chalmers Co. have received amongst other orders, two orders each for 40 steel shoes and 40 forged steel dies, one for the Gold King Syndicate and one for the Bear Gulch Mining Co., of Jardine Montana.

THE ROASTING, SMELTING AND REFINING OF ORES.

Catalogue No. 3, the sixth edition of which has been published by the Allis-Chalmers Co., is devoted, as the introductory chapter remarks, "to illustrated descriptions of the machinery which modern practice has found best suited for the purpose of extracting gold, silver, lead and copper from ores by ingenious processes." Like all this company's catalogues, the present work is most comprehensive, and contains a vast deal of information of value to the metallurgist.

COAL STATISTICS AND TRADE.

CALIFORNIA market conditions remain practically unchanged. The present price of coal has reached so low a point that there is little likelihood of any further decline. The competition between oil and coal interests is, however, very keen, and in both markets prices have been cut until profits have practically disappeared. The importations of coal into San Francisco during the first six months of 1902 show a falling off of at least 125,000 tons in comparison with the 1901 returns for a like period. British Columbia meanwhile continues to be the heaviest contributor to this market.

THE LOCAL SHARE MARKET.

THE local share markets this month have been practically featureless, speculation in the East having almost entirely ceased. There has, however, been some considerable dealing locally in Mount Sicker (V.I.) stocks, while Fairview and Dominion Consolidated shares have also been in demand at higher prices. The completion of the branch line of the Great Northern Railway into the Republic camp in Washington has had the effect of creating a better market for the shares of companies operating in that locality, and as several of the Republic mines are now in a position to commence regular shipments, a general advance in prices may be ere long expected. Among Rosland stocks, Centre Star is steady at from 38 to 40; War Eagle is unchanged at 13; Giant has sold at 3½; Iron Mask at 7 to 9; while White Bear has been fairly active at from 2½ to 3. There has been no movement in Boundary securities, Granby being quoted at \$3 Montreal & Boston at \$3 Winnipeg at 5 and Morrison at 3½. Slocan shares are dull, Payne having fallen to 16, Rambler-Cariboo at 70@80; Dardanelles at 2½@3 and Wonderful at 2@3, have, however, been freely dealt in. Cariboo-McKinney has again declined to 17 asked, 14 bid, and North Star is also very weak.

GRADUATES OF A SAN FRANCISCO SCHOOL OF ENGINEERING.

THE A. Van der Naillen School of Engineering recently held its 38th annual examination in practical, civil, mining, electrical and mechanical engineering and surveying, architecture, drawing, assaying, cyaniding and metallurgy. The following successfully passed and were granted diplomas:

Assayers—H. A. Kuns, Ingomar; D. Woodruff, San Francisco; H. B. Shaw, Sonoma; C. S. Bryant, Diamond; H. C. Guentische, San Francisco; W. T. James, San Francisco; C. L. Bosson, San Francisco; F. G. Blackhart, Angels; J. K. Wilson, Placerville; F. S. Beckett, Grizzly Flat; G. Messner, Callahans Flat; W. W. Thurston, Grass Valley; T. J. Douglass, Berkeley; J. Sklower, Berkeley; R. Mawbray, Salmon City, Idaho; C. W. Soule, Salmon City, Idaho; D. J. Mahoney, Glendale, Or.; L. L. Mann, Elelee, H.I.; G. R. Huggins, Murfreesboro, Tenn.; E. Williams, Nome, Alaska; G. Colin, Victor, Colo.

Surveyors—G. Gibson, San Jose; M. J. Blake, Matthews; G. W. Grove, Wheatville; G. J. Grinnell, San Francisco; G. V. Nichols, Berkeley; A. E. Duffey, Ben Lomond; R. J. Barr, San Rafael; C. Goerl, San Rafael; F. Juhl, Kings City; U. Coffman, Cedarville; R. C. MacLachlan, Laton; A. Watson, Dawson, N.W.T.; A. Dumas, Nome, Alaska; W. H. Warnecke, San Francisco.

Mining Department—G. A. Ray, Gualala; S. M. Waterman, Cinnabar; F. A. Horvill, Stone Canyon; J. L. Hutchinson, Sumpter, Or.; H. Newman, San Francisco; M. C. Kerr, Johnsville; F. M. Lyle, San Francisco; D. W. Lyon, Grass Valley, W. H. James, Iowa Hill; J. A. Shields, Michigan Bluff; Charles E. Sloan, Memphis, Tenn.; B. G. B. McDowell, Nankin Ohio; J. H. McDowell Nankin, Ohio; W. O. Maxwell, Marshfield, Or.; E. F. Beck, Dayton, Nevada; O. W. Alderton, Ehrenberg, Ariz.; F. W. Saunders, Coos Bay.

Draughtsmen—R. Keeler, San Francisco; G. Fee, San Francisco; R. W. Cudworth, San Francisco; W. K. Blackburn, San Francisco; S. L. Casella, Alma; J. F. McLaughlin, Port Blakeley, Wash.

Electrical Department—W. R. Dunbar, Murphys; H. E. Shuck, Sacramento; T. J. Zenmdner, Arcata; P. L. Gedney, San Diego; D. McDougall, San Francisco; W. T. Rutledge, San Bernardino; R. Dewart, Gilroy; E. L. Faust, Bakersfield; A. W. Hunt, Redlands; V. Urban, San Jose; H. G. Schemel, Gilroy; A. Mauser, Napa; J. W. Dooley, Sacramento; F. A. Dooley, Sacramento; A. H. Kennedy, Arabelle; C. W. Cooper, Campbell; T. C. Thayer, Biggs; H. B. Patterson, Armona; R. Urquhart, Napa; C. T. McKenzie, Napa; H. A. Smith, Santa Barbara; J. T. Worthington, Waddington; F. W. Mielenz, Napa; F. Bond, Cloverdale; F. R. George, Los Angeles; E. Krett, San Francisco; R. L. Cathy, Ferndale; E. R. Foster, Dixon; E. Schlessinger, San Francisco; L. A. Hedger, San Francisco; J. Minor, Arcata; J. P. Gericke, Tomales; H. F. Fahs, San Francisco; E. P. Mann, San Jose; O. G. Wilkes, Hillsboro, Or.; L. E. Wilkes, Hillsboro, Or.; E. Mayer, Butte, Mont.; L. T. Russell, Portland, Or.; S. C. Mills, Salt Lake, Utah; E. M. Hengell, Andover, S. D.; H. Piggott, Ontario, Canada; John Fletcher, Manila, Philippine Islands; D. C. Rudolph, Lompoc.

COPPER PRODUCTION.

In their annual statistics of the world's production of copper, Henry R. Merton & Co., Limited, of London, show that there has been an increase in the output abroad while in the United States there is a slight decrease. Canada, Australia and Chili are the countries mentioned which have increased their supplies.

THE METAL MARKET.

THE silver market has been dull and featureless, although prices are slightly higher than during June. The Indian Government is now well supplied with silver, and buying of the metal on Government account has fallen off. Exports of silver bullion from San Francisco to the Orient for the six months ending June 30th are valued at \$2713,352,—a large increase over the corresponding period

between 52% @ 53¼. The copper market is inactive, partly as a result of the coal strikes in the United States. It is therefore expected that, as manufacturers are not well supplied, large buying will take place when the industrial equilibrium in the coal mining districts is again restored. Prices remain practically unchanged, with Lake copper at 117% @ 12; electrolytic in cakes, wire bars and ingots at 113¼ @ 117½; in cathodes at 11½ @ 115½, and casting copper 11¾. The lead market shows little improvement, 3.97½ @ 4.05, St. Louis; 4.05 @ 4.10, New York. In London, Spanish lead is quoted at £11 5. @ £11 6s. 3d., English lead being five shillings high. Spelter has been very active and prices have advanced. There is apparently a shortage in the supply and consumption is exceptionally heavy, while no stocks have been accumulated. The latest quotations are:—5.05 @ 5½, St. Louis; 5¼ @ 5¾, New York.

COMPANY NOTES AND CABLES.

THE YMIR GOLD MINES.—During June 50 stamps ran 675 hours (28 days 3 hours)—estimated profit on operating \$6,850 (£1,412)—above was arrived at after development \$3,730, repairs etc., \$1,390 written off.

VELVET, ROSSLAND.—Cable received from manager on the 30th June, states: "First diamond drill hole—the total length is 110 ft.; intersected ore at 92 ft. for a length of 12 ft. Apparently southwest vein 80 ft. below. 500 ft. level—Core looks encouraging."

ENTERPRISE (BRITISH COLUMBIA).—Cablegram from the company's representative at Nelson, British Columbia: "Profit for May, \$1,250."

WHITEWATER.—Cable from the company's representative at Nelson, British Columbia: "During May 3,684 tons were milled, producing 196 tons of concentrates; approximate loss on month's working, \$860."

SLOUGH CREEK.—Cablegram from the mine manager: Horizontal drill in the gravel 5 ft. in front of—1 ft. under the cap; is in good order throughout." An office note says: "It may therefore be anticipated that the face of the cross-cut (to which this cable evidently refers) will be in the gravel a few feet further on, thus saving a great deal of further exploration work."

YUKON GOLDFIELDS.—Cablegram from the manager at Dawson City, Yukon: "Clean-up for the month of June, \$2,800. There is every prospect of improvement this month. N. A. D. Armstrong."

MONITOR, THREE FORKS.—The following report has been issued by the Monitor and Ajax Fraction, Limited:

APRIL.

Ore shipped—		
	Tons	Est. net val.
Crude	41	\$2850
Carbonates	43	1453
Ore on hand—		
Crude	102	7140
Carbonates	6	250
Screenings	80	1600
Ore mined—		
Crude	52	2640
Carbonates	6	250
Cost of mining per ton		\$10.13
Development 166 feet.		
Cost of development per foot		\$6.75

MAY.

Ore shipped—		
	Tons.	Est. net val.
Crude	9	\$800
Carbonates	11	550
Screenings	20	400
Ore on hand—		
Crude	135	9000
Screenings	20	400
Ore mined—		
Crude	30	2100
Cost of mining per ton		\$3.05
Development, 263 feet.		
Cost of development per foot		\$7.10

A large body of ore was discovered about 780 ft. from the Portal tunnel in the month of April, where three feet of solid galena was encountered.

Under date the 5th May the mine manager reports that No. 5 crosscut tunnel has struck the ledge at 408 feet from the Portal and 217 below No. 4 level; 6 in. ore has been encountered in the ledge and drifting north and south on the ore body thus exposed will shortly be resumed—this is a most important strike, and indicates that the ore chutes are continuous between the two levels.

Shipments for the month of May have been small owing to seepage in the leading stopes.

The works are now drying and the manager estimates that he will ship 160 tons of the approximate value of £2,500 during the present month.

Report of Le Roi Mining Co., Ltd., for May, 1902:

"Output, contents and gross values of first class ore:—	
13,047,277 dry tons containing:—	
Au, 7,217 ozs. at \$20	\$144,338
Ag, 11,108 ozs. at 52c.	5,776
Cu, 464,330 lbs. at 121.8c.	56,300

Total gross value \$206,414
Equal to a gross value per ton of \$15.82.

Mine Expenditure.—The expenditure for the month on mine account was \$51,783. The cost of breaking and delivering ore on the railroad cars for the month was \$2,62, and the cost, including all mine expenditures, was \$3.94 per ton.

Northport Smelter.—The expenditure for the month was \$109,048. The following statement gives the details of the ore received at the smelter during the month, and the contents:—

	Dry Tons.	Ozs. Au.	Ozs. Ag.	Lbs. Cu. wet.
Public Ores—				
Le Roi No. 2	6,324	3,281	6,795	259,754
Rossland G.W.M., Ld	313	221	743	15,945
Le Roi Ores—				
1st class	13,047	7,217	11,108	464,330
2nd class dump	172	43	69	2,625
	10,856	10,762	18,315	742,654

The tonnage treated during the month was as follows:—

	Tons.	Tons.
Roasted ores		26,724
Raw ores		4,683
Le Roi No. 2 Ltd.	4,588	
Rossland Great Western	95	
		31,407

"Profit for the month:—

The gross value of ore shipped from the mine was. \$207,130
Equal to a value per ton of \$15.86
From this deduct difference between gross value and refiners' settlement rates and interest on gold and silver values for 90 days and copper 60 days 2.37

Net value per ton	\$13.49
Value of 13,047 dry tons	\$176,007
Cost of mining	\$3.94
Cost of freight	50
Int rest	06

	\$4.50 per ton, equal to	58,713
Cost of smelting	3.83	
Interest	03	
	3.86 per ton, equal to	50,362

Total cost \$109,075

Net estimated profit. \$66,932

June Returns.—The manager cabled: "Shipped from mine to smelter during the past month 11,479 tons of ore, containing 6,800 ozs. gold, 11,100 ozs. silver, 501,100 lbs. of copper. Estimated profit on this ore \$66,000. Shipped from mine to smelter during the past month second class ore dump 3,200 tons, containing 1,591 ozs. of silver, 1,666 ozs. of silver, 73,550 lbs. copper. Estimated profit on this ore \$21,000. Have had second class ore dump surveyed. It contains 3,000 tons

LOCAL STOCK MARKET FOR THE MONTH OF JULY.

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

COMPANIES.	Week Ending Saturday, July 5.				Week Ending Saturday, July 12.				Week Ending Saturday July 19.				Week Ending Saturday July 26.				DIVIDENDS
	Highest.		Lowest.		Highest.		Lowest.		Highest.		Lowest.		Highest.		Lowest.		
	Asked.	Bid.	Asked.	Bid.	Asked.	Bid.	Asked.	Bid.	Asked.	Bid.	Asked.	Bid.	Asked.	Bid.	Asked.	Bid.	
Cariboo McKin'y.	\$0 17	\$ 14½	\$0 16	14	\$ 18½	\$ 16	\$ 15	\$ 12	\$ 16½	\$ 14½	\$ 15½	\$ 12	\$ 17	\$ 14½	\$ 16	\$ 14	
Cariboo Hydraulic	1 05	90	1 05	90	1 10	90	1 05	90	1 05	90	1 00	90	1 05	90	1 05	90	
Centre Star	40	39	39	38	40	39½	39½	38½	41	39	39½	38	40	39	40	38	
Crow's Nest P. C.	125 00	115 00	125 00	112 50	127 50	112 50	125 00	112 50	125 00	112 50	125 00	112 50	125 00	117 50	125 00	117 50	
Dardanelles	3½	3¼	3¼	2½	3¼	2½	3¼	2½	3½	2½	3¼	2½	3¼	2½	3¼	2½	
Evening Star	6½	5¾	6½	5¾	7¼	7	6½	5¾	7¼	7	7¼	6	7¼	6	7¼	6	
Fairview Corp'n.	10	8¾	9½	7	10	7½	8½	4½	9	5½	8	5	8	6	7½	5	
Iron Mask	10	8¾	9½	7	10	7½	8½	4½	9	5½	8	5	8	6	7½	5	
Jumbo	23	20	19	15	21	18	19	15	20	15	19½	15	18	15½	17	15	
North Star	22	20½	21	19	21	18	17½	15	19½	16½	17½	15½	18	15½	17	15	
Payne	82	79	81	78½	86	79	81	78	81	79½	80	78½	81½	79	79½	78	
Rambler	82	79	81	78½	86	79	81	78	81	79½	80	78½	81½	79	79½	78	
Slocan Star	8	7	8	7	8	7	7¼	6½	8	6¾	7	6	7¼	6¾	7	6	
Sullivan	8	7	8	7	8	7	7¼	6½	8	6¾	7	6	7¼	6¾	7	6	
War Eagle	14½	13	13½	12	14½	13½	14	13	14½	13½	14	13	15	13	14	13	
Waterloo	1½	1	1½	1	1½	1	1½	1	1½	1	1½	1	1½	1	1½	1	
Winnipeg	5½	3	5	3	5½	3	5	3	5	3	5	3	5	3	5	3	
St. Eugene	3 05	2 70	3 05	2 65	3 05	2 75	3 05	2 70	3 05	2 75	3 05	2 75	3 05	2 75	3 00	2 75	
Granby	3 05	2 70	3 05	2 65	3 05	2 75	3 05	2 70	3 05	2 75	3 05	2 75	3 05	2 75	3 00	2 75	

The Robertson-Godson Co'y, Ltd. Vancouver, B. C.

Wholesale Jobbers of SHEET METALS, Galvanized, Flat and Corrugated Iron, Canada Plates, Tin and Tern Plates, Etc. IRON PIPE one-eighth inch to eight inch, Valves, Fittings and Brass Goods; Estimates furnished for Cast-Iron Water Pipes and Water Works Supplies. PLUMBERS' SUPPLIES—A complete stock on hand; we are headquarters for British Columbia

BOILED AND RAW LINSEED OIL.

WHITE LEAD—Robertson's Chemically Pure is Standard for Canada.

We are manufacturers of and carry in stock White Lead, Lead Pipe, Brass Goods, Shot, Marble for Plumbers' use, Lacquer for Canners

WRITE FOR QUOTATIONS.

THE ROBERTSON-GODSON CO., Ltd, 32 Hasting St., Vancouver.

that will net \$20,000 and 84,000 that will net \$126,000. Estimated deficiency Bank of Montreal 30th June, \$50,000. There is no improvement in 1,050 level. On 1,200 level drift is now in 70 ft. going west, same distance east, no value. Top floor 700 level averaging \$30.00. High grade ore reserves probably 50,000 tons."

Le Roi, No. 2.—Report of Le Roi No. 2. Ltd, for month ended 31st May: Output—The total tonnage of ore hoisted from the mine amounted to 7,259 dry tons, of which 6,465 tons were shipped to the smelter, and the remaining 793 tons placed on the second-class dumps at the mine.

Gross value in the 6,466 tons shipped—
 3,690,485 ozs. gold at ...=\$73,810 or \$11.41 per ton.
 7,338,520 ozs. silver at .51 ...= 3,743 or .57 "
 269,262 lbs. copper at .12¼ ...= 32,984 or 5.10 "

Making the total gross value, \$110,537
 Or the average value per ton\$17.08

Note by Mr. Macdonald:—In the superintendent's report, no mention is made of the second-class ore that is sorted out from the shipping ore. He has assumed that you are now familiar with the fact that an average of about 20 per cent. of the ore hoisted out of the mine is sorted and goes to the second-class ore dump. The average grade of the ore sorted out varies from \$10 to \$12 per ton. Thus it will be seen that, in addition to the assets of the mine as reported by him, there was an addition of 20 per cent. of the 6,466 tons, or 1,293 tons, which would have a gross value, at, say, \$10 per ton, of \$12,933. The second-class ore hoisted directly from the mine and delivered to the second-class dump is entirely different from this product, it coming directly from the

FOR SALE, A Four-Stamp Mill

Complete with pulleys, etc., also Harbour Concentrator

25 h. p. boiler, 15 h. p. engine

The above machinery was not long in use and is in good order and will be sold cheap for cash to close an estate. Apply to

B. C. MINING RECORD,
 P. O. Drawer, 645,
 VICTORIA, B. C.

JEFFREY
ELEVATING MACHINERY
 FOR MILLS, FACTORIES, POWER PLANTS.
 Designed for Handling Material of all kinds.
 SEND FOR CATALOGUE
THE JEFFREY MFG. CO. Columbus, O.

work of opening sill doors, and otherwise prospecting the vein. It is pleasant to me to be able to record the fact that the mine never looked better for continued profitable operations than it does at the present time.