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THE EDITOR, B.C. MINING RECORD,
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BUSINESS MANAGER, B.C. MINING RECORD,
P.O. Drawer 645, Victoria, B.C.

THE MONTH.

THERE is already a stirring of the dry bones in London. The attitude of the market is distinctly more favourable to British Columbia. Le Roi No. 2, Le Roi No. 3, the reconstructed Velvet Mines and the Emily Edith in the Slocan have all been introduced to the public there recently. And although the announcements made of successful flotation, like the premiums maintained on the Stock Exchange prior to allotment, are often perfunctory, and like the mimic thunder of the stage manufactured on the premises, there is no question that these properties will receive the recognition from the public due to merit. As to the first of these, Le Roi No. 2, it is recognized not only in London, but in British Columbia also, as a first rate investment. The properties represented by this company possess bodies of ore blocked out sufficient to guarantee good profits on the capital and possibilities arising out of future development which make the shares a most attractive speculation as well. A very wide distinction must be drawn between this issue and Le Roi No. 3, a distinction not likely to be sufficiently appreciated by investors at a distance from the scene of operations. If the Le Roi No. 3 is a mine at all, it is a mine capable of paying dividends on the issue of shares. And doubtless the capital from that point of view is not excessive. But at present the best that

can be said is that it has excellent prospects of becoming such a property. But investors have often discovered to their cost that the booming stage is not one which justifies a premium upon shares. The reconstruction of the Velvet is a happy augury of improved market conditions in London. It is evident from the report submitted that Velvets have never been in favour with investors and that the parent company has been carrying the baby, up till now too infirm to stand upon its own legs. In view of this the rig which carried the Velvet shares up to £2 3s. cannot be too severely condemned. It was a market operation beneath the dignity of a company controlling so fine a property, and one that cannot fail to react unfavourably upon the legitimate prospects of the new issue. Particularly as it is well known that such operations are carried on as a rule, not for the benefit of the company involved, but to enrich a few individuals who manipulate the rig. Nothing succeeds, however, like success. Having made a mine of the Velvet, everything must needs be forgiven to those in control of the property. It seems to be one of the exigencies of the London market to keep the small end of the telescope directed towards the property controlled and to bring a magnifying glass to bear upon the financial conditions at home. Otherwise it is inconceivable that the directors of the Velvet should have decreed that it was more advisable to borrow money for development than to build a road and market their ore for cash. What is being done now, namely, the construction of a waggon road to the nearest point on the railway, should have been done as soon as the ore was located on the 160-foot level. The credit of the company would have been higher had the mine been producing even a small tonnage during the last year, as it well might, than on the strength of claims that the company owned a Le Roi in the backwoods. It must also be admitted that the criticism of some of the shareholders that a report made by an independent engineer should have been submitted as well as that of Captain Morrish is well made. This is not said in detriment of Captain Morrish's honesty, impartiality, accuracy and experience. But an independent report would have greatly strengthened the credit of the company in appealing for funds to the British investor. In short, the directors of the Velvet have handled the company's property precisely in the same manner as a group of ingenious but unscrupulous manipulators would handle a wildcat enterprise. They have shown no anxiety over production and transportation. They have not really tested the productive capacity of the mine (because the shipments made of carefully selected ore were not a real test). They have allowed the shares to be rigged on the market, and they have had no independent examina-

tion and sampling of the mine. This somewhat harsh criticism is not intended to show hostility to the Velvet or want of belief in its capabilities. There is no mine in British Columbia which shows brighter promise, there is none whose success is more earnestly desired, nor any whose effects upon the mining industry will be more stimulating and beneficial. The difficulties which have hampered the Velvet have been to some extent due to its situation; but have been largely created by the London directorate. A new policy, it is to be hoped, will be carried out in the future. The capitalization of the Velvet is moderate, and its future such as to make its shares an attractive speculation. Compared with the issues we have just been discussing, the promotion in the Slocan is an unimportant one. The Slocan country is a poor man's country in two respects. If it is likely to make a poor man rich, it is also likely to make a rich man poor. So far as experience of the country has gone its mines will not produce permanent dividends upon large amounts of capital, whereas the returns upon small investments have in many instances been dazzling in their proportions.

In a recent issue of the *Critic* Mr. Henry Hess devotes three columns of closely printed matter to the persons who comprise the London board of Velvet mines. It must be confessed that the *Critic's* disclosures give point to the statement already made "that the directors of the Velvet have handled the company's property precisely in the same manner as a group of ingenious but unscrupulous manipulators would handle a wildcat enterprise." It may be pointed out that our conclusion was arrived at by a close

THE LONDON Velvet while Mr. Hess shows as
"CRITIC" complete ignorance of the mine
ON VELVET. and company as he does intimate
acquaintance with the promotion

history of the individuals who direct it. In the article under question Mr. Hess refers his readers to another column in which he discusses the Velvet as a "mining proposition." Here, naturally, one expects to find some appraisal of the value of the property, and from the pen of so just and all-wise a person, some expression of regret that so promising a property should be handicapped by a direction so scathingly denounced. On the contrary, a criticism of the enterprise is discovered so grotesque, that it is difficult to know whether to greet it with laughter or with tears.

Some time ago a racing tout was exposed whose methods were surprisingly simple and wonderfully successful. Had he a field of ten horses he tipped every one of them to win, to different people of course, and accepted a percentage from the grateful backer of the horse which did win. Mr. Hess, at any rate so far as B. C. is concerned, works precisely the converse game upon his readers, though we of give him credit for disinterestedness. Having observed in the course of his career that the majority of joint stock mining enterprises come to grief, he spends one-fourth of his time denouncing anything that comes out and the other three-fourths proving by the derelicts what a good prophet he is. The successful ones escape his memory and his notice. It is a sincere pleasure to jog Mr. Hess's memory with regard to one British Columbia mine. For no apparent reason except that a romantic story concern-

ing the first discovery of this property went the rounds of the press, Mr. Hess ran foul of it with sneers worthy the idiotic eighteenth century snob whose effigy adorns the cover of the *Critic*. This mine paid \$70,000 net during the month of June and is earning 10 per cent. per month upon all the money invested in its purchase and development. But after all the present concern is with what he has to say of the Velvet as a "mining proposition." The first thing he has to say is that it is in bad company, most of the promotions of the parent company having been failures. This will be recognized at once as a valid criticism of the property as a "mining proposition." He then goes on to remark that as the Velvet was valued at £150,000 two years ago and as £20,000 has been spent on it since, it should now be worth £170,000 "apart altogether from any results shown by development." This we take it to be the most fatuous proposition ever advanced by any writer not suspected of insanity. To find it soberly advanced by anyone that expenditure upon a mining property enhances its value, or should enhance its value, or could enhance its value, "apart altogether from any results shown by development," is a melancholy example of the rubbish which, once put in print, will pass current for sensible criticism. But apart from that, Mr. Hess is entirely wrong as to the valuation put upon the Velvet by its owners. They retain three-quarters of the property and sell a quarter for £50,000 to secure working capital. That is the true analysis of the transaction. There is nothing reprehensible about it. It would seem to an unprejudiced mind that the proper basis for a judgment as to the value of the investment was the question whether the Velvet had ore enough to pay interest and sinking fund on £200,000. That such an inquiry has any bearing on the matter seems never to have occurred to Mr. Hess. British Columbia has been victimized by English company promoters who are the off-scouring of the earth, the very dregs of the South African and Western Australian markets. They have gone through the country with a drag net after all our men of reputation and standing, and they have slimed them over with the disrepute of their rotten and rascally adventures. So thoroughly disgusted has British Columbia become that an English promoter can no longer do business for a good property except for cash in advance unless he represents one of the few concerns who have maintained their reputation through this inundation of rascality. The province has been victimized to such an extent that it will be victimized no more. It has suffered far more than the British investor has, and is almost ready to cry *ad inferos* with the whole seething mass of corruption known as the London mining market. Mr. Hess has not done justice to the difficulties of situation under which the Velvet has been developed; he has not done justice to the honest attempt by the company to prove their property; he has not passed in review its excellent prospects as a productive and paying mine; he has simply produced everything he could to discredit the promotion. He has done so deliberately upon the grounds of the standing of the directorate, a basis of criticism responsible for four-fifths of the loss sustained by English people in joint stock speculation. To be consistent he should remove from his title page the monocular effigy which ornaments it. He would find a more suitable illustration from an earlier type in John Bunyan's "Man With the Muck Rake."

There are five great gold producing countries in the world, Australasia, South Africa, the United States, Russia and Canada, which are responsible for 85 per cent of the annual output of gold. In the figures given for 1899 South Africa would easily have been first but for the outbreak of war which completely disorganized the industry. As it is, the palm was taken by Australasia with an output of \$79,206,130. The United States has fallen to third place and although for this year it may again be second it cannot hope to compete with South Africa after the disturbing element of war has disappeared. Two years ago Canada was eighth on the list, with an output of \$6,027,016 which has grown to \$21,049,730 running Russia's output a close race for fourth place. No country in the world has increased in such an extraordinary ratio as Canada. Our gold production has from practically zero become an important factor in the world's output; and is growing so rapidly that within a few years Canada will be running neck and neck with Australasia, South Africa and the United States for the honour of first place. This great movement is not recognized in its bearings and effects as it ought to be. The great gold discoveries in California had a most important bearing, not only upon the commerce of the world, but also upon the development of the resources of the United States. The discovery of gold rescued Australasia from commercial stagnation by placing its internal trade upon a hard money basis and thus stimulated its growth and the prosperity of its people. Prior to the discovery of gold in Australia the commercial intercourse of Australians was governed by that peculiar mixture of barter and credit which restricts a man's energy to the district in which he is born or has settled, for the simple reason that nothing he possesses passes current anywhere else. Canada is now producing gold enough to have a very marked effect upon the growth and internal prosperity of the country. Not that \$20,000,000 is any great matter compared with the value of agricultural land, railways, or other national productive assets. But it is gold which makes wealth freely interchangeable and upon the free interchangeability of wealth does the prosperity of a people depend as much as upon the existence of the wealth itself. Unfortunately Canada, so far as its gold production is concerned, is a mere appanage of the United States. Canada has not taken the trouble to make a local market for gold produced within its own borders. Yet a local market for gold is at the present time the most important concern of anyone imbued with the idea of national progress and national existence. How long this very unsatisfactory condition of affairs will continue it is impossible to say. How much pressure will have to be brought to bear before the advisability of a distinctive Canadian gold coinage is recognized is still a problem. There are strong elements in the country in whose minds the general advantage is offset by disadvantages peculiar to their own interests. These will eventually be overborne, and the sooner the better.

In the twinkling of an eye the interest of the civilized world has been transferred from South Africa to China. During the last nine months it has seemed as though South Africa would continue to hold the feverish attention which it had received as the theatre one of the most remarkable wars of history, remarkable not because of its greatness, nor

on account of the magnitude of the issues involved; but because it brought into such strong relief the superficial weakness and inherent strength of the British Empire. Yet suddenly and without any warning the scene of history has been changed, the map of South Africa is torn down and that of China substituted for it. There is a vast difference in the nature of the issue. The South African affair is an episode, certain from the beginning in its conclusion and without material significance to the history of civilization. But in China it is different. The gloomy prologue has been spoken of a scene integral to the action of the piece we call modern civilization. In China the outbreak against foreign powers marks the last revolt of Oriental barbarism against the civilization of the West. It is not necessary to apologize for the use of the word barbarism. That there is in China a great but to us incomprehensible civilization is not denied. The very fact that we do not understand it is sufficient to justify our distinction of it as barbarous. Doubtless to the Chinese we are barbarians of the worst type. But our type of civilization is, as we believe, in harmony with the evolution of humanity, that of China the decadent remainder of an early phase. Doubtless in the course of time forces will arise destined to break up and destroy the fabric of our civilization and the field of the world will again lie fallow. Nor perhaps is it certain that in the philosophy of Lord Bacon with all its outgrowth of modern science absolute or applied, will anything have been added to the secular history of mankind greater in itself or more valuable in its effects than the teachings of Confucius. But that is not the point. Our modern institutions seem probably to most of us as permanent and inextinguishable as the sacred fire on the Capitol seemed to the citizens of Rome. Permanent and inextinguishable they are until their work is accomplished and their dynamic force is exhausted. Not only so, but they are incredibly hostile and bitterly cruel to anything that opposes them. That the banner of Christian civilization might perch on the battlements of Khartoum the African desert was strewn with the corpses of oppugnant fanatics, whose holy patriotism, and self-sacrificing courage were of no avail. *Causa victrix placuit deis.* The same result will occur in China. That is inevitable although its fulfilment will probably occupy the lifetime of a generation. And then Orientalism will have been driven into its last stronghold in the Himilaya Mountains under the aegis of the Grand Lama of Thibet. It is not a question of warring states, but of warring forces. Much is often made of the destiny of Russia in the Far East. But it is only in so far as Russia assimilates Western ideas and usages that Russia counts. The conquest of Russia is not to be carried on by batteries of artillery and battalions of men, but by the pressure on the Slav of the ideas and institutions of the modern inheritance in which Russia claims a share. The disintegration of the Chinese Empire will not leave the world as it found it. It will move the centre of gravity westwards. As China is developed in the modern industrial sense it will be found that the greater portion of the trade and commerce of the country will be across the Pacific Ocean with the United States and Canada and the great ports of Oriental trade will be Victoria, Vancouver and Seattle. The effect upon the Pacific slope cannot be overestimated. The first great demand from the East will be for iron and steel, for locomotives and machinery. There is no possi-

bility of competition with the United States and Canada in the supply of these articles. Then, again, a great carrying trade will be developed on the Pacific Ocean. Ship yards will be built on our coast and navies constructed there. An immense demand for lumber will spring up. Our forests will at length find a market. From the first day that a European army operates in China the stimulus to our industries will be felt. The grain and beef and horses of Canada instead of going east will go west to feed the army. Troops and transports will throng the docks at Vancouver. An era of prosperity undreamt of hitherto must come for the province of British Columbia. British Columbia will find itself upon the main line of the world's progress. There is nothing visionary and nothing unforeseen about this outcome of the Chinese embroglio. Every observer with sufficient acumen to pierce the veil of future events has foretold this result of the expansion of modern civilization. But the events of the next few months will make its beginnings tangible and apparent.

The position of the market for silver should fill the heart of every silver miner with comfort and joy. The world's annual production of this metal amounts to the enormous quantity of nearly 175,000,000 ounces, four million ounces less than the output of 1898. Silver has nevertheless appreciated in price during 1899 to the extent of 1-3 cents per ounce. Nor is there any evidence of any accumulation in the reserve stock of silver. The output is entirely consumed in the arts and manufactures every year, and while the output of silver is not increasing, is in fact diminishing, the demand for silver is remaining steady if not expanding. Nor need any great increase in the supply be expected. The same cause which has operated to contract the production of silver is not by any means exhausted, and is likely to show its effects for some years to come. A large number of mines in operation at the time of the slump in silver would never have been opened up with silver at its present price. Having been opened up they could still be profitably worked. But these mines are becoming gradually exhausted and new mines of a similar type are not being brought forward to take their place. When a market situation of that kind develops it is only a question of time until a very favourable reaction in favour of silver mining takes place. Meanwhile where silver is a joint product with gold or copper or lead, as in all the silver mines in British Columbia, the stability of this particular part of the product is a feature both gratifying to the mine owner, and a guarantee of the steady growth of the industry. The present high prices of lead and copper may not be maintained, but the silver contents of our ore will steadily if slowly appreciate in value.

The Boundary Creek district is slowly but surely emerging from the prospect stage and entering upon that of production. We learn from our local correspondent that the information supplied to him by the respective mine managers during the third week in July showed the ore shipments for that week to have been approximately as follows: From Old Ironsides, 875 tons; B. C., 490 tons; Golden Crown, 200 tons; City of Paris, 140 tons; Winnipeg, 80 tons. Total for week, 1,785 tons. Shipments at this rate only would aggregate 8,000 tons per month, worth, roughly, \$100,000 to \$120,000. This, however, is by

no means a fair estimate of what the district may reasonably be expected to be yielding—*i.e.*, in gross returns—to mine owners from this on. If, for instance, the Old Ironsides, Knob Hill and Victoria together shortly realize their mine superintendent's estimated daily output of about 1,400 tons, they will ship a monthly aggregate of 12,000 tons, which quantity, calculated at the average value of \$8.37 placed on the Knob Hill ore, will of itself reach a total value of \$100,000. To this may be added the increased quantity the B. C. and the City of Paris are expected to ship, making their total say 4,000 tons, of an average value of \$20 per ton, equal to \$80,000. There is, moreover, the Golden Crown and Winnipeg output to be considered, which should soon be 1,500 tons per month, worth, say, \$30,000. These several totals give an aggregate of more than \$200,000 which assuming, as there appears to be good reason to do, that our correspondent's informants may be relied on, it may reasonably be expected will shortly be the minimum gross value of the monthly output of the Boundary Creek mines. The position shows up even more satisfactorily when the prospective early output of the Mother Lode mine—leaving altogether out of account the Jewel, Oro Denoro, Gold Drop, Snowshoe, Brooklyn, Stemwinder, Morrison and others that should contribute to the total yield of the district—is kept in view. With the Mother Lode sending 100 tons of ore per day to the smelter, there should be at least \$30,000 more to add to the value of the general output. It does not therefore, appear to us that we are in any way exaggerating the outlook when we say that the earlier part of the year 1901 should see a monthly gross return of at least \$250,000 from Boundary mines, and if this forecast be realized it will be a very important consummation favourably affecting a much larger sphere than the immediate district, which should within six months witness a transformation from a section that long has been and still is a heavy drain upon those who are persistently putting money into the development of its staple industry, into one that is at least supplying the greater part of the capital requisite for the utilization on the present scale of its resources. Of course the proportion of profit that may be derived is quite problematical, depending as it does upon conditions untried so far as this particular district is concerned. The important point we have in view just now is that after years during which it has been entirely unproductive the district at length bids fair to shortly be in a position to produce at least a quarter of a million dollars per month towards the maintenance and further development of its chief industry.

Our Boundary Creek correspondent writes:

So much has been said and published during the past six months or so regarding the proposed establishment of pyritic smelters at Grand Forks and in the vicinity of Greenwood respectively, without there being any tangible evidence in the district that these enterprises really are to be established that doubt as to their bona fides seems quite excusable. However, information has lately been received by the writer from an apparently reliable source that Mr. A. Laidlaw, representing a Quebec company who some time since sent out a few tons of ore from Boundary Creek mines for treatment by the pyritic process and obtained such satisfactory results therefrom, that he has ordered the requisite plant for a pyritic smelter. This plant is being manufactured, it is posi-

tively asserted, in Denver, Colorado, and delivery of it is to be made within three months. This intelligence, if it prove true, will be gratifying, but it would be received with much more confidence could the assurance also be given that the site for the location of this smelter had been definitely decided upon and secured. This very necessary preliminary does not appear to have yet been arranged, or, if it has, no public announcement to that effect has been made. This fact, though, need not necessarily stamp the scheme as but one of several which though announced by district newspapers with, figuratively, a flourish of trumpets, have seemingly not yet got any farther than an existence on paper. So wide of the truth in their reckless assertions respecting mining and smelting enterprises have certain district newspapers and correspondents sometimes been that they are still reluctant to admit that their wild suggestions have not been warranted. On the contrary, some are persisting in sending out inflated reports and, what is more regrettable, newspapers of good standing are continuing to publish them. There are these truths, though, forcing themselves upon all interested in the district, whether willingly or reluctantly received, that nothing but actual and profitable returns from the mines will now bring prosperity to the local mining industry; that booming is a played-out business, and that until such time as smelter returns have amply demonstrated that values are sufficiently good new mining enterprises are unlikely to be undertaken here. The question of quantity of ore is no longer open to reasonable doubt, development work in several Boundary camps having already disclosed the existence down to the 300-foot level of big bodies of ore with every indication that deeper workings will show that these live down.

The publication of truths like that above mentioned is unpalatable especially to many interested residents who hold that a newspaper correspondent's duty to the district he lives in is to write favourably of it or not at all, and who resent, even to the extent of practically boycotting him, the actions of the correspondent who dares write conscientiously, and who is not open to accept "something on the side." But fortunately there are many others who do not countenance deception, not even the deception of silence, so that after all there is small danger of actual facts being long kept back.

After much careful enquiry and observation the writer believes himself amply warranted (assuming as he thinks they are, that the assurances of mining men in charge of some of the better-developed properties of the district are to be relied upon) in concluding that not only are there several mines in the district that give abundant promise of permanence as far as quantity of ore is concerned, but that values will, with economical mining and treatment, leave a sufficient margin of profit to encourage the further investment of capital in the utilization of the extensive mineral resources of the Boundary country. The time for the crucial test of the vital question of values of ore in bulk is, however, near at hand. Both the Grand Forks and the Greenwood smelters should soon be in regular operation, the former within a few weeks, and the latter ere the snow flies this year. The results that they will bring are awaited with confidence, there being substantial reasons for anticipating that generally they will be satisfactory.

Journalistic piracy is in other countries generally

recognized as a very unpardonable offence, but, unhappily, it is commonly practised in British Columbia. The offence is inexcusable because it is such a very easy matter for a newspaper copying an article from the columns of another to be sufficiently courteous to credit the source from which the information was drawn. Within the last month no less than three of our contemporaries have appropriated, without any sort of acknowledgment articles specially prepared and paid for by this periodical. One of the offenders was the Greenwood *Times*, and we mention this case particularly for the reason that in the article "Mining Plants in the Boundary District" thus extracted several stupid and unfortunate typographical errors appeared to which our attention was subsequently drawn, and were also repeated by our contemporary. The errors to which we allude occurred in connection with the dimensions of an air-receiver, in every case "feet" being substituted for "inches" and *vice versa*. Meanwhile we certainly do not object to articles contributed to these columns by our paid correspondents appearing in other newspapers—in fact we are only too happy that our efforts to disseminate information concerning British Columbia's most important industry should be thus assisted—provided always acknowledgment is likewise given. On the other hand, when newspapers of the standing and business connections of the *Times* "pirate" an article which in this instance might easily have been obtained and paid for first-hand, reasons for protest are obvious, and we are quite certain our excellent contemporary will accept this view.

During the week ending the 14th of June the Le Roi mine shipped 4,675 tons of ore, the largest output ever made from a single mine in one week in the history of the province. The smelter at Northport is quite incapable of handling the output of the Le Roi alone, without counting the other properties of the B. A. C. now nearing the shipping stage. As a measure of temporary relief until the Northport smelter has been enlarged a contract, said to be for 150 tons a day, has been entered into with the Trail smelter. The risk that the Rossland output will fall below that of last year and the hope that it will go materially beyond it are equally fading away as the season advances. With all due deference to the general anticipation, it will be some time yet before the Le Roi No. 2 and Le Roi No. 3 begin to ship ore. And the War Eagle and Centre Star seem as far off as ever from the solution of their difficulties. Great things are promised for 1901, an output of 700,000 tons of ore being even hinted at. But the present concern is the year 1900, and it does not seem likely that last year's tonnage will be materially increased.

More satisfactory even than the successful reconstruction of the Hall Mines and the provision of £50,000 additional working capital is the decision of the company to overhaul the management from top to bottom. Sunk in the Hall Mines is an immense amount of capital which may be written off as a dead loss and is so considered by the market, as witness the price of the shares. Sooner or later the capital of the company will have to be scaled down to a more reasonable figure. On a less ambitious basis, however, there is no reason why the mine and smelter should not pay. The best wishes of everyone interested in British Columbia mining are extended to the

new company, or say, rather, the reconstruction of the old.

It is a pleasure to draw attention to a late clean-up at the Athabasca mine in the Nelson mining division: 475 tons of ore were milled of an average value of between \$58 and \$59 per ton. The resultant profit was naturally very large, as the cost of operation is light and the percentage of extraction high. It is to be hoped that this was not selected ore, but that the mine can maintain this record without material reduction. If so the Athabasca will be a remarkable dividend paying property.

With the news, long expected, of the collapse of the Golden River Quesnelle concern, which must obviously suggest a dam to the minds of shareholders, comes the much more welcome intelligence of a most satisfactory first season's clean-up by the Consolidated Cariboo Hydraulic Mining Company resulting in a gold brick valued at \$132,275. Before the present season closes it is estimated that more than double this amount of gold will be recovered and as we have had Mr. Hobson's assurance that beyond a relatively inconsiderable sum no further expenditure in equipment is required, shareholders may now expect regular and handsome dividends in the future. The undertaking is the largest of its kind in British Columbia and, we believe, in the world, and Mr. Hobson is entitled to hearty congratulations for having seemingly brought it to so successful an issue.

An impartial observer, Dr. Philpot, of Vancouver, who has recently made known what he saw and heard of Cape Nome during a recent visit, more than corroborates some of the worst previous accounts of the state of affairs in that district. There are, or recently were, 20,000 people on the spot, with only sufficient opportunities for some 5,000 of this number to earn a livelihood, the majority of the remaining 15,000 being either destitute or very near that condition. The Doctor estimates that nearly \$2,000,000 worth of valuable goods lay, when he was at Nome, upon the seashore, with no buyers available for most of the things and large quantities of them left absolutely derelict by ruined owners. Typhoid, smallpox and pneumonia were rife in the camp and murders and acts of violence had been many, though soon after the Doctor arrived, General Randall, with the aid of 175 United States troopers, brought about something like a restoration of law and order. Our informant states that there is daily risk of fire sweeping away the camp, the tents and hats of which—all highly inflammable—are closely crowded for a distance of some ten miles along a narrow strip of foreshore.

East Kootenay has at once taken rank as one of the leading districts in the production of the precious metals. If the output of coal were considered as well it would easily rank as the first district in the province. Certainly it is a very large district and the comparison between it and a small section of country such as that containing the Rossland mines is not altogether a fair one from a territorial point of view. But the district is larger because it has hitherto been barren. People speak of East Kootenay just as they speak of Trail Creek and Slocan although it denotes a territory large enough and of diversified

formation enough to contain them both. During the month of June 130 carloads of ore were shipped from the North Star mine, which means an output of between 2,500 and 3,000 tons at least. During the same month the St. Eugene mine's output was 9,000 tons of ore, resulting in 1,800 tons of concentrates of good grade. Here, then, we have a country which, represented so far by only two large producing mines, already produces over 10,000 tons of metal bearing rock per month, which in value equals, if it does not exceed, the monthly returns of the Trail Creek mines. Were this the only feature of mining development presented in the province of British Columbia this year it would be eminently satisfactory and encouraging. But it is only an instance of the expansion in production which is going on everywhere. The output of silver and lead from East Kootenay will have a marked effect upon the total output of the province in those metals which should, this year, establish a record. The mining industry in British Columbia is growing so fast as already to completely overshadow and dominate every other interest in the province; 1900 will always be remarkable as the year in which the greatest comparative progress has been made.

It seems that there was little foundation for the report that the Britannia copper group on Howe Sound was lately bonded to the British America Corporation, which has probably its hands fully occupied just now with its Trail Creek flotations. The group is, however, likely soon to be secured by very substantial investors, several syndicates being now "in the nibble" for what seems to be a most promising property. The prospects of the Britannia group would probably not suffer, however, were there rather less doubtful "booming" of the venture in certain provincial journals, which from time to time announce quite prematurely that the Britannia group has been sold for a big sum. The inevitable contradiction, or half contradiction, appears shortly afterwards with the result that people begin to question, if the property's prospects be really so bright as painted. "*Au fond*," however, the Britannia group seems to possess very large possibilities, but for the development of the claims included therein big genuine capital investment is needed. Such investors usually pay scant heed to obvious "boom" paragraphs.

It is significant that Miss Faith Fenton, the Yukon correspondent of the Toronto *Globe*, the chief organ of the Dominion Government, frankly declares that the season's rush of Yukon miners to Nome was largely due to overpressure of royalty and other mining taxation in Klondike. Such an opinion, coming from such a political friendly quarter should not prove without weight in influencing the future Yukon policy of the national administration. There is clearly an absolute agreement amongst all who are either in or interested in the Yukon, that there should be a lessening, amongst other things, of the percentage of the gold royalty.

The Seattle press, which is largely responsible for heavy loss of life and money at Cape Nome, through its mendacious booming of the prospects of that terrible country, has lately striven to make much of some new Alaskan placer finds about Glacier Bay beyond Juneau. There does not seem to be great value in the discoveries made at Glacier Bay, though a great rush

from Juneau has resulted from the fortunate finds of a few men, who probably unearthened gold-bearing pockets. Fortunately Glacier Bay is not far from Juneau and any rush thither will, unlike that to Nome, entail comparatively small risk of any disastrous consequences, unless there should, as at Nome, arise serious outbreaks of murderous outrage, due to claim-jumping.

Latest reports show that comparatively little gold is being got from Nome by the primitive processes there used on the beach gravels, for out of \$5,500,000 worth of gold which during the first half of July reached the assay office in Seattle from the far North, only some \$100,000 worth, according to the *Post-Intelligencer*, the greatest "boomer" of Nome, came from that camp.

The *Critic* (London) not infrequently "gets off" some extremely clever things, and the following dialogue between a fond parent and his child of enquiring mind "A Child's Guide to the City" is really excellent, though perhaps a bit hard on Mr. Whitaker Wright. The phenomenal infant enquires:

"Hasn't Mr. Whitaker Wright just given the manager of Lake View what is generally known as the out-some-chuck-and-gorgonzi?"

"He has, my son."

"Then, why—unless he had the true interests of the company at heart—did he do that?"

"Because, my boy, Whitaker considered 'his explanations were not adequate.'"

"What did he mean by that, Pa?"

"Well, my enquiring young friend, 'explanations' from mine managers are of two kinds, and are usually (in the case of a rotten concern) furnished by wire, sometimes prepaid and sometimes not."

"It must have been very annoying to Mr. Wright to have to pay for wires that weren't 'adequate,' Pa?"

"Undoubtedly, my son, and especially so, when the manager was a man of his own choosing, who has been thoroughly 'coached' in all essential details before leaving England."

"What do you mean,?"

"This, youngster. An 'adequate' manager wires always to Mr. Wright something like the following:—"

We are crushing 40 ounces to the ton. Praise God, from whom all blessings flow. Miners are singing hymns. Machinery in perfect order. Mr. Bill Bunker—our chief engineer—is doing much good by his evangelising meetings, and has much improved my immortal soul.

"That's an adequate wire, is it, Pa?"

"It is, my child, according to Mr. Whitaker Wright."

"Then, what's an 'inadequate' wire, my Pa?"

"Mr. Wright's idea of an inadequate wire is something like this, my boy:—"

Mine bust up; machinery wrecked. May the devil and all his angels seize you, you vagabond. All the miners have D.T.'s. Why the blazes haven't you sent the blank money you promised me for my last fictitious account of crushing? Shan't send another bogey cable under a poney, damn you. My immortal soul is worth at least that. Bill Bunker just tried to shoot me. Wish I could shoot you.

"Greenland's Icy Mountains, Pa! I don't wonder at such a devout person as Mr. Wright sacking a man for stating the truth in such a manner."

It may, meanwhile, be said that Mr. Whitaker Wright has neither "adequate" nor "inadequate"

nine managers in British Columbia, but men who thoroughly know their business and do it.

PUBLICATIONS.

THE eighth volume of the *Mineral Industry*, edited by Richard P. Rothwell, who is also editor of the *Engineering and Mining Journal*, and published by the Scientific Publishing Co., of New York, has been issued.

This is the first volume of the statistics for 1899 of the mineral resources of the world, published during the present year. This fact alone reflects great credit on the editor, for the reason that the chief value in statistics is the compiling and giving of them to the world at the earliest possible date. In addition to the statistics which show the progress of the mineral industry in the different countries throughout the world for the year 1899, there are very valuable chapters on the following subjects: "Review of the Literature on Ore Dressing in 1899," by Robert H. Richards, also a chapter by the same author on the subject of ore dressing; "Progress in Electro Chemistry in 1899," by Wm. Borchers; "Liquid Air," by T. O'Connor Sloane; "Progress of Metallography in 1899," by Albert Sauveur; "Mine Timbering," by William Sanders.

The volume contains over 900 pages, and after a casual perusal the writer is of the opinion that this work, together with the preceding volumes, by the same author, which has been published annually since 1892, are among the most valuable and instructive of all the literature, bearing on the mineral industry, and these volumes have come to be considered indispensable as books of reference by all who desire to keep thoroughly well posted on the progress of mining and metallurgy, throughout the entire country.

With regard to the mineral industry of Canada, a perusal of the volume shows that, in addition to the chapters devoted to statistics of the product of minerals in the Dominion for 1899, allusion is also made to our mineral resources in the several chapters devoted to a description of each mineral and metal, taken in their order alphabetically.

Consequently, this volume will be found equally interesting and instructive to any who may be interested chiefly in the consideration of the mineral resources of the Dominion.

Report on the Warrior Coal Basin, with Plates and Maps, by Henry McCalley, Assistant State Geologist; Geological Survey of Alabama; State Printers, Jacksonville Fla., 1900.

This is a very comprehensive official report on an important coal area in the State of Alabama, the output from which last year was about 5,556,532 tons of coal and 1,480,605 tons of coke. The geological formation, size and characteristics of the measures, methods of working and other interesting data is very fully described.

Summary Report of the Geological Survey Department of Canada for the Year 1899; Queen's Printer, Ottawa, 1900; Price 10 cents.

The Summary Report of the Canadian Geological Survey is, this year, particularly interesting to Western readers, as it includes not only Mr. McConnel's excellent report, on the Yukon region, but also re-

ports on the Atlin and West and East Kootenay districts.

The *Chicamon Stone*, by Clive Phillipps-Wolley; London: Geo. Bell & Sons, 1900; Colonial Edition, 75 cents.

Some months ago Robert Barr, himself a Canadian bred and born, who has won if not an eminent at least a most respectable place in the world of letters, wrote an article which was published in a leading Toronto magazine, pointing out, with much truth, that literary effort was so lightly regarded in Canada that no man who had achieved more than a local success could afford to remain in his native land, that is, if he desires to market his wares to favourable advantage. Mr. Phillipps-Wolley, it is true, is a Canadian only by adoption, but in the thirteen or more years in which he has resided amongst us, he has so identified himself with Western life, so thoroughly entered into the spirit that comes from an intimate acquaintance with the sublimity and silence of our bleak mountain ranges and the gloom and grandeur of century-old forests of pine that he has succeeded, both in verse and prose, in depicting truly the ideas and manners of life of the Westerner. Yet, while the influential British press has unstintingly praised this work of a British Columbian, we who should be first are last and feeblest in expressing our appreciation. It is a strange state of affairs. In Mr. Wolley's capital tale, the "*Chicamon Stone*," the scene is laid in Cassiar and the whole story rests on the exciting search under great difficulties for a vein, the whereabouts of which are known to the native Indians and to which the hero's attention is first drawn by the exhibition of a marvellously rich sample of quartz (actually in the possession of a store keeper at Wrangel) brought out by Siyah Joe. The book is so well worth reading that we do not propose to lessen the interest by following, as is sometimes customary in reviews, the evolution of the author's plot to its climax. It may, however, be said in conclusion that the "*Chicamon Stone*" is the strongest book Mr. Wolley has yet written, and the descriptions of the wild Cassiar scenery in particular are exceptionally vivid and powerful. If one were inclined to be captious, the one defect, if it can be so classed, is the author's apparent enthusiasm for brutal and revolting situations, and perhaps his work would not lose in popularity if this tendency was held in check.

TECHNICAL PERIODICALS OF THE MONTH.

THE ENGINEERING MAGAZINE.

The Engineering Magazine and International Review for July contains a number of very interesting articles, of which three in particular draw more than passing attention. An article by W. H. Donner on "Power Features at the Paris Exhibition" is well illustrated and to those interested in machinery, who have not visited the Exhibition, will form a good description of wonders they have not seen; while those who have been in Paris, or are going there, will find it none the less valuable as an indication of the most prominent features of the Exhibition in this respect.

"The History and Progress of Mining in British Columbia," another article by H. Mortimer Lamb, gives in a very clear and succinct manner a great amount of information about the Province, which has been extracted from official reports and other authentic documents with great care, and presented to the

average reader in a most readable form. It is profusely illustrated and should form a most valuable introduction to British Columbia's greatest industry to those, and they are many, whose sympathies with regard to mining exceed their knowledge. "A British View of the Iron Trade" is another article containing much matter for reflection. It sketches the causes and progress of the recent boom in the steel and iron trade and points out with some justice that the boom conditions are beginning to disappear. The relations of the different productive countries are compared and the conclusion is arrived at that the outlook for the iron trade of Great Britain in the face of the competition of the United States is glowing in the extreme:

"There is no gainsaying the fact that the iron and steel manufacturers of Europe are beginning to look with anxious eyes to the United States. It seems to those who think they can discern the coming events casting their shadows before that the sword of Damocles is suspended over the heads of those who are now enjoying a feast of fat things. That sword is the near competition of the United States. It is, moreover, a two-handed sword, for it cuts to the very dividing asunder of joints and marrow by an admitted capacity to produce more cheaply than European countries, and it also presents the very formidable aspect of threatening to dump a vast surplus on neutral markets, on terms that are not competitive at all. To be perfectly candid, this latter is the form of competition of which the people of Europe are most afraid, because they are most powerless to resist it, and this remark, of course, applies more especially to Great Britain, which is a free-trade country."

It may be noted that the writer does not take into account the iron deposits of Canada, which are the largest known in the world; which have been brought into notice on account of the boom conditions which have recently prevailed; and must shortly become an appreciable factor in iron and steel production.

MINES AND MINERALS.

Mines and Minerals for July contains articles on the mines of Butte, Cape Nome and Rosslund, all of which are interesting, the last particularly so to British Columbians. It is a highly technical article, but at the same time most descriptive and appreciative of our greatest mining camp.

THE ALASKAN MAGAZINE.

The Alaskan Magazine and Canadian Yukoner is a new publication, dating from Tacoma. What a Yukoner is we don't know, still less a Canadian Yukoner. But if the *Alaskan Magazine* is a Yukoner, all that can be said is that it denotes something much better than the barbarous term would lead us to expect. The magazine contains a considerable amount of interesting reading matter.

The world's ironmasters are stated to be apprehensive of a shortage in the world's supply of the raw material which they use so increasingly year by year. This fact explains the suddenly displayed eagerness of Eastern States ironmasters to investigate our Province's ore supplies on Barclay Sound, and suggests that in the early future other British Columbia iron ore deposits will come quite into request. Then for the first time will serious efforts be made to ascertain the extent of our Province's possessions in rich iron ore, which there is every reason to believe will be found to be far larger than is at present even surmised. Hitherto nobody has troubled himself much in regard to finding and developing our iron ores, except to a very limited extent for smelter fluxing.

CAMP MCKINNEY AND ITS MINES.

(By Donald A. Ross, Superintendent of the Sailor Mine Group.)

THE discovery of Camp McKinney dates from, relatively speaking, as far back as 1884. In that year two placer miners, Goericke and Runnels by

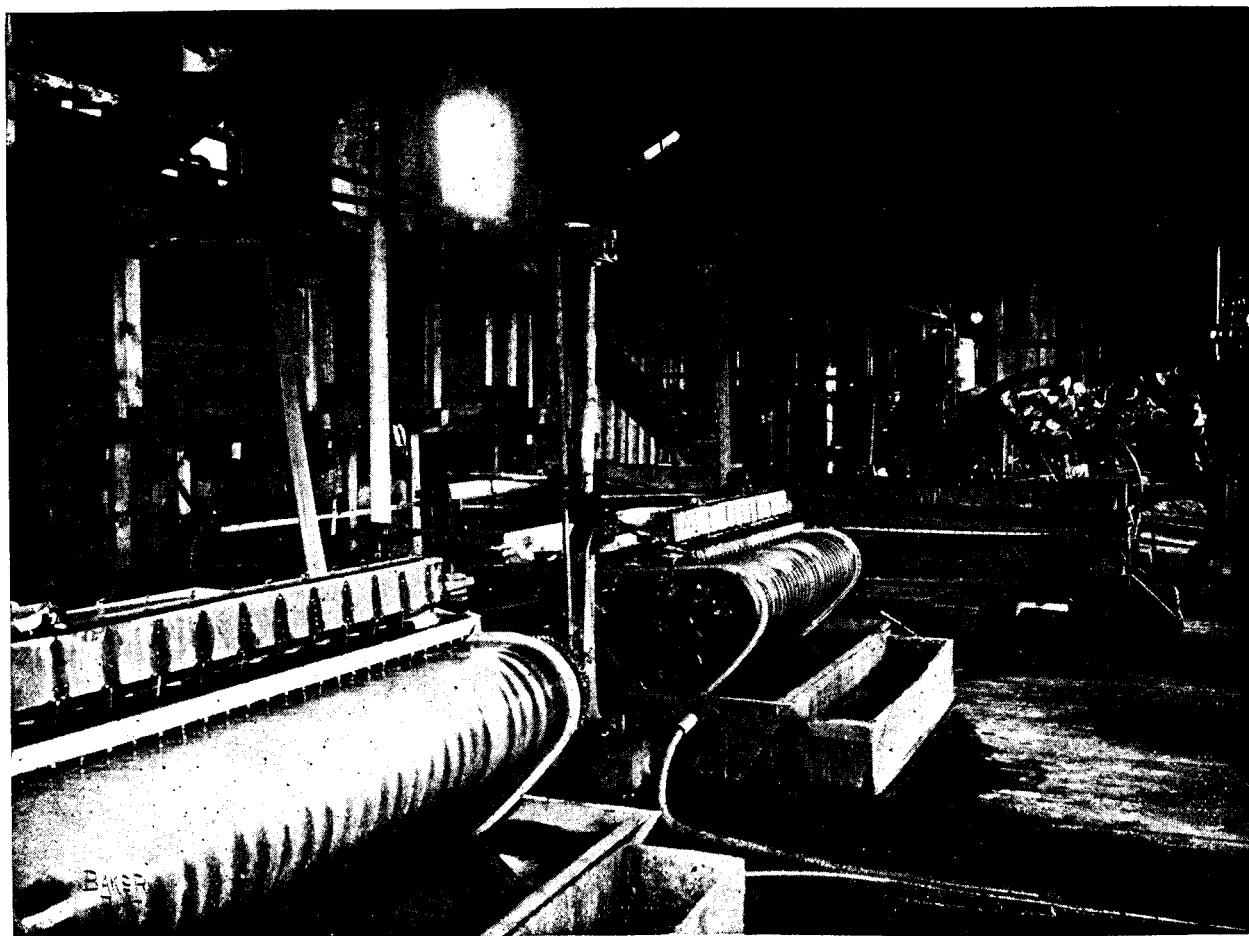


The Cariboo Mill, Camp McKinney.

some three years later visited the locality en route for Baldy Mountain, a granite peak on the east slope of the divide between Okanagan and Kettle rivers. McKinney making his camp on Rice Creek then discovered the croppings of the now famous Cariboo vein. This showing stood very boldly out to view and the value of the rock was apparent from the visible gold disseminated throughout it. The discoverer consequently staked out a claim on his location under the Mineral Act of that year which gave him 1,500x600 feet of ground. Thinking, however, that the vein ran with the formation, he staked the property in accordance with this belief and subsequent locations were also made in the same manner.

The camp, which from this beginning, has since become an active and more promising mining centre, is situated, at an altitude of 4,600 feet, on round-topped hills, about thirty-nine miles west of Greenwood, the centre of the Kettle River mining district, and fifty-six miles east of Penticton, at the foot of Okanagan Lake, from both of which points communication is established by means of a government waggon road. It is bounded on two sides by the forks of Rock Creek, while Rice Creek flows through the centre.

The formation lies in a north and south direction



Interior of the Cariboo Company's Mill, Showing Concentrators, Camp McKinney.

name, while searching for an old "cache," came across the capping of what are now known as the Victoria and Old England mines. The camp, however, takes its name from a prospector, one Al. McKinney, who

and consists mainly of highly altered schistose diabases banded with quartzites, crystalline limestones and gneisses. West of the camp there is a large tract of granite, gneiss and porphyry. The veins for the

most part are fissures cutting across the formation in an easterly and westerly direction with a dip slightly to the south. Faults are frequently encountered, in nearly every case breaking towards the south. The ores in the central portion of the camp are all quartz or quartzites, and are free-milling and concentrating. About two miles due east, however, there have been found dyke rocks carrying good values in pyrrhotite, pyrites and chalcopyrite.

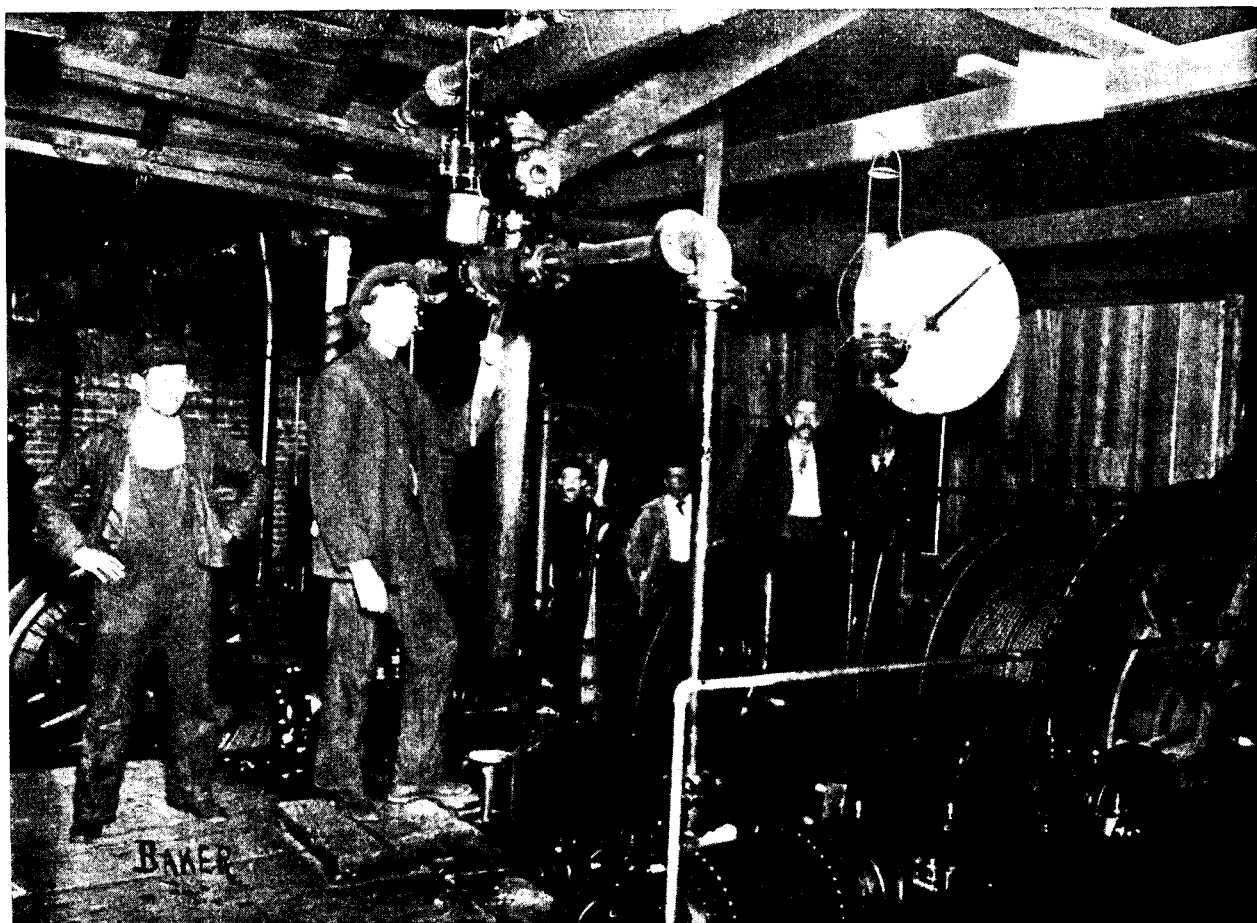
Of the principal properties the most important is the Cariboo, which is also the only free-milling gold mine among the comparative few discovered in the province to pay regular dividends. It is at present owned by the Cariboo-McKinney Mining and Milling Company, with head offices in Toronto.

The inauguration of development work took the

1,300 feet, and on No. 4 level 1,100 feet. In addition to this work there is an upraise from No. 2 to the surface 350 east of the shaft, three winzes from No. 4 to No. 3 and three from No. 3 to No. 2.

In the shaft house are two return tubular boilers, a 60 h.p. link motion hoist built by the Union Iron Works of San Francisco, and a 10-drill Rand compressor. The mill is situated in the Rice Creek gulch about 800 feet west of the shaft and is equipped with two five-stamp batteries supplied by the Risdon Iron Works, and the same number supplied by the Jenckes Machine Co. A 60 h.p. Corliss engine, two Johnstone vanners, a Wilfley table, one Blake crusher and one Gates crusher, complete the equipment.

The mill crushes on an average 1,400 tons per month, the result of the clean up for the month from



The Cariboo Hoist.

form of a tunnel driven in from the side of the Rice Creek gulch. Later on a shaft was sunk to connect with this tunnel. Another shaft was also sunk 200 feet to the east by the Butte and Boston Company, who in 1894-5 secured an option on the property. The present working shaft is on the Amelia claim 300 feet east of the Butte and Boston shaft, and is now driven 360 feet. The tunnel was continued in 700 feet and a connection with this shaft was made at a depth of 70 feet. No 1 level is 128 feet down and here there are 350 feet of drifts, mostly towards the west. No. 2 level is 45 feet below No. 1, and from it is 1,000 feet of drifting. On No. 3 level, which is estimated at a depth of 258 feet the drifts aggregate

April 15th to May 15th having been a brick approximating \$20,000 in value. In addition the ore concentrates from three-quarters per cent., yielding \$1,500 net per month. The concentrates originally were sent for treatment to Everett (Wash.) smelter, but on the completion of the C. & W. Railroad their destination was changed to the Hall Mines smelter and at the present time to the Trail works.

The company own the Okanagan, Saw Tooth Fraction, Amelia, Cariboo, Alice, Emma and Maple Leaf, but have so far worked only one of the first four. In the past the Cariboo has paid its shareholders a dividend of one per cent. per month.

The vein has an east and west strike and dips

slightly to the south. The average width is about three and a-half feet, but in places it widens out to 15 feet. A fault plane has been encountered in all the levels, dipping like the pay chute towards the east and throwing the vein south almost invariably. The ore is of several different characters—a white milky quartz carrying pockets of free gold, but otherwise of a low grade; a close-grained bluish chalcedony; and a spongy bluish-white quartz heavily mineralized with sulphides of iron and zinc, galena and a little copper pyrites. It is this latter quartz which forms the main pay chute.

Most of the high-grade ore has been stoped out above the No. 4 level, but there are still large reserves of lower grade ore which it will pay to mine should the capacity of the mill be increased to 40 stamps. At present operations are being confined to the lower level in some of the richest ore yet encountered.

South of the Cariboo lies the Minnehaha. This is a full-sized claim, 1,500x1,500 feet, and is owned, together with the Cariboo Fraction and Golden Crown Fraction, which adjoins it, by the Minnehaha Gold

tained there. The main shaft on the E. & W. vein has been sunk to a depth of 190 feet. A drift was run in about 40 feet at the 60 foot level and the ore stoped out to near the surface. On the 90-foot level a cross-cut was run in 20 feet north and the vein was drifted on 268 feet east and 73 feet west. The ore



The Minnehaha Mill.



The Minnehaha Compressor.

Mining Company of Toronto. This company also own several claims to the south including the Big Bug and Iron Duke. On the Minnehaha a small vein was found near the western line and was exposed by stripping for some distance. Another north and south vein was opened up about the middle of the claim by several small shafts but no values were ob-

was also stoped out from this level. On the lower level a cross-cut was run in a northeasterly direction for 108 feet and for 65 feet west. In the latter a small stringer of quartz was encountered near the side line, but in the former no ore was found, the two walls having "crushed" together at the point where this cross-cut was run. Had the level been higher up or lower down, it is asserted by Prof. Montgomery, of Toronto, ore would have been met with. The vein, so far as it was opened, seems to have been freer from breaks than the Cariboo vein, to which it runs parallel, and should future development show ore in place at a greater depth, the prospects of the property should be more promising. At present, however, the mine is "closed down" as the mill run made last January and February was

far from satisfactory. On the Minnehaha are installed a 5-drill Ingersoll-Sergeant compressor, an 80 h.p. boiler, a hoist and two pumps (one Cameron and one Northey). The mill, exceptionally well-constructed and planned, is equipped with two 5-stamp batteries (Jenckes Machine Co.), a 35 h.p. boiler, Blake crusher, a Wilfley table and Frue van-

ner. A water supply is afforded from the South Fork of Rock Creek by means of a flume built jointly by the Minnehaha and Sailor companies. The ore is a bluish quartz carrying pyrites and galena and was found from a few inches up to four and a-half feet wide.

Another of the original locations, the Kamloops, is situated to the west of the Minnehaha, and is now owned by the Kamloops McKinney Gold Mining Company of Montreal.

During last fall and winter the superintendent, Mr. E. G. Warren, carried on the development of the property. An incline shaft had been sunk on the foot wall to a depth of 40 feet. This was abandoned and a main working shaft (5x8 in the clear) was started

The quartz is similar to that of the Minnehaha, but carries more sulphides.

The plant which was supplied by the Jenckes Machine Co., consists of a 6x8 hoist, a 30 h.p. vertical boiler, a No. 4 Cameron pump and a Rand drill. Air for the drill was carried about 300 feet from the Minnehaha compressor through a two foot pipe line. A shaft house, engine house, blacksmith shop, powder magazine and office have been erected.

The property with which I am myself associated as superintendent consists of the following claims lying to the west and southwest of the Cariboo Company's properties: The Sailor, Rover, Bellevue, Bellevue Fraction, Snowshoe, Diamond, Toledo and Alice Fraction.



The Shaft on the Warton, Camp McKinney.

about 60 feet north of the old one, it being expected that the vein would be encountered on the dip at a depth of several hundred feet. At the 100-foot level a cross-cut was run south for 40 feet, where the vein was encountered. The drifts were then pushed eastward for 30 feet and westward for 50 feet. The vein was broken to the east but there was a good face of ore assaying \$27 in the west drift, when work was discontinued. The property has not been operated for three months, but it is reported that work is shortly to be resumed; and certainly the showing in the west drift is sufficiently encouraging to warrant further development.

The vein was also opened up by surface cuts to the west end of the claim where it passes into the Sailor.

Development work has been chiefly concentrated on the Sailor, where a strong outcrop of quartz assaying as high as \$50 occurred. On the Bellevue a shaft has been sunk on the same ledge which passes through the Alice, Emma, Maple Leaf and Eureka. On the Rover and Alice Fraction sufficient work has been done to secure Crown grants. This work on the Rover has been devoted to locating the continuance of the Sailor vein.

Work was commenced on the Sailor a year ago but was not actively pressed till the beginning of August. At that time the shaft was down 35 feet. Since then the shaft has been sunk to 173 feet (5x8 in the clear). At the 75-foot level a cross-cut was run in from 45 feet north, with a large sump at the end. The foot

wall was encountered nine feet in, and the vein there was eleven feet wide. Drifts were then run east and west, the latter being in 95 feet and the former 200 feet. The vein on this level averages about 4 feet wide and so far no breaks or faults were encountered. On the 150-foot level a cross-cut was run in for 44 feet and 140 feet of drifting run. On this level the ore is of a somewhat different character to that found above, the quartz occurring as stringers in a mineralized talc. The vein, which is undoubtedly the western extension of the Cariboo lead, has been opened up across the Sailor and Rover and will, according to the strike (N. 40 E.), pass on into the Snowshoe, thus giving this company two-thirds of a mile in which to work it. The dip at the first level was 75 degrees

and Success claims owned by a local company. A north and south vein of white quartz associated with zinc blende and pyrites in small quantities has been opened up by surface cuts and a shaft sunk to a depth of 60 feet.

Northwest of the central portion of the camp is a hill known as Douglas Mountain. Here are the Eureka, Mammoth, Shannon-Dolphin, Bellevue, Alma, Pendray, Highland Chief and Blue Bird mineral claims.

The Eureka was one of the first claims to be operated in the camp. Under great disadvantages the owner, Mr. Douglas, of Midway, sank a shaft on a vein of white quartz about seven feet wide. At a depth of 85 feet a drift was run for 125 feet, the vein



In the Drift at the 80-foot Level in the "Waterloo," Camp McKinney.

north, but in the second level it is dipping 80 degrees south. As in the Cariboo, there are three kinds of quartz; the bluish white quartz, where mineralized, assaying from \$17 to \$31 per ton.

The plant consists of a 6x8 hoist, a No. 5 Cameron pump, a 35 h.p. locomotive boiler and a Rand steam drill all supplied by the Jenckes Machine Co. In addition to this we have a Peerless drill made by the Mac Machine Co.

The mine is at present closed down pending negotiations for the purchase of the Minnehaha Company's properties and plant by the Sailor Company.

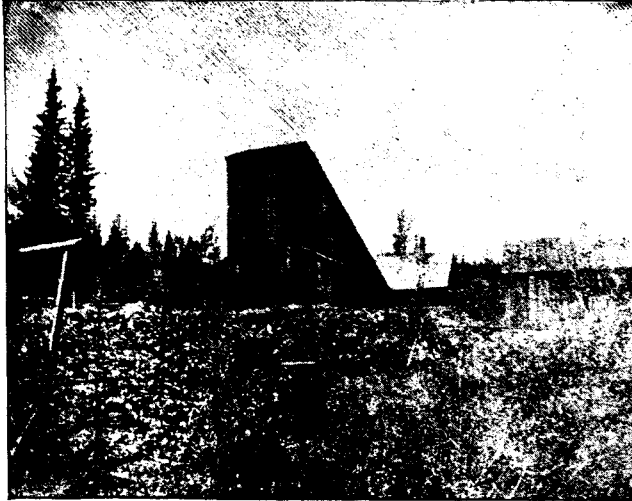
Three-quarters of a mile or so west of the Sailor property and south of the waggon road, in a granite formation are the Anarchist, Explosion, Dynamite

averaging from four to six feet wide. About 100 feet to the east a shaft was sunk on the same vein to a depth of 15 feet. Work has been suspended a number of years.

The Mammoth and Shannon-Dolphin Companies were formed by Dr. Reddy, of Spokane, to secure these properties.

On the Mammoth a tunnel was run in on the vein for about 65 feet, when a fault was encountered. The ledge was found again about ten feet wide and a winze was sunk at that point. Some fine specimens of quartz carrying pyrites and galena were taken from this winze in which the pay chute averaged about 30 inches wide and assayed \$27. The vein is now being opened up by surface cuts further up the hill side.

On the Shannon and Dolphin work was confined to tracing the ledge which runs through the Bellevue (Sailor company's) and on down through the Maple Leaf, Alice and Emma (Cariboo company's). Several shafts were sunk and the ledge was stripped in two or three places, but so far has evidently not been found in place, except towards the east end. The ore



The Kamloops Shaft House.

is a coarse-grained white quartz carrying massive plates of pyrites, but these sulphides do not seem to carry much values. There are also several other veins on these properties.

On the Alma and Pendray free gold has been found in a weathered bluish quartz. The vein, which has an easterly and westerly strike, has been opened up by a series of small shafts and a contract has been let for a 75-foot shaft on the Alma.

The other claims on this hill are being developed by their owners, and the showings so far are decidedly encouraging.

Coming east again, the Wiarnton mine, adjoining the Cariboo company's properties, is owned by the Camp McKinney Development Company of Spokane. While there may be strong reasons for the assumption that the continuation of the Cariboo vein will be found through the Wiarnton ground, the fact has not yet been demonstrated finally by development to date, as the vein has not been found in place. About 300 feet from the side line of the Saw Tooth a shaft was sunk to a depth of 52 feet and a cross-cut run south from here for 65 feet. A second shaft was sunk near the Waterloo to a depth of 54 feet and a cross-cut 40 feet north was run without encountering ore. About 200 feet south of this working a third shaft was sunk on a vein of bluish-white quartz carrying some sulphides. This shaft is 60 feet deep, and the vein on which it was sunk has been traced by open cuts for at least 400 feet in a westerly direction.

Adjoining the Wiarnton on the east lies the Waterloo mine owned by the Waterloo Mining and Milling Company, of Spokane. The property was located in the spring of 1897, the surface ore affording very fine specimens of free gold, occurring as plates in a dark blue coarse-grained quartz. Preliminary work consisted of a shaft near the west end of the property sunk to a depth of 46 feet. The ledge was then stripped towards the east and about 300 feet away a second shaft was sunk on a cropping of quartz containing

free gold. This one was put down, 80 feet and at the 60-foot level drifts were run 40 feet in an easterly and 260 feet in a westerly direction.

Last autumn a stamp mill was erected and after a month's run a brick to the value of \$2,000 was produced. Owing to the cutting off of the water supply last winter by frost the mill, after a second clean up of \$600 had been made, was temporarily inactive. Stopping was, however, commenced in the mine, and an upraise 180 feet west of the present shaft was started. This upraise when completed will be utilized as a main shaft and will, as soon as a more powerful hoist is obtained, be continued on down through the pay chute. The present equipment consists of a 30 h.p. vertical boiler, a small hoist and a No. 5 Cameron pump supplied by the Jenckes Machine Co. A new 10x10 hoist and a steam drill are, I believe, to be installed when the new shaft is completed. The stamp mill consists of one 5-stamp battery, a 50 h.p. boiler and 40 h.p. engine, Johnstone concentrator and Blake crusher. In building the mill, the ore bins, battery blocks and the concentrator floor were all constructed with a view to enlarging the mill, hence the capacity of the battery can be increased to the stamps with very little trouble or expense. The tramway between the shaft and mill is approximately 280 feet long. The new shaft will be about the same distance away and ore bins are to be built near the shaft and a good supply of ore therefore may always be kept in reserve. The vein is about four feet wide, has a strike W. five degrees N. and is almost vertical. The ore is a dark



The Sailor Hoist.

blue coarse-looking quartz carrying heavy bands of sulphides (pyrites, blend and galena). The average values, according to the superintendent, Mr. Graham's last report was \$15 per ton, \$12 of which is saved on the plates. The result of the last mill run was \$1.480, and when the capacity of the battery is

added to and the mine developed to a greater depth, the property should yield very handsome returns.

East of the Waterloo is situated the Fontenoy, owned by the Fontenoy Gold Mining and Milling Company, of Victoria. Here an incline shaft has been sunk on the foot wall for 129 feet. The drifts are in 95 feet east and 110 feet west. A second shaft 40 feet from the west line was sunk 65 feet with a 15-foot cross-cut at the bottom, and to the southeast another shaft 59 feet deep with a 35-foot drift. Several open cuts were also made on the vein. The company have installed a 30 h.p. locomotive boiler, a 6x8 Jenckes hoist and a No. 7 Cameron pump.

The vein appears to curve around the hillside with a strike varying from N. 45 degrees W. to almost E. and W. where the main shaft is situated. The dip is

Situated about two and a-half miles east of the town where the Greenwood waggon road crosses the north fork of Rock Creek are the properties of the Lemon Gold Mining Company of B. C. This company has its headquarters in Omaha, Neb., and own the Lemon, Pennsylvania, Last Chance, Gold Standard and Galena claims. Mr. M. J. Greevy, the president and managing director, acquired the Lemon in 1893, but nothing was done till the summer of 1897, when the company was formed and the other claims acquired. The Lemon itself is Crown granted and has been prospected by small shafts and tunnels. The claim, however, on which most of the work has been done is the Gold Standard.

Here an incline shaft has been sunk on the vein to a depth of 228 feet and passes directly under Rock



Entrance to Tunnel of Shannon and Dolphin Mine, Camp McKinney.

about 45 degrees north. The quartz is white and massive and is about four feet wide in the face of both both drifts. It carries coarse cubes of pyrites and a stringer of galena about three inches wide. Assays of \$65 are reported, while an expert sent up to examine the property last autumn obtained average assays of \$52.50.

On the Vernon, which lies to the south of the Fontenoy and which is owned by Mr. Hugh Cameron, the "father" of Camp McKinney, the vein has been opened by a shallow shaft. Five hundred feet south of the Fontenoy sinking is now progressing on a second shaft to encounter the vein on the dip. The vein where exposed here has a strike almost north and south with a dip 45 degrees to the east, and is about six feet wide.

Creek. From the 125 foot level they have drifted 57 feet south and 50 feet north and have also cross-cut 25 feet west from the south drift. All the ore which was run through the mill came from the stopes on this level. At 210 feet they again drifted, 18 feet south and 38 feet north. Underground work was then suspended and a more extensive surface development was undertaken.

The plant consists of a 25 h.p. upright boiler, hoist, a No. 5 Cameron pump and steam drill supplied by the Mac Machine Company. A 5-stamp mill supplied by the Wm. Hamilton Manufacturing Company and a saw mill was installed by the company's engineer, the saw mill being so placed that the same 50 h.p. engine and boiler can be used for both it and the stamp mill. Water power would be easily available from the

talls of Rock Creek on the property and should considerably lessen the cost of crushing.

The vein has a north and south strike and dips about 45 degrees near the surface, but has now straightened to about 80 degrees east. The ore is a chalky looking quartz well mineralized with pyrites. It occurs in a talc ledge matter which also contains cubes of pyrites, and is found mostly near the hanging wall. Assays of from \$12 to \$72 have been obtained from the pay streak.

Across the creek and a little lower down are the workings of the Victoria mine, owned by the Rock Creek Gold Mines Company, Ltd. The Victoria and the Old England, as I have mentioned before, are the oldest locations in Camp McKinney.

In 1896 and 1897 about 1,000 feet of development work was done. An incline shaft 110 feet down ran into base ore. No. 1 tunnel, run in 198 feet from the side of the Rock Creek gulch, struck the vein which was drifted on for 200 feet. In No. 2 tunnel the vein was found 205 feet in and a winze sunk for 106 feet. Thirty tons were stoped out and shipped, giving returns of \$50 gold, \$2.00 silver and two per cent. lead.

There are two undeveloped veins of which little is known, but the main one has been opened up sufficiently to demonstrate that if the ore is found in place it will pay well to mine. The ledge is from five to six feet between walls and contains a bluish quartz with pyrites, blende and a little galena. This quartz is from a few inches up to 20 inches wide, and is badly broken. Work has been suspended a number of years, but it is nevertheless unfortunate that in view of the circumstances development was discontinued at so early a stage.

Last November some excitement was created by the report that free gold had been struck on the Dayton, a claim lying on the "hog's back," which runs southward about two miles due east of the camp. The gold occurred in "gossen" and was found in large quantities where the vein was opened up. "Colours" could be obtained by "panning" any of the rock. The claim was located a year ago and shortly after the "strike" of free gold, was bonded and sinking was commenced. The ore proving refractory the bond was allowed to lapse, but the owners of the claim continued the shaft down to a depth of 50 feet and cross-cut twelve feet east to the vein. Surface cross-cuts were also made, in all of which rock was found that would "pan." The strike of the vein is north 40 degrees west and it dips about 70 degrees east. Assays of \$72, \$96 and \$812 have been secured from the surface, but, of course "specimen" assays are hardly satisfactory evidence as testifying to the value of a prospect or mine.

On this "hog's back" there are many other properties with good showings of base ore, but on these so far very little development work has been done, and but little can be accomplished without the aid of outside capital. The Dayton, Le Roi, War Eagle and many other claims offer good inducements to the capitalist prepared to expend an adequate sum for their proper exploitation and development.

Camp McKinney in the past has not received that attention which in view of the many excellent surface showings to be found in the neighbourhood it merits. The only mine, the Cariboo, which has been extensively developed, has rendered an excellent account of itself, as all who have been fortunate enough to be shareholders have every reason to know. The Water-

loo, Fontenoy and other mines, on the development of which the expenditure has been very much less considerable, will ere long prove profitably productive, while there are unquestionably many good claims elsewhere in the camp which would well repay investigation. It, however, can only be a question of a short time ere these facts are more widely recognized.

DEVELOPMENT ON TEXADA ISLAND.

(By Wm. M. Brewer, M.A.I.M.E.)

WHILE the geological formations on the northern end of Texada Island are very similar in some respects to those on the western coast of Vancouver Island, yet there is one very marked difference with regard to the values carried by the ores on Texada as compared with those on Vancouver Island. The difference is in the gold values carried by the Texada gold-copper ores.

So far as work has demonstrated to the present time, the copper gold ores of Vancouver Island rarely carry more than \$2.00 per ton in gold, but these ores on Texada Island usually average \$8.00 or \$9.00 per ton in gold, and very often carry more than one ounce per ton in gold. Of the southern portion of Texada Island hardly anything is known with regard to its mineral resources or geological formation. So far as one can judge while travelling up the Straits, the mountains on this portion of the Island are not only very much higher than on the northern portion, but the timber and underbrush are very much more dense. These conditions account for the fact that this portion of the Island has not been prospected.

It would appear as though the geology in the Southern portion differs considerably from that in the northern portion. The writer's reason for stating this theory is that the ore deposits which have already been discovered southerly from an imaginary line drawn across the Island from Van Anda to Davies Bay, carry very much heavier iron contents than those north of this line. In fact the ore in the Raven prospect near North East Point is principally iron, while on the west coast are located the very extensive deposits of magnetite which carry practically no copper values and which have been prospected to a depth exceeding 200 feet at which depth the writer is reliably informed, the ore is to all intents and purposes a Bessemer iron ore. Northerly from this imaginary line the principal ore deposits are copper carbonates and bornite, the latter even to a depth of 450 feet; actual work having demonstrated this fact in the Copper Queen mine. The ores from this northern portion are very much more silicious than those which have been so far discovered south from the Copper Queen.

A change in the geology occurs about 2,500 feet southerly from the Copper Queen shaft, and on the mineral claim known as the Little Billy. At that point a quartz syenite flanks the metamorphosed lime stone, which is apparently the oldest rock, at least on the northern portion of Texada Island. As one proceeds towards the extreme north end of the Island at Blubber Bay, he finds this lime stone is the predominating rock with intrusions of felsite and diorite dikes. The latter appear to belong to a more recent period than the former, as it is found in the underground workings that the diorite dikes usually cut through the ore bodies which occur on the contact between the lime stone and felsite.

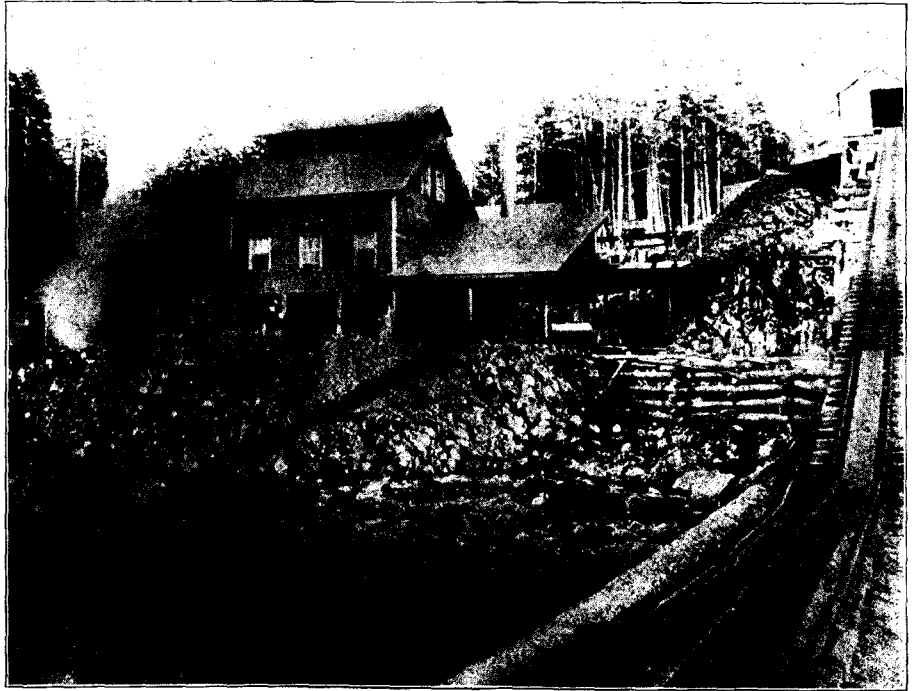
There has apparently been a still later movement,

because in the Marble Bay underground workings one finds fissures crossing the general trend of the formation which are to-day only filled with mud and breccia. In these, so far as they have been prospected, which in the Marble Bay is for some considerable distance, no ore bodies occur, and as the fissures intersect ore bodies in that mine cutting through them with the ore found on both sides of the fissure, the theory that these mud seams were formed more recently than the period when the deposition of ore occurred would appear to be warranted.

The ore from the Copper Queen 400-foot level carries besides its high copper values \$9.00 per ton in gold, making the total smelting value of the ore not less than \$25.00 per ton. In fact this has been the average value for 6,000 tons of ore smelted from the Copper Queen and Cornell mines during the past nine months.

While on a recent visit to the Island, the writer had the opportunity of examining the development work in the various properties, and found that the main

ing the ore to be continuous to that depth. It is probable that driving on the 500-foot level will have to be continued for about 50 feet before the same ore body as occurred on the 400-foot level is reached, because all the ore in the Copper Queen mine has dipped towards the west as well as dipping vertically



From Minister of Mines Report, 1899.
The Vau Anda Smelter, Texada Island.



From Minister of Mines Report, 1899.
Marble Bay Lime Kiln, Texada Island.

shaft on the Copper Queen had reached a depth of 518 feet. At the 500-foot level a station has been cut, and drifting started and the ore body found, but apparently this is not the same as on the 400-foot level, reached a depth of fifty feet, show-

and conformably with the foot wall. It would appear as though the ore which has been exposed on the 500-foot level and which is being stoped is another lense having its apex between the 400 and 500-foot levels. On the 14th of July there was the following described virgin ground opened ready for stoping: On the Copper Queen—A newly discovered ore body from the 174-foot level upwards, also between the 224 and 174-foot levels, also between the 500 and 400 foot levels, also an ore body having its line of strike nearly at right angles to the main ore body and extending northwesterly from the old 100-foot incline shaft. This last has been proven from the 100-foot level to the surface and in an open cut on the surface run when the discovery of the body was first made has been proven in length 40 feet with ore still in the face of the cut, and with every indication that this body extends under the waggon road and houses opposite to the shaft-house. On the Cornell the main shaft has been sunk 80 feet and the 160-foot

level opened, station cut and drifting on the ore body which is proven to be a continuity of the ore body which was stoped from the 80-foot level up. The two levels have been connected by an upraise on ore and stoping has commenced. This ore body on the 80-foot level had a length of 112 feet, and an average thickness of 12 feet with a maximum thickness of 23 feet. On the 160-foot level the maximum thickness of ore in felsite gangue exceeds 30 feet. The virgin ground ready for stoping is between the 160 and 80-foot levels on what is known as the east ore chute.

About 300 tons of ore have recently been shipped from the Lenora mine at Mount Sicker to the Van Anda smelter. There is also being shipped a quantity of ore from the Marble Bay, the property of which company adjoins the Van Anda company's properties. The management at the Marble Bay mine have commenced to stope the ore between the 50 and 140-levels. Heretofore the only ore mined below the 50-level has been such as was taken out while driving.

The lime kiln at Marble Bay is also being run up to its capacity, lime from these kilns having been placed on the Vancouver and Victoria markets.

The difference in the appearance of this portion of the Island to-day and a year ago is very marked as can readily be understood when it is considered that in place of a small population a year ago, and a few shacks together with the Marble Bay hotel, to-day there is a population of between five and six hundred on the two townsites. Of course the bulk of this population is located on the Van Anda townsite, because the company employs a very much greater force of men than the Marble Bay. The growth of the town of Van Anda during the past year has been somewhat phenomenal, the houses are substantial structures built from the lumber sawed in the Van Anda company's mill which has a capacity of turning out about 12,000 feet daily, and is furnished with planing and shingle mills, as well as ordinary saw carriage.

Travelling up the east coast of Texada three miles above the town of Van Anda there is a new prospect being opened known as Loyal group. The discoveries of ore were first made on the Crown grant land owned by Carter-Cotton, and in many respects these prospects are ideal ones. The fact that to a depth of some 40 or 50 feet the ore can be mined from an open cut, and also that this open cut is only about 500 feet from deep water where a cribbing has been built for a dock, and connected with the open cut by a surface tramway, demonstrates some of the advantages found at these new prospects.

Surface work has been done on this prospect which demonstrates that bodies of ore (carbonates) occur for a distance of some three or four hundred feet along the line of strike, and apparently the mineralized zone has an average thickness of some 50 or 60 feet. The actual conditions though will be thoroughly demonstrated after the open cut already referred to has been driven across this zone.

At the time of the writer's visit only two weeks had elapsed since work of development had been commenced. This had been prosecuted so diligently though, that it is almost a certainty ore will be shipped to the smelter within fifteen days from the time of the writers' visit. The most encouraging feature with regard to this northern portion of Texada Island is that the Cornell mine for instance, and almost certainly the Loyal group can be considered as having paid from the grass roots, which is certainly phenomenal.

At Blubber Bay, the extreme end of Texada Island, Messrs. MacKenzie, Mann and Holt are opening some copper prospects, and employing a large force of men. Considerable ore has already been accumulated on the dumps, and good waggon roads built connecting the mine workings with the shore.

A peculiar feature with regard to ore found on these Blubber Bay properties, is that galena carrying 25 to 30 per cent. lead has been found associated with the copper ore.

At Blubber Bay are located some old lime kilns in which lime was burnt some years back. At the present time, although the kilns are not in operation, yet a certain quantity of the lime stone is quarried, and used in the manufacture of cement.

There are at present upwards of 300 men employed in the various mines on the northern end of Texada Island, a large proportion of whom are married, and have their families residing on the Island with them. The majority of these live either on the Van Anda or Marble Bay townsites.

THE REVERBERATORY SMELTING OF LEAD ORES.*

(By Capt. C. C. Longridge, M.I.M.E., M.I. Mech. E., Etc.)

I.—REVERBERATORY SMELTING.

THE process of roasting to which most lead sulphide ores are subjected preparatory to smelting is not always effected outside of the smelting furnace. In the method of smelting here considered, the roast is accomplished in the smelter itself, and the treatment is, therefore, graphically described as the roasting and reaction, or sometimes the air reduction or the reverberatory process, inasmuch as it is conducted in a reverberatory furnace. The crushed ore charge, spread out in a 3 to 5 inch layer on the reverberatory hearth, is first roasted at a comparatively low temperature, until the requisite quantity of lead sulphide is converted into oxide and sulphate. For the English method of reverberatory smelting, the proper proportion is one molecule of lead sulphate to two molecules of lead sulphide; for the Carinthian method, one molecule of sulphate and two of oxide to one molecule of sulphide. When the roast is sufficiently advanced, the furnace temperature is raised and the interaction of the sulphate and oxide is started and the metals are reduced. The reduction, however, is not at once complete. For, in the first place however assiduously fresh surfaces of the ore may have been exposed to the air by rabbling, during the roast, the whole charge will not at once have been brought into the necessary condition for the reduction reactions. On the other hand, as the reactions are satisfactorily effected only when the sulphides and oxides are in, not a fluid, but a pasty condition, complete contact of the interacting particles and reduction of the enclosed metal is not at once effected. The reverberatory lead smelter, therefore, employs a cycle of operations in which the ore is first roasted at a temperature of 500-600 degrees C., then partially reduced at a higher temperature; when the furnace heat is again lowered, the charge re-rabbed and re-roasted, and the temperature once more raised for a further reduction, and so on. Every time the operations of roasting and reducing are repeated, and the ore becomes poorer in lead, a higher reduction tem-

*From the London Mining Journal.

perature must be used. To avoid fusion under the greater heat, and to keep the charge in the desired pasty condition, slacked lime is added; while, to accelerate the chemical reactions, powdered coal or charcoal may be mingled with the charge.

II.—EFFECT OF ORE IMPURITIES.

This process of reverberatory smelting, of which the details appear sufficiently simple, may in practice be much complicated by the ore impurities. The influence of some of these impurities is described: A small quantity of iron oxide is advantageous, in so far as it helps to stiffen the charge. A slight proportion of iron pyrites also is favourable, as it promotes oxidation, and when itself reduced to ferric oxide, renders the charge less fusible. If, however, the proportion of pyrites rises to 10 per cent. or 12 per cent. it is injurious, since it is likely to combine the lead sulphide, and thus prevent reduction of the latter. The presence of 35 per cent. to 40 per cent. of iron pyrites renders the ore unfit for treatment in a reverberatory furnace. Spathic iron ore, in the presence of silica, forms a fluid slag, and is to be avoided in reverberatory lead smelting. In the case of copper pyrites most of the copper combines with sulphur to form subsulphide, but some is likely to enter the lead and may be sufficient to need subsequent separation. Blende, in quantities of 4 per cent. to 5 per cent., assists the roasting of the charge, but 10 per cent. to 12 per cent. both prolongs the roast and diminishes the lead extraction. With 20 per cent. to 24 per cent. of zinc very little lead is extracted, and with 35 per cent. to 40 per cent. the reverberatory method cannot be employed. Antimony, even to the amount of 2 per cent. to 3 per cent. is very prejudicial, as it not only promotes caking and fusing of the charge, but carries lead into the slag, and itself mixing with the lead, injures the quality. It also increases the volatilization losses. Next to antimony, arsenic is the most deleterious impurity, producing results similar to those of antimony. The gangue constituents also have considerable influence on the process of smelting. Limestone, more especially dolemite, stiffens and hinders fusion of the charge; but a large quantity will prevent the various lead compounds coming into contact, and thus, by impeding reduction, will reduce the yield of lead. The highest permissible percentage of limestone for a reverberatory charge is 12 per cent. Silica combines to form lead silicates. These not only react with the oxide, sulphate, and sulphide of lead; but, in consequence of their low fusion point, easily melt, and, coating the particles of the charge, check all reaction. For successful reverberatory work, therefore, the lead ore charge must not contain more than 4 per cent. to 5 per cent. of silica. Barytes and fluor spar, if separate, have no effect; but if both are present, they may increase the fusibility of the charge by combining with lead sulphide.

III.—ADVANTAGES AND DISADVANTAGES OF REVERBERATORY SMELTING.

These may be deduced from the observations made in the foregoing paragraphs. Briefly enumerated, the advantages of reverberatory smelting are: First, raw ore can be smelted. That is to say, no preliminary or independent calcination of the ore is required, because the ore roasting is done in the furnace itself. Secondly, raw fuel can be used. The use of cheaper combustibles, such as coal, wood, etc., is possible, because very high temperature is not needed. The operation, as we have seen, does not

aim at gangue fusion, except in the last stage; and, even then, as much refractory material, such as lime, silica, etc., cannot be present in the charge, no great heat is necessary. Thirdly, the volatilization losses of silver and lead are small; an advantage due to the low furnace temperature. Fourthly, the slag losses are strictly moderate. For, though the slags themselves are rich, their quantity, owing to the purity of the ore employed, is small; and thus the net loss in the operation is reduced. Fifthly, unbricked fines can be smelted without excessive loss in flue dust, since the necessary temperature can be attained without the use of a blast. Sixthly, extraction is easy, and the yield is pure; this results from the high grade and purity of the ores used. Lastly, the plant is cheaply erected. As offset to these advantages, there are the following defects: As intimate contact of the metallic particles is necessary, only rich sulphides, or mixtures of sulphide and carbonates, containing, say, 58 per cent. to 70 per cent. of lead are suitable for reverberatory smelting. For the same reason, the ores must be fairly pure. Blende, iron pyrites, chalcopyrite, calcespar, barytes, silica, lime, magnesia, etc., must not, therefore, be present in larger quantities than already indicated. Other defects are the comparative slowness of the operation, the heavy fuel consumption, usually about 45 per cent. of the charge, the necessity for a good deal of skilled labour, and lastly the richness of slags, which necessitates their re-treatment.

IV.—VARIOUS FORMS OF REVERBERATORY SMELTING.

Those that merit attention are the Carinthian, the English and the Silesian.

The Carinthian method, now almost obsolete, is adapted to treat small charges of pure rich ores, containing 60 per cent. to 75 per cent. of lead, at a low temperature. On account of this low temperature, the Carinthian are more durable than the English furnaces. Instances of such furnaces are the Raibl at Carinthia, the modified Raibl at Egnis, Belgium, and the American air furnaces in the Mississippi valley. The Carinthian method gives a high extraction, but is attended with the disadvantages of a small output and heavy cost of fuel and labour.

The English method aims at dealing with large charges at a high temperature. The extraction is quicker but lower, and, in consequence, the charge residues have to be re-smelted in the blast furnace. The volatilization losses naturally are higher.

The Silesian is a modified English method, the furnace, etc., being correspondingly arranged. This method follows the English in dealing with large charges, but the Carinthian in employing a low temperature. The result is a larger output of purer lead than the English furnace product. The volatilization losses also are lower. The charge residues are sent to the blast furnace.

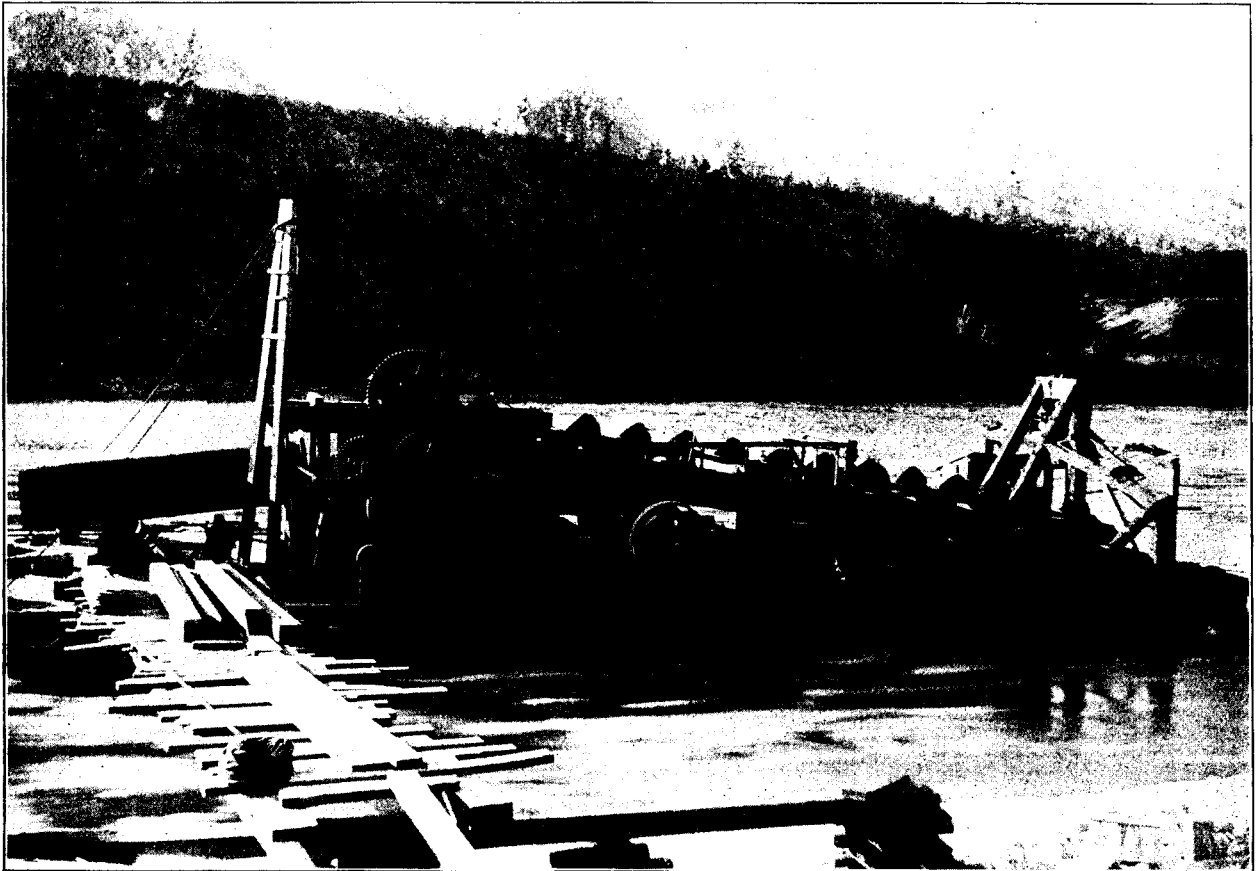
The reasons for the above difference in practice are sufficiently obvious. A slow roast at a low temperature, without charge fusion, favours the extraction of a comparatively large percentage of pure lead, with low volatilization losses. Hence the suitability of the Carinthian method for treating small quantities of pure and richly argentiferous, high grade lead ores. But the majority of lead ores are not pure, and their complete reduction, therefore, requires a higher temperature. The Silesian method is designed to deal with these by extracting, with the least lead and silver volatilization losses, as much lead as possible at

a low temperature, and then re-treating the refractory portion in the greater heat of the blast furnace. Finally, a large proportion of lead ores are either non or poorly argentiferous; with these less valuable ores, large output and low costs are essential. These are obtained, in the English method, by forcing the extraction by a rapid elevation of the furnace temperature to the highest permissible limit, and by retreating the residues in the blast furnace.

V.—THE PRODUCTS OF REVERBERATORY SMELTING.

The products of reverberatory smelting, together

and, in passing, will also make a few remarks anent hydraulic elevating and sluicing. I do not propose to dwell at length on the technical detail of a dredge, because to describe a dredge from beginning to end sufficiently clearly to be understood by the layman would take too much time, nor do I intend to refer largely to the earlier history of bucket-dredging in New Zealand. I shall rather endeavour to illustrate to you the immense advantage of the bucket-dredge as a gold producer. As you are all well aware, there are immense tracts of country in this colony known to be highly auriferous, but which on account of their



Cobeldick Dredge No. 1—In Course of Construction—Fraser River, Lytton, B.C.

with the subsequent treatment to which they are submitted, are shown in the following table:—

PRODUCTS.	TREATMENT.
Lead—Termed "Work-lead"; or, if argentiferous, "Base Bullion." Gray slag—The charge residue.	Refining—Desilverisation.
Flue dust—Chiefly oxides.	Either crushing and concentration to save the metallic lead; or, especially with argentiferous ores, resmelting in the blast furnace.
Hearth bottoms—Hearth material impregnated with metals.	Either resmelting with fresh charges; or, if very impure, bricking and smelting in the blast furnace. The same treatment as gray slag.

NOTES ON GOLD DREDGING.*

By J. W. H. Piper, M.I.M.E.

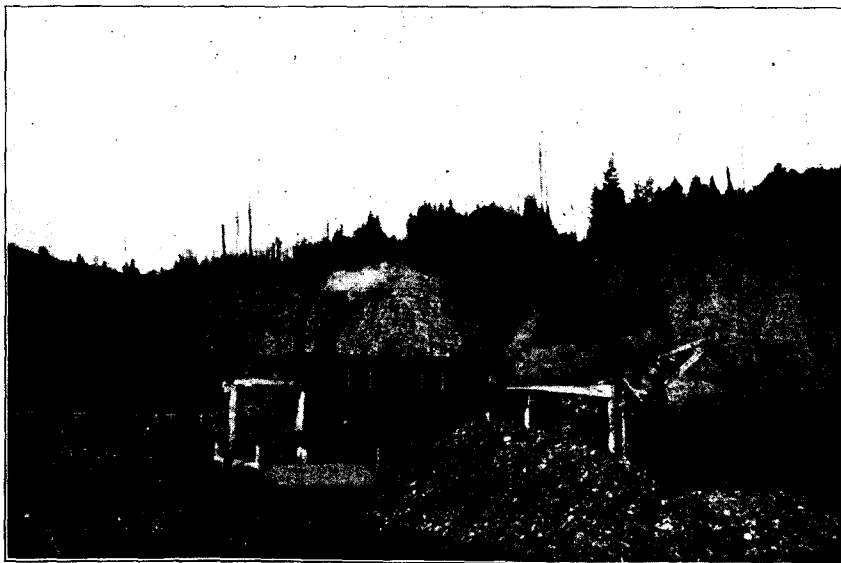
I give me great pleasure to address you this evening on a subject which I think is likely to prove one of the most important branches of the mining industry of our colony. I refer to bucket-dredging,

wet nature have baffled all attempts of the miner to extract the hidden treasure. To overcome this difficulty the bucket-dredge has been designed and brought to its present pitch of perfection; although this class of mining has for some years been carried out successfully in New Zealand, it is only within the past eighteen months that it has made its advent into New South Wales. The modern gold dredge, as used so successfully, is the outcome of years of practical work, and the brains and experience of many inventors are embodied in its mechanism. Bucket-dredging is unlike all other systems of mining, the principal outlay being the first cost of machinery, very little preliminary preparation of the ground to be treated being necessary. The chief advantage claimed for the bucket dredge is the enormous quantity of material which may be operated upon at a surprisingly low cost, owing to the economy effected in labour. Under favourable conditions two men can handle and treat, with a suitable plant, 800 loads in a shift of eight hours, at a cost of about 1d. per

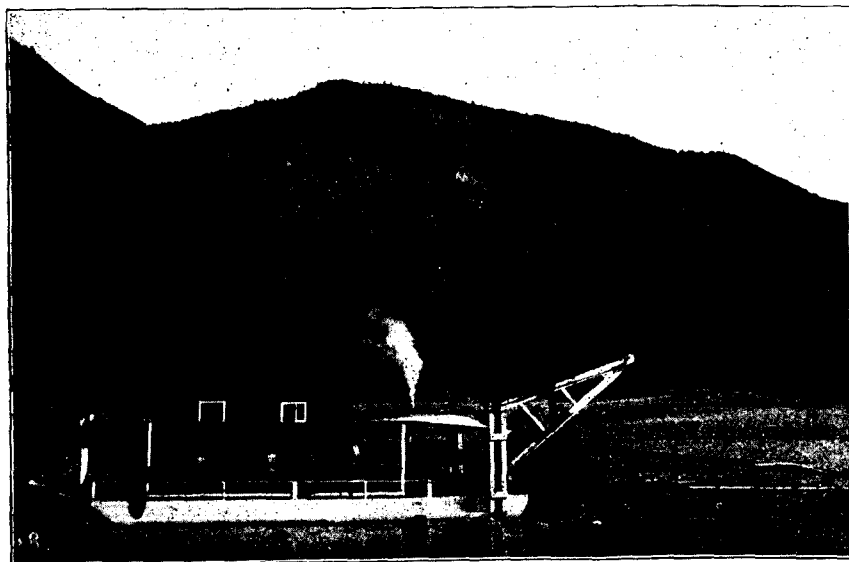
*Paper read before the New South Wales Chamber of Mines.

ton, thus it will be seen that ground containing 1 or $1\frac{1}{2}$ grains to the ton can be made to return a profit. I might mention, in passing, that I know of a large dredge treating and handling ground at $\frac{3}{4}$ d. per cubic yard. The object of the engineer is to design a plant that will give the largest possible output per week combined with the smallest possible expenditure, and it is absolutely necessary for him to study all the possibilities of the operations, in order to provide for all contingencies in the class and character of the machinery, so as to secure the best results. Although the main features are similar in almost every instance, at the same time many details will vary greatly according to local conditions, and it is on the careful consideration of these conditions that the successful working of the dredge will largely depend. The principal points to be considered are: The greatest depth of the ground to be worked below, and its height above the water level; the nature of the wash; whether fine or coarse, friable or otherwise; whether it contains many large boulders, sand, clay, or bands of cement; the character of the bottom, whether it be hard or soft; the probable difficulties to be overcome in the shape of rocky bars or snags; and the quantity of water available. Last, but by no means least, it is always essential that the wash to be treated

the ultimate result. It might be interesting to note, however, that over-sanguine views as to possible returns lead to disappointment, as was the case in the early days of New Zealand dredge mining. As regards the prospects of dredging in New South Wales, most of our rivers and flats appear to have been worked by fossickers and others in a crude and perfunctory way, consequently a large percentage of gold still remains to be recovered, particularly the fine gold. In proof of this statement and of the value of old and abandoned channels, I will, later on,



From Minister of Mines Report, 1899.
Dredge Cutting through Bar on Fraser River.



From Minister of Mines Report, 1899.
Same Dredge in Open Water.

should be thoroughly tested by, say, inexpensive boring operations or other methods so as to give some idea of the character of the gold to be saved and to ensure success in the undertaking. Care should be taken to obtain accurate results from every prospect, so that the engineer may be placed in a position to calculate the proper average value of the material, overburden, etc. If the preliminary investigations are only conducted in a proper and judicious manner, the investor need have no fear as to

show you slides of modern dredges working at a profit upon areas which in one case had been previously worked by an old-type dredge and in other cases where the ground has been repeatedly turned over by Europeans and Chinamen. In New Zealand, where the more easily worked and richer ground has been gone over by the smaller dredges, it was recognized that there were still immense tracts of lower grade country to be worked, and to do this profitably the lifting capacity of the buckets was gradually enlarged from about two to, in some cases, seven cubic feet. Here fears were entertained as to whether a dredge, fitted with the latter-sized buckets could successfully treat the enormous quantities of wash which it lifted.

All doubts on this score were soon dispelled, and although on the large modern dredge the gold saving tables usually have an area of about 200 square feet, it has been found that practically the whole of the gold, including even the very finest, is saved on one-fourth of that area. It is on account of this gold-saving power of the bucket dredge that the modern machine, where it is possible to apply it, is rapidly superseding all other forms of alluvial mining. Of course, where both fine and coarse gold occur, special provision must be made

to save the whole of it, and this can also be done now without the use of separate screen sieves. In the near future attention will doubtless be given to dredging those auriferous drifts which lie away from and at a higher level than the watercourses. This can easily be accomplished, and the dredge worked almost as economically as is being done at present. An examination sufficiently large to allow of a dredge being manoeuvred in, say 100 square feet by 8 or 10 feet deep, could be made. The dredge could then be built in or beside this hole and a small pumping plant erected to convey water from the nearest convenient stream. The hole or paddock, once filled, the additional water necessary to compensate for loss by soakage, evaporation, etc., would not be very great, and the cost of pumping would then be a trifling item. The chief advantage that may be claimed for this particular class of dredging, and one that would almost counterbalance the cost of pumping, is that the dredge would be immune from floods, which in a river are always more or less dangerous and certainly detrimental. So far I have discussed more particularly the continuous bucket dredge. There is yet another type of dredge which has occasionally been experienced with as a gold-winning machine. I refer to the Shovel and Grab Dredge. As excavating machines these dredges have done, and will continue to do for many years, no doubt, admirable work, but where large boulders or submerged trees are met with, and where continuous feed is necessary, these machines cannot be compared to the bucket dredge. Again, the labour necessary to operate the dredge in question is about twice as great as that required for the continuous bucket plant. Various other methods have been adopted, such as pneumatic caissons and dredges, but without success. One type of alluvial mining, erroneously called dredging, is that in which a centrifugal pump is employed to lift the wash, after it has been broken down and conveyed to the intake pipe of the pump by water under considerable pressure. This should rather be designated: "Steam Hydraulic Elevating." A very able paper on this latter subject has been given before the Chamber by Mr. A. J. Bensusan. I do not, therefore, intend to discuss it further.

The construction of a pontoon suitable for bucket-dredging is not so easy a task as it may seem to the layman, as it requires great strength at special points to bear the great unequal strains which may be put upon it. A visit to the hold of a well-constructed pontoon is an object lesson, and is a surprise to most people who see it for the first time. It will seem as if literally a whole forest of timber has been used to obtain the great desideratum of strength and utility. The arrangement of the plant is an important point, requiring careful consideration. When it is neglected, it is a cause of much inconvenience in the conduct of operations and often leads to loss of time, which of course means loss of money. Improvements are being continually effected, and it is necessary for the engineer to be well posted in designing a dredge of the most modern type. With regard to the provisions, under the Dredging Act of this colony I am satisfied that the government are desirous in every way to encourage bona fide investment, but it appears to me an inflated notion as to the possible gold yield has led to some misconceptions in the terms chargeable for dredging areas. It is remarkable that a charge of 20s. per acre should be made for areas that were, previous to being pegged out,

practically useless to the Crown, and had been abandoned by the individual miner. It must be seen that the inducement offered to investors compares very unfavourably with the terms offered in all the adjoining colonies. In New Zealand a small charge is made for the first year which embraces the period when the ground is yielding no profit. However, as the government propose to bring in a new mining bill, this point is worthy of consideration. Objections have been raised to gold dredging in this colony on the score that it may result in robbing the fossicker of his living and damaging the agricultural and piscicultural industries. I can confidently assert that these fears are absolutely groundless. In the foregoing remarks I have referred more particularly to dredging for gold, but my remarks may apply with equal force to the dredging for stream tin, this, however, is still in its infancy. Nevertheless, I am inclined to think that there is a great future in this colony for tin dredging.

REMARKS ON ASSAYS AND SAMPLES.**

(By W. F. Robertson, Provincial Mineralogist.)

THE assaying of any given parcel of ore is necessarily preceded by the process of 'sampling,' by which we seek to obtain, within the compass of a few ounces, a correct representative of the entire quantity of ore, which may vary from a few pounds to several thousand tons.*

"Accurate sampling is quite as essential as accurate assaying, for if the sample does not truly represent the lot or mass from which it is taken, the subsequent assay will be valueless.

"The assayer or chemist will usually receive the sample already prepared, but as he will occasionally be called upon to take his own sample, a knowledge of the art of sampling * * * is essential.†

I preface my remarks by quoting these two well-known writers and practical men to show the stress they put on the matter.

In this province, the majority of the samples brought to an assayer are taken by the prospector or other party, and, as the assay certificates are often used as "documentary evidence" of the value of the property, the assayer should be very careful to state on the face of such certificate exactly from whence he obtained the sample on which the assay was made.

If the assayer sampled the ore himself, he owes it to his client so to state, as it doubles the value of the certificate.

If he did not take the sample himself, he should place the responsibility of the sampling where it belongs by stating who did take it. Without some one known vouching for the correctness of the sample, assay certificates carry no weight as a document.

This can best be accomplished by the assayer seeing to it that his printed certificate blank is so worded as to cover the desired points, telling the whole story, and protecting him from any after-talk.

A certificate form worded somewhat as follows is suggested:—

"I hereby certify that I have assayed a.....
..... sample marked..... handed
me by..... and said to represent
..... sampled by.....
and I find such sample to contain:—"

If this is filled in every time, no one feels hurt, and no honest man will object to it.

**Minister of Mines Report, 1899.
*Peter's Modern Copper Smelting, page 28.
†Forman's Practical Assaying, page 25.

Before leaving the subject of assay certificates, I must protest against the habit of certain assayers in filling in the value of the ore on the assay certificate, as they do, at the price of the metal in marketable shape delivered in New York. It shows a gross ignorance on the part of the assayer as to the value of the ore here, and often misleads the prospector frightfully.

I have seen, this past summer, assay certificates on which the copper value of a five per cent (wet assay) ore was figured out at 18 cents, equal to \$18 per ton, whereas no smelter in the province could afford to pay more than about one-third that price.

A good practical rule for the prospector in British Columbia to use in figuring out the approximate value of sulphide ore—at present market quotations—is as follows:—

Allow \$1.25 for every per cent. of copper contained.

Allow .40 for every per cent of lead contained.

Allow .50 for every ounce of silver contained.

Allow \$20.00 for every ounce of gold contained.

These values are for ore delivered on line of railway. This is not strictly accurate, but is near enough to prevent the prospector being misled by false values placed on assay certificates.

The prospector who has to sample his own claim and wishes to know the truth, naturally asks how he is to do it, and the following remarks are for his benefit, not for the expert—they are only outline directions for following a well-beaten trail—the expert knows many short cuts—but unless one is pretty familiar with the country, it is safest and as quick to stick to the trail.

The two pre-requisites to accurate sampling are common sense and common fairness, or honesty, on the part of the sampler.

In sampling a lead, if the vein-matter is such that it will all have to go for treatment, a section of uniform thickness, right across the whole of the face of the lead usually possible for a correct sample. This is not usually possible, so it should be approximated as closely as is possible. Wherever it is practicable, make cuts right across the lead—the bigger and more of them the better. In such places as the face or roof of the tunnel or the side of the shaft, several strips should be cut out. Make no selection, take all that comes out of such cut, taking great care that the cut is uniform in depth and width—a thing not easily done if there is a great difference between the friability of the ore and gangue. In extended exposures make the cuts at regular intervals of say 5, 10 or 20 feet—the closer the better—letting them hit where they may, making no selection.

Take all that come out of these cuts to a convenient place, break it up as fine as practicable and by such means as are available; allow nothing to be added to or taken from sample.

Thoroughly mix the broken sample. This is best done by the old and tried "quartering method," viz.: Select a smooth, level, clean spot—preferably a floor or canvas sheet; proceed to "cone the sample," placing a shovelful of ore in centre of floor, and directly on top of this another shovelful, thus continuing and forming a "cone." The rest of the sample is then placed, shovelful by shovelful, on the very apex of the cone, so that it distributes evenly down all sides radially. When all the sample is in the cone, it should be flattened into a circular pile, with height about

one-twelfth its diameter. This is done by scraping the ore from the apex of the cone radially in all directions. Across the circular pile there should be marked two lines at right angles and passing through the centre of pile, so dividing the pile into quarters. Two of these quarters, opposite to each other, are then removed, and the space they occupied carefully swept. The quantity of ore is now reduced to half the original. This operation of coning and quartering is continued until the sample is reduced to such size that it can be carried to the assayer. Any pair of rejected quarters should also be retained as a check, or in case of mishap to regular sample.

Should the lead being sampled contain a pay streak which only would be shipped, it is best to sample this pay streak as if it was a separate and distinct lead, carefully noting the width sampled. It must be remembered that the sample only represents that portion of the lead from which it was taken.

Another and quite as satisfactory a method is to sample, by method described, all the rock that comes out of the prospect, or sample the dump, if there is any, by cutting channels through it, on the same principle as in sampling a ledge, and working down the ore taken from such channels to a convenient bulk.

It must always be borne in mind in sampling that there is liable to be a great difference between the lump and fine ore, and, consequently, a due regard must be had to getting the proper proportion of each.

Hand-picked samples are never reliable, and should always be avoided. As an instance of this: The manager of a certain mine on the Coast brought into the Government Laboratory for close and accurate check on the smelter, a large sample of a shipment of ore. The writer found he had taken "a few lumps out of each sack at random," and advised him to go back, dump every tenth sack, and "quarter down" as described, which he did. Both samples were assayed; the first gave 14 per cent. copper, the second gave 5.6 per cent. copper. The ore went to the smelter, where it was accurately sampled by experienced samplers, and gave within one-tenth per cent. copper of second result.

Experienced mining men frequently take hand samples of the particular classes of ore in a mine, have these assayed, and from these results they estimate what grade of ore they are mining. This may be correctly done, and it is wonderful how close to the correct assay an experienced man can "guess," but it is uncertain at the best, and dangerous for inexperienced persons to attempt to be guided by such estimates.

Assays cannot be averaged unless one knows the actual weight of the material represented by each assay, and only then by a long calculation, too long to describe here, except briefly. In nine cases out of ten, when the "average assay of a mine" is spoken of it is incorrect, and has usually been obtained by adding up a number of separate assays and dividing the sum by the number of such assays. It is quite correct to take an average sample, have that assayed, and call it the average assay; but this is seldom done. The correct "average assay" may be obtained by the rule:—Multiply the weight of each lot of ore by the assay of such lot, add the products of such multiplications and divide this sum by the sum of the weights of the various lots of ore; the quotient of such division will be the "average assay" required.

A RETROSPECT.

(By James Moore.)

IN March, 1885, a prospecting party, of which I was a member, ascended the Fraser River, and camped for a meal on a bar a short distance below Fort Yale. Our gastronomic wants satisfied, we proceeded to prospect this bar, and that was practically the beginning of gold mining on the mainland of British Columbia, or New Caledonia as it was then called; for we found excellent prospects. We christened our find Hill's Bar, and set to work with axe and saw on the heavy logs, constructing rough rockers and with these rude appliances (in startling contrast to the high-class and elaborate machinery of to-day) we succeeded in making on the average \$100 to the man a day. Among the difficulties against which we were obliged then to contend was the scarcity of provisions, but some of our party went down the river to old Fort Langley, then a Hudson's Bay post, and succeeded in getting a few groceries and a little black flour on which we managed to subsist. We were not, however, long left in undisputed possession of our Bar. The Yale tribe of Indians soon tumbled to our game and also took a "hand in the pot." They numbered about three hundred, while our party numbered thirty or so. Soon after the return of our colleagues from Langley, a boat belonging to a Capt. Taylor, from Puget Sound, hove in sight. At first, believing that the vessel was laden with provisions and tools we were highly delighted at the prospect of supplying our somewhat pressing necessities, and our disappointment may be imagined when we learnt that the vessel's cargo was composed entirely of spirits. The whiskey-seller is always among the first to follow a mining rush, but this particular vendor was not allowed to ply his dubious trade at our bar—the perpetration of a joke, if there is one, is not intended—for any considerable length of time, although it was no doubt profitable enough while it lasted. The Indians, whom I have already mentioned, had invaded our bar, being well supplied with gold-dust, the value of which they were, however, pretty ignorant, willingly parted with the nuggets for whiskey, the inevitable result being that they one and all were soon in a state of jubilant intoxication. But the situation was far from pleasant so far as we were concerned, and we were not slow to realize that if we did not at once devise some plan for terminating the orgy the consequences might prove serious—for a drunken Indian is a wild beast and ten to one are big odds. Desperate ailments demand desperate remedies and after holding a council of war, early the following morning we marched down in a body to the water-edge and boarding the little vessel as she rode at her moorings, seized the cargo. The heads of the whiskey kegs were speedily knocked in and the contents dumped overboard. After committing our lawless act we gave the commander of the craft ten minutes in which to "clear out," and he did not hesitate long in availing himself of the opportunity. The incident seemed to cause the Indians with whom previously we had been on fairly friendly terms annoyance. They became quarrelsome and a row appeared imminent. The tribe foregathered, every man defiantly exhibiting his musket, while a chief mounted a stump and harangued the assembled braves. The speech-making proved a fortunate circumstance for us, for just as the dusky orator had worked himself, and no doubt his audience to a criti-

cal state of excitement, a boat manned by bluejackets and in which was seated the best friend British Columbia has known, Governor Sir James Douglas, was rowed rapidly towards us. After firing a salute in the Governor's honour we informed him of the position of affairs. Now the Indians had a great respect for Sir James Douglas and he soon induced them to leave the bar for Fort Steele where their ruffled feelings were gently smoothed by a grand "blow out" of molasses and hard tack. Thereafter the Indians gave us no further trouble.

Other adventurers now began to arrive, and among others one "Billy" Balue, a Californian, who inaugurated the Pioneer express service of British Columbia. To this man we showed our prospects and gave him also letters and samples of gold dust for transmission to San Francisco and the outside world generally. And that was how the great Fraser River gold rush of the fifties came about. Prospectors simply swarmed into the country and it was estimated that no less than thirty thousand men camped that year at Fort Yale. Many rich bars and benches below Yale were then located, but hoping to discover still more profitable diggings farther inland many prospectors availed themselves of the route to the Upper Fraser opened up by Sir James Douglas by way of Harrison River to Lillooet, while others, waiting till the freshet subsided, pushed their way up the narrow defile of the big canyon through which the Fraser gains a passage from the Cascades to the sea. The more venturesome of the adventurers forced a passage into the interior of the province despite the overt hostility of the native tribes. In due course Boston Bar, Lytton, the Thompson River, Lillooet and the mouth of the Quesnel River placers were discovered and prospected, and the latter locality in particular gave great promise. The news of these finds were bruited abroad and the main body of pioneers, abandoning the valley of the Fraser, crossed the spur of the Rockies known as Bald Mountain, and commenced locating claims on the bars of the Quesnel River. Some of these bars were very rich and the first locators at the mouth of the river, "Charley" Snider and two others, took out with a rocker \$1,700 the same day they located the ground. Hicks, McDonald's and a number of other bars in this vicinity paid equally well. The party of which I was a member and others started overland from Soda Creek in 1859, discovering rich diggings, known as the blue lead, at Horsefly, from which we won gold to the value of several thousand dollars that year. This deposit of auriferous gravel is now, by the way, covered by the Harper lease which was sold in 1895 to the Horsefly Gold Mining Co., of which Mr. R. T. Ward, of San Francisco, is manager. I visited this mine last year and was piloted by the foreman to a spot where some rich gravel prospecting several ounces to the pan, was in sight; but what struck me most forcibly was the extraordinary difference between the modern methods employed in the operation of this property and the crude mining of forty years ago when on this very ground, which is now worked with hydraulic elevators and the workings illuminated with electric light, I and my companions had toiled with a rocker. Nevertheless our rocker had given us six ounces a day per man and that was not so bad a showing after all.

But to return. After the main Quesnel River had been prospected the bars and branches of the north and south forks of this stream were accorded attention with satisfactory results. In 1860 Keithley, Har-

vey, Snowden and other creeks in the vicinity were discovered and a good pay rewarded the miner, but it was not until 1861 that the most notable discoveries across Ball Mountain of Williams, Antler, Lightning, and Lonhee Grace creeks took place. The news of these rich finds created a second and a greater "rush" to British Columbia. Of these creeks Williams proved the richest, and too, the gold was coarse, deposited in enormous quantities easy of access both in the creek itself and some of its tributaries. From some claims as much as 200 pounds weight of gold was taken out in twenty-four hours, while a daily clean-up of 100 ounces was

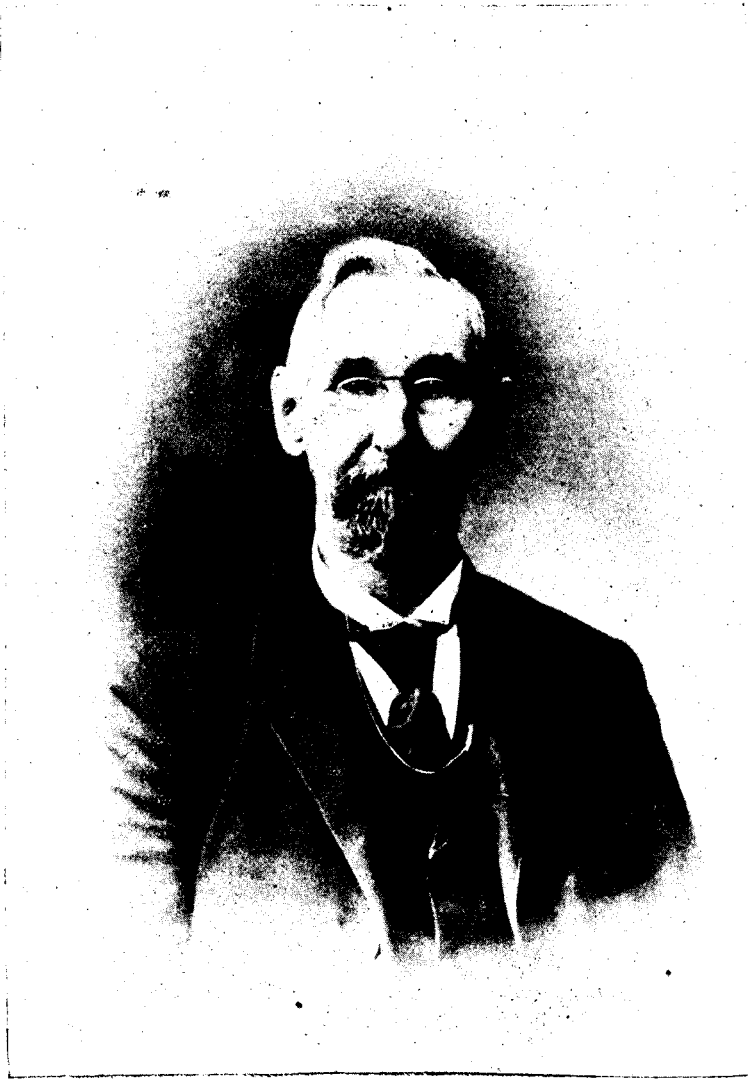
quite common. Needless to say, fabulous fortunes were won in a brief period extending over a few months by several among the more fortunate claim holders. How Williams Creek proved may be gathered from the Report of the Minister of Mines for 1875, where it is stated that the average value of gold obtained per lineal foot of channel of certain claims was \$1.075; while from Lightning Creek alone \$2,179,272 worth of gold was recovered. When in natural order these rich creeks were exhausted, Cariboo as a field for the individual miner lost its attractions, and at the close of the "sixties" the population had greatly diminished. With the exception of a short-lived and merely stock-jobbing quartz excitement, little mining was done in the district until within the last six or seven years, since when

capital has been introduced to operate the alluvial deposits and deep placers upon an extensive scale. In many ways the conditions are much more favourable to mining than in the early days and for the sake of illustration it is only necessary to mention one circumstance, that while, in the "sixties" we were obliged to pay weight charges of one dollar per pound on all supplies and machinery brought in, to-day this cost has been reduced to five cents

About seven years ago a syndicate composed largely of C. P. R. officials secured the services of Mr. J. B. Hobson, a mining engineer of experience in methods of deep gravel mining in California, to

operate an extensive area of auriferous gravels on the south fork of the Quesnelle at Dancing Bill Gulch. Under Mr. Hobson's direction something like \$1,000,000 has been spent in the development and equipment of this mine, the operation of which has been continued on a very large scale. Another great enterprise on Horsefly is the Miocene Gravel Mining Company, of which Mr. R. H. Campbell is manager. This company last year sunk a shaft to a depth of 490 feet. At that depth it was found necessary to cease operations, as before proceeding additional machinery was required. Meanwhile this

shaft had been sunk through the finest quartz I have ever seen. There are several very deep channels known to exist in Cariboo but the Miocene Company's is the first in this vicinity to make the practical test of very deep ground and the work is watched with much interest. On this creek the Horsefly Hydraulic Company is also under the management of Mr. J. B. Hobson. This company controls 2,000 miner's inches of water brought through a ditch 12 miles long by six feet wide on the bottom and eleven feet on top and two and a-half feet deep and two and a-quarter miles of thirty-inch steel pipe. The pipe line is laid on the plan of an inverted siphon and carries this body of water over three deep depressions. A ten-stamp mill was erected at the mine to crush the hard cemented gravel found in the face. On the north fork of the Quesnelle an



Mr. James Moore, the only Survivor of the First Band of the Province's Pioneers.

English syndicate represented by Mr. Jos. Hunter is driving a bedrock tunnel to tap an ancient channel which lies back at a distance from the river. The channel is covered by a large body of gravel, but sufficient work is not yet done to prove its extent. On Spanish Creek, a tributary of the North Fork, the Moore Company has been working for several years and during the last twelve months they are getting very good pay, amounting to approximately eight ounces per set of timbers in gravel. The operations are not on bedrock. On Black Bear Creek a tributary of Spanish Creek the Pioneer Company, for which I myself act as manager, is sinking a shaft in



Horsefly Hydraulic Gold Mining Co's Stamp Mill for Cemented Gravel.

From the Minister of Mines Report, 1899.

the bed of the creek, for the purpose of reaching the deep ground which has never yet been prospected. In early days in working on the North Fork good pay was obtained from the Forks to Spanish Creek. Above that point no pay was obtained on the North Fork, but the lead has been traced into Spanish and Black Bear Creeks.

REVIEW OF THE ALASKAN BOUNDARY QUESTION.

(By Alexander Begg, Author of the History of British Columbia.)

(Continued from Last Month)

"We are at one with the General as to the accuracy of the starting point as mentioned, but we must differ

from him when he says: 'The line shall then proceed through Portland Canal.' Here is where the difficulty comes in. Portland Canal is not mentioned in the treaty; neither does Portland Canal reach the 56th degree of latitude. After referring to the proposed boundary along the coast, north of latitude 56 degrees General Duffield continues: "With this description in the treaties, I do not see how it is possible that there should be any differences between the two governments."

"Differences, however, do exist," the *Gazette* continues, "and General Duffield will require to show 'how it is possible' to reach the entrance to Portland Canal, by going north as required and described in the treaty, to the 56th degree of latitude, where the line of demarcation strikes the coast of the continent, before these differences can disappear. It may also be required that the United States representatives shall produce evidence to show why they have departed from the wording of the treaty and substituted a new line south of the 56th degree. It is a matter of fact that from the initial point of the line of demarcation, as mentioned in the treaty, the entrance to Portland Canal is slightly south of the said initial point, and about fifty miles to the east of it. It therefore follows, that to reach latitude 56 degrees, the point of intersection mentioned in the treaty on the coast of the continent, the line must run from south to north, and not east, or from west to east as the United States maps assume."

General Duffield further remarks: "Moreover, Portland Canal is clearly designated on the charts of Captain Vancouver, of the Royal Navy, which were in existence when the treaty between Russia and England was entered into, so there can be no doubt as to where Portland Canal is."

"Perfectly true: there is not the slightest difficulty about the locality of Portland Canal, neither is there any doubt that the framers of the treaty did consult Vancouver's maps and charts and understood them thoroughly. They indicated very clearly where the meridional line of 132 degrees west longitude starting from Cape Chacon, should strike the coast of the continent at the 56th degree of latitude. This will be seen by examining the provincial map of British Columbia, the Admiralty charts, or the United States official charts of that region, which show that the meridional line runs along the east coast of Prince of Wales Island, through Clarence Strait and strikes the coast of the continent in Ernest Sound, making a slight deflection to the west around Cape Camaana, following the channel (called Portland Channel) as described by Sir Charles Bagot and the Right Hon. George Canning, in 1824."

"The root of the matter is this," continues the *Gazette*: "Portland Canal is an inlet into the mainland, so named by Captain Vancouver in 1793 or '94; Portland Channel is a coastal water, so called by Canning in 1824-5. They are entirely distinct waters, in different directions. The Portland Channel is named in the treaty as a prolongation of Clarence Strait and Ernest Sound—a natural boundary for British dominions. Portland Canal is a purely inland water running into British territory; and to assume that when the treaty spoke of Portland Channel it meant Portland Canal, is to run in the face of all delimitations of the treaty, and of what an examination of the map shows to be the common sense of the question."

The strategic importance of British Columbia

should be evident to every intelligent student of the map. The day will assuredly come, in the not very distant future, when new lines of railway and telegraph will cross the Canadian half of the continent, and these lines which under the new Imperial policy will make Canada the western highway of the Empire, must play a large part in its consolidation. Can we afford, therefore, to allow valuable strategic and commercial points on the Pacific coast to pass into the hands of a foreign nation, when by treaty rights they are unquestionably British?

The necessity for such a protective arrangement was seen by the framers of the treaty; hence the stipulation to make the line of demarcation from the 56th degree, at not more than ten marine leagues from the ocean. This can easily be secured under international law, and what is the "ocean coast" can be ascertained without any expensive survey, and will furnish a just, practicable, convenient boundary line, in accordance with the wording of the treaty and prove an accommodation to the subjects of both nations, who may require to use it,—which could not be said of the boundary contended for by the United States, over glaciers and rocky promontories.

Since the appointment of the Joint Commission in 1892, I have carefully noted their reported proceedings. The United States commissioners have persistently contended for the boundary via Portland Canal from Cape Chacon; indeed some of them have gone further west, to a neighbouring island, and its "southernmost point (Cape Muzon), the initial of the boundary, as is shown on the United States official maps and charts. It is stated that on a large map of Canada, sent from Ottawa to the Paris Exhibition (1900), the Alaskan boundary is delineated according to the United States contention, commencing at Cape Muzon, and thence due east to Portland Canal.

To arrive at as full an understanding as possible of the treaty of 1825, and the Portland Canal contention the writer of this review made a trip to London to consult the archives there. The Colonial and Foreign Offices gave every opportunity to obtain information; but I failed to discover anything in the records of negotiations or despatches touching the Alaskan boundary question, which gave the right of claim under the treaty to place the line of demarcation along or through Portland Canal. The direction and route indicated was by Clarence Strait and Ernest Sound to the 56th degree. The difficulties alluded to by General Duffield have arisen from the United States starting the line from Cape Chacon, on the wrong point of the compass—90 degrees astray.

In the House of Commons, Mr. Seton Karr (St. Helen's), in reference to the Alaskan boundary, asked the Secretary of State for the Colonies "whether his attention had been called to the result of the investigations of Mr. Alexander Begg, historiographer of British Columbia, regarding the boundary line between Alaska and British Columbia, south of the 56th parallel of latitude, as detailed in the *Canadian Gazette* of April 16th; whether it was a fact as contended by the British Columbia government, that three million acres of land of high strategic and commercial importance, on the Pacific Coast, opposite Prince of Wales Island, which was assigned to Great Britain by the Anglo-Russian treaty of 1825, was now marked upon United States official maps and charts as United States territory; and whether seeing that the Alaskan boundary south of the 56th parallel was

not reported upon by the recent Alaskan Boundary Commission, he would suggest to the Canadian government that an early and independent investigation be made upon the subject."

The Right Hon. Mr. Chamberlain replied: "Mr. Begg has communicated to this department, from time to time, various memoranda, all of which have been duly transmitted to the Dominion government. * * * When the question is ripe for diplomatic discussion, the points raised by Mr. Begg will no doubt receive due consideration for what they may be worth."

The *Canadian Gazette* of May 7th, 1896, referring to Mr. Chamberlain's remarks in the House of Commons says: "We gather that as soon as the final reports of the Survey Commission have been received, the most important aspect of the question will claim attention. Meanwhile it is enough to note Mr. Chamberlain's admission that the area which Mr. Begg maintains was assigned to Great Britain by the Anglo-Russian treaty of 1825, is marked on all United States maps as United States territory. Mr. Chamberlain might have added, that it is so marked even on some Canadian maps, for a dependence on Washington cartography would seem, in this instance, to have misled even the alert officials at Ottawa."

From the facts and statements in the foregoing review of the Alaskan boundary question, the following points may be accepted as fully demonstrated:—

1. That in 1793-4 Captain Vancouver discovered and took possession of all the islands of what he termed Prince of Wales Archipelago, from Cross Sound south to Dixon Entrance, in the name of and for the British sovereign.

2. That in 1799 'a charter was granted by the Russian Emperor Paul to an association of Siberian merchants to form the Russian American Company to trade with the natives.' The Russians extended their explorations to Baranoff Island and founded Sitka.

3. In 1821 Emperor Alexander issued the notorious imperial edict or ukase against which Britain protested. It was withdrawn under the united protest of Britain and the United States.

4. In 1825, the treaty which is now under discussion, as to its interpretation, was passed, after considerable negotiation between the British and Russian plenipotentiaries. The Hudson Bay Company, being in possession of the British portion of the North American continent at the time, represented Great Britain under the treaty.

5. About the year 1838, the Russian possessions, south of Cross Sound to Dixon Entrance was leased to the Hudson Bay Company, as the Russians found they could not control the waters, nor prevent them from breaking the treaty by dealing with United States traders in intoxicating drink, fire arms, etc., in contravention of the treaty. The arrangements gave the Hudson Bay Company entire control of the whole continent east of the Rocky Mountains, including the western frontier and islands of the Pacific fronting thereon.

6. The United States government in 1867 purchased the Russian possessions under their treaty of 1825, with all its rights and privileges.

7. Their interpretation of the treaty, according to Mr. Bayard's letter to his ambassador in London, in 1885-6 asking for a joint commission to decide on

a permanent location of the line of demarcation between Alaska and British Columbia and the Northwest Territories to the east of the 141st meridian of longitude, has led to great difficulties, in fact has been the stumbling block in the way of the Joint Commission concluding a fair settlement of the line of demarcation, and it may further be said, that until the clear wording of the treaty of 1825 is followed, pure and simple from Cape Chacon, and thence north—from south to north, as the Right Hon. George Canning so clearly expressed it in his despatch, dated July 12th, 1834, to Sir Charles Bagot, and until the course described in the treaty and in George Canning's despatches, and Sir Charles Bagot's negotiations with the Russian plenipotentiaries are strictly adhered to, it is useless to expect that Great Britain will, or can obtain justice in the settlement. Mr. George Canning's despatch last referred to reads: "His Majesty's government have resolved to authorize Your Excellency to consent to include the south points of Prince of Wales Island, from south to north, Portland Channel, till it strikes the mainland in latitude 56 degrees; thence following the sinuosities of the coast along the base of the mountains nearest the sea to Mount Elias; and thence along the 139th degree of longitude to the Polar Sea. (The 139th degree was corrected in the treaty to 141st degree.) Sir C. Bagot enclosed in a despatch to Mr. George Canning, along with other statements, one marked "D" in reference to which Sir Charles had previously informed the Russian plenipotentiaries; it contained his ultimate decision on that point. The statement plainly says, that the line of demarcation was to be drawn from the southern extremity of the strait called Duke of Clarence, through the middle of the strait, to the centre of the strait which separates the islands Prince of Wales and Duke of York from all the islands to the north of said islands; thence toward the east by the same strait (which must have meant Ernest Sound in Vancouver's map or chart) to the mainland, and afterwards along the coast of Mount St. Elias." There is no mention of Portland Canal, nor of going east to reach it. The name "Portland Channel" is not found on any of Vancouver's maps or charts nor any other maps or charts extant in 1824 or 1825, but Portland Channel is described fully, as aforementioned. The island "Duke of York" on Vancouver's map, referred to in the treaty negotiations has disappeared in United States maps and charts, and Etolin Island occupies its place. The authority for removing this landmark is not given.

This tampering with the treaty and changing the line of boundary—its direction—initial point—the substitution of Cape Muzon for Cape Chacon, the recognized initial point of the line of demarcation, in the treaty—"the strip of land" claimed by the United States on the continent immediately to the north of the 56th degree should all be disallowed, as not in accordance with the treaty. The deflection of the boundary line from Cape Chacon, the southernmost point of Prince of Wales Island, running "east" instead of "north" along Portland Channel, and approximately on the 132nd meridian of longitude, as signified in the treaty, creates an impracticable and incorrect line entirely beyond the limits pointed out and defined in the treaty. Besides, there is no authority for using Cape Muzon as an initial point, as it is not situated on Prince of Wales Island—but be-

ing a separate island to the west of Prince of Wales Island, may or may not be included in the final interpretation of the treaty as having belonged to Russia.

9. The water-boundary running north from Cape Chacon to the 56th degree of north latitude, on the coast of the continent is accepted by a large number of British Columbians as being in accordance with the wording, spirit and sense of the treaty. It forms a convenient, reasonable and practicable boundary to accommodate both countries, which the line by way of Portland Canal is not, nor never can be.

10. As to the line from Cape Chacon, along Portland Channel to the continent at the 56th degree, it is contended by British Columbians that the correct line from that new point of departure (the 56th degree) in accordance with the treaty, should be retracing the line through Ernest Sound (a portion of Portland Channel) until the former line along the eastern coast of Prince of Wales would be reached, and following that line to what is now known as Sumner Strait (a portion of Clarence Strait on Vancouver's map and charts); thence crossing Sumner Strait, and working under the ten marine leagues measurement from the ocean coast, as a conventional boundary line, proceed northerly between the islands Kuiw and Kopreanof to Frederick Sound as far as the 57th degree of north latitude; thence west along that parallel to Chatham Strait, which would be followed to Icy Strait to the continental shore, at such point as might be deemed most convenient, to utilize "the strip of land" mentioned in the treaty; and thence ten marine leagues from the ocean coast to the 141st degree of longitude; and thence to the Arctic Ocean along the 141st meridian. It is but reasonable to conclude that Great Britain desired to protect the frontier of British Columbia, to the east of Prince of Wales Island and north to Cross Sound. This was effectually accomplished by the deflection of a branch of the main boundary through Ernest Sound to the continent at the 56th degree. Then by retracing the same line and joining the line of demarcation from Cape Chacon, continued along the east side of Prince of Wales Island as formerly mentioned, completed the southern portion.

10. The latest infringement in connection with the Cape Muzon extension line of boundary, is an imaginary line drawn from Cape Muzon, east to the entrance of Portland Canal, thence north to the head of the Canal, and then westward (forming an elbow) to Burroughs Bay, where the line is supposed to cross the 56th degree of latitude. Should the interpretation of the treaty according to the contention and belief of many British Columbians who have studied the question, together with not a few of the citizens of the United States, (amongst others, Mr. J. W. Treadwell, of San Francisco, who wrote a conclusive article on the boundary question in 1897), be accepted, and the common sense, just view be adopted according to their contention, the Portland Canal boundary line, and its continuation along the frontier of the mainland must be abrogated, and the Portland Channel water boundary to Cross Sound be used. The settlement—the just settlement of the question to both the United States and Canada, hinges on the direction of the line of boundary from Cape Chacon.

11. The *Edinburgh Review*, April, 1900, has a comprehensive article on the Alaskan boundary dif-

ficulty. Amongst other things it says: "It is commonly though erroneously supposed that the United States have exercised control at Dyea and Skagway for a considerable period of time. The facts are that Dyea and Skagway did not exist prior to the spring of 1897. At the opening of that year there was nothing more than a single log cabin or shanty at either place. In May the influx of miners to the Klondike began. Thousands of them arrived by steamer in the Lynn Canal, and congregated on its margin where Dyea and Skagway now stand. The necessities of this migration caused considerable trade and commerce. Without any survey or further diplomatic action respecting the position of the boundary, the United States government assumed political control of these points, and established custom houses, post offices and other evidences of authority, with such reasonable diligence as the extreme difficulties of access to this territory and other circumstances permitted, Canada protested against this cavalier mode of solving the difficulty, and urged the desirability of establishing the boundary line as contemplated by the convention of 1892." The United States people are continuing this summer to take possession of land in Clarence Strait, on Island Revilla Gigedo, and on locations along Behm Canal—complications are increasing, and hence the greater necessity for an early settlement of the boundary.

12. A few points in the *Review* article from a British Columbian point of view require amendment. For example on page 287, last paragraph, it is stated that: "Having ascertained the southernmost point of Prince of Wales Island, one is suddenly confronted by the fact that between it and Portland Channel sixty miles of ocean intervene. Furthermore, Portland Channel lies almost due east from the southernmost point. * * * Again, the line is to ascend north along Portland Channel, until it strikes the 56th degree of north latitude. But Portland Channel does not attain to latitude 56 degrees, etc." The difficulty here is the substitution of the name Portland Channel for Portland Canal. The name Portland Channel was not used by Captain Vancouver in his maps or charts—only Portland Canal—and Portland Channel was only used in the description of the line of treaty by George Canning and Sir C. Bagot. The change of the name seems a small affair, but when it applies to a different body of water and gives the boundary another line or direction it makes the treaty impracticable, and unworkable. That the name "Portland Channel" should have been written Portland Canal, appears evident from the explanations and the reference of "sixty miles of open ocean" between Cape Chacon and Portland Canal, whereas Portland Channel as named and described in the treaty is alongside Prince of Wales Island, and furnishes a water boundary, as mentioned by the framers of the treaty to lead to the 56th degree on the coast of the continent. The paragraph quoted is therefore incorrect, except where it says the line is to "ascend north along Portland Channel" to the 56th degree, and the error, though apparently trivial, has been the case of the principal misinterpretations of the treaty. It affects the whole continental frontier of British Columbia from Cape Fox to Cross Sound. Also on page 288, par. 4, a mistake occurs. It is stated that "both parties concur in holding Cape Muzon to be the southernmost point of Prince of Wales Island. * * * and both acknowledge that

the body of water to-day known as Portland Canal is, despite the erroneous description in the treaty, the channel along which the line is to ascend." The foregoing extract does not state fact. There is no erroneous description in the treaty; "both parties do not concur in holding Cape Muzon to be the southernmost point of Prince of Wales Island;" whereas Cape Muzon is on Dall Island, which is over forty miles long, and is situated to the westward of Cape Chacon. Again, the article quoted says: The British contention is that the Portland Channel of the treaty is the channel as marked on Vancouver's charts, and described in his narrative in terms that leave no doubt as to the body of water which he intended them to apply." There is no such British contention which would substitute Portland Channel as described in the treaty for Portland Canal; neither does Portland Canal afford the "first natural boundary on the continent, south of the 55th degree." The natural boundary conceded by British Columbians is Clarence Strait, (the Clarence Channel of the treaty.) There seems to be a discrepancy on page 290, top paragraph, which says: "Canada also contends that, having determined the point of departure (Cape Muzon) etc., the reference appears untenable, and it may be that the word "Canada" has been substituted in error by the printer, for "United States."

Numerous examples could be furnished to exhibit how unjust and unwarrantable many British Columbians consider the action which their neighbours of the United States have taken in occupying the lands claimed by them under the treaty of 1825, but to which until the subject is decided, one party has the same right as the other. British Columbians blame their neighbours, not only for the manner in which they take possession of the land but for the tardiness they manifest in allowing the disputed lands to come to a final settlement. British Columbia does not wish a foot of land from the United States, beyond what the treaty authorizes—but she expects to get the whole of that. Neither country is badly off for room or scarcity of land: that, however, does not affect the rights of either, nor the sovereignty of the lands in dispute. Many able writers in Canada and Britain have expressed their views on the subject. Amongst others the *Toronto Globe*, which in an editorial which appeared in that paper in September, 1899, says: "When the Alaskan boundary question comes to be settled, we hope it will be settled in a manner worthy of civilized nations, and not in the manner of dogs fighting for a bone."

(The End.)

VERBATIM EVIDENCE IN THE IRON MASK-CENTRE STAR LITIGATION.

(Continued from Last Month.)

Q. Well, as I understand it the War Eagle workings extend in this direction (indicating)? A. Yes, sir.

Q. And there is a raise in the War Eagle workings called the No. 1 raise? A. I don't know anything about it.

Q. You never saw it? A. No, sir.

Q. This is the surface of the ground, is it? A. Yes, sir.

Q. This is the No. 9 raise (indicating)? A. No. 5 raise.

Q. Does this No. 5 raise extend below the level of that tunnel? A. No, sir.

Q. Any workings below the No. 5 raise at all? A. No, sir.

Q. Is there ore in the No. 5 raise from the collar of the shaft down to the tunnel level or not? A. I never examined it, but I think there is.

Q. You surveyed it? A. Yes, sir.

Q. Is there ore below the tunnel level? A. I don't know; that has never been opened up.

Q. Never been opened up? A. Not that I know of at that point.

Q. Did you survey that without looking for ore? A. Yes, sir.

Q. Well, you have been looking for ore in these neighbourhoods for the last year, have you not, pretty steadily? I mean to say, Mr. Clarke, you have made a lot of affidavits in this case—several affidavits at least? A. Yes, sir.

Q. And your attention has been challenged to all the points in controversy in this action several times, has it not? A. Yes, sir.

Q. Now then, you made the survey for the purpose of this model, and in the course of that survey you made a survey of No. 5 War Eagle raise, which is this raise, here (indicating)? A. Yes, sir.

Q. And you did not have the curiosity enough to ascertain whether there was any ore in it or not? A. No, sir.

Q. Did you want to see any? A. Well, I was not looking for any. I was pretty busy running lines about that time.

Q. Now then, you say that this (indicating) is the south fork of the War Eagle vein. This drift on station No. 151, you say, that this is the south fork of the War Eagle vein? A. Yes, sir.

Q. How did you find it out? A. I saw ore in that drift.

Q. Was it in this drift? A. Yes, sir.

Q. But no ore in this raise? A. No, I did not see any ore in that raise. I was not looking for it.

Q. You were not too busy to look for ore in that drift? A. No, sir.

Q. But you were too busy to look for ore in this raise? A. Yes, sir.

Q. And that is the reason why you say that is the south fork of the War Eagle vein? A. What is the reason? I don't understand your question.

Q. Well, never mind. You say this (indicating) is the north fork of the War Eagle vein? A. Yes, sir.

Q. Where do you find the evidence of that? A. Well I am simply here to prove this map.

Q. I know, but you are here to answer a few questions. Where do you find the evidence of that? A. Well, its course would take it right in to the War Eagle vein.

Q. What do you find there? A. I find a vein of ore there.

Q. Where? A. In this drift.

Q. How far have you examined it? A. I have examined it from the station 210 out to the face.

Q. Is that the end of it? A. Yes, sir.

Q. That is the end of it? A. Yes, sir.

Q. Did you go up the raise? A. Yes, sir.

Q. For the purpose of finding ore in the raise? A. Yes, sir.

Q. You found it in the raise? A. Yes, sir.

Q. To that point? A. Yes, sir.

Q. And it stopped there? A. The ore did not

stop. The work stopped at that point.

Q. Now, why do you say that is the north fork and this is the south fork? A. They both have the direction that would take them into the War Eagle vein.

Q. How far west of that point? A. That I am not prepared to say.

Q. Well, how do you know that it would ever get there, then? How do you know where the War Eagle vein is? Have you ever seen it? A. Yes, sir.

Q. Where did you see it—at what point? A. I have seen it in the No. 1 tunnel.

Q. That is here (indicating)? A. Yes, sir.

Q. Have you ever seen it at any point west of the No. 9 raise? A. Yes, sir.

Q. Where? A. I have seen it in the No. 1 tunnel and in the No. 2 tunnel.

Q. West of the No. 9 raise? A. Yes, sir.

Q. How far west? A. Well, I have seen it to the bottom of the main tunnel.

Q. No, that does not answer my question—how far west? A. Well I am not prepared to state. I have not examined that for ore at that portion of the winze.

Q. Then you are ready to state that is the south fork and this is the north fork of the War Eagle vein without knowing where the War Eagle vein is, is that right? A. I am not prepared to say anything about these veins on the—

Q. Then why did you tell my friend that was the north fork and this was the south fork of the War Eagle vein if you are not prepared to show why and how it is so? A. I say that is what is known as those forks. I am not prepared to say whether they are or not.

Q. When you say "what is known" what do you mean? A. Because I have not traced them into the War Eagle ledge.

Q. Then we can take it you do not know anything about whether this is the north fork or this is the south fork of the War Eagle vein? A. I think that they are, but I say I don't know.

Q. Now you say that this is part of what you call the Centre Star vein, this east drift at station 151 here (indicating)? A. No, sir.

Q. Well, where is the Centre Star vein No. 2 in this action? A. The Centre Star vein in this action lies to the east of the vertical fault and is seen in No. 3 shaft.

Q. The No. 3 shaft is on that alleged vein, is it? A. Yes, sir.

Q. Is it on the foot wall or hanging wall? A. I don't understand the question.

Q. Is the No. 3 incline shaft on the foot wall or hanging wall of the alleged Centre Star vein No. 2? A. It is about the foot wall.

Q. How far from the foot wall is it? A. I don't know; nobody can tell that.

Q. Has it a foot wall? A. Yes, sir.

Q. Has the Centre Star vein No. 2 a foot wall? A. Yes, sir.

Q. Where is it? A. Well, it is shown at various places; it is probably in the walls.

Q. Where is it with reference to the collar of the incline shaft No. 3? A. The Centre Star foot wall of the ore body is right at the south boundary of that shaft, the foot wall of the ore body itself is found.

Q. You know very well I did not ask you where the foot wall of the ore was. I asked you where the foot wall of the vein is. A. I am not prepared to say where it is there.

Q. Has the vein any foot wall except the footwall of the ore body there? A. Yes, sir.

Q. Where is it? A. That can be shewn at hundreds of places.

Q. (Indicating on model.) At this point? A. I don't know where it is at that point.

Q. Is it south or north of that point? A. It is south of the collar.

Q. How far south? A. I don't know exactly.

Q. Why can't you tell? A. Because the surface is covered by dumps,—various obstructions.

Q. Where is the hanging wall? A. I am not prepared to say where the hanging wall is: it is there.

Q. Is it north? How far north? A. I don't know.

Q. Well, what is the theory upon which you say that that is a part of the Centre Star vein No. 2? It is based upon the fact that there is a continuous body of ore all the way down the shaft.

Q. I am not asking you what the fact is. I am asking you what is the theory upon which you say that the incline shaft is on the Centre Star vein No. 2?

Mr. Davis—He has answered.

Mr. Bodwell—If he has answered, he may answer again.

A. Because it is sunk on a continuous body of ore, with a regular dip.

Q. Has a hanging wall? A. Has a hanging wall.

Q. Where is the hanging wall? The hanging wall is shewn at various places in the roof as you go down the incline.

Q. How far from the foot wall, what is the horizontal distance? A. Well, I am not prepared to give distances about the foot wall and hanging wall.

Q. Are we to understand that the hanging wall of that vein is the boundary of the ore? A. Not always, no, sir.

Q. Where is the boundary of the ore, the hanging wall? A. What I consider to be a hanging wall is a plane that you can find about two feet.

The Court—I cannot hear you very well. Your definition of the hanging wall is what?

The Witness—Of the Centre Star is a plant about two feet above the ore body; there may be a space between of ledge matter.

Q. Where do you find it, all the way down? A. Yes, sir.

Q. What are its characteristics? A. I am not prepared to say that.

Q. Then you don't know whether it is vein matter or not? A. Yes, sir, I do know.

Q. Then describe it? A. But I am not called upon—I am not—

Q. I think you are. You say you know. I ask you to describe it.

Mr. Davis—He has stated that he don't know, that he is not prepared. Mr. Clarke is not put on as an expert at all.

The Court—He can say if he knows.

Mr. Davis—He has already said twice that he is not prepared to say what it is. He was asked to say what the characteristics are. He said he is not prepared to state.

The Court—Mr. Bodwell is entitled to a definite answer.

The witness—I am not prepared to say what the characteristics of that rock are. It is ledge matter.

Q. You can't say? A. No, sir; I say I am not prepared to say; I am not a mineralogist, and I don't profess to classify the rock.

Q. You know vein matter, or else you would not say that you did. A. I recognized what I think is vein matter.

Q. Now, why do you call it "vein matter?" That is what I am trying to get at? A. I call it vein matter because it contains some quartz, because it contains pyrrhotite and chalcopyrite, calcite and all of those characteristic features of the veins of Rosslund.

Q. And you say that that lies between the ore and the hanging wall? A. At some places, yes, sir; most places.

Q. Where? A. It is seen all the way down the No. 3 shaft, and is also seen in the winze.

Q. Where do you say this vein joins the Iron Mask, on the incline shaft? A. It does not join it on the incline shaft. This (indicating) is the incline shaft at this point.

Q. Where would it join it on a line produced from the incline shaft? A. At a point right here, about 40 feet below the collar of the winze.

Mr. Davis—It is only fair, my Lord, to state this. I asked this witness as to the direction of the vein, but I did not ask him to identify the different veins at the time. I said he was not an expert, and he was not put on to give expert evidence.

The Court—Still he has a right to cross-examine.

Mr. Bodwell—I think I will show your Lordship before I am through that Mr. Clarke has figured as an expert to a considerable extent in this case.

Q. The Iron Mask has a separate vein from that point up—the point 40 feet below the collar of the winzel think you said? A. Yes, sir.

Q. It has a separate vein? A. Yes, sir.

Q. That is the theory of the defendants' case, then, that this is a separate vein from that point to the surface, and this is a separate vein, from the north of the incline shaft to the point of junction with those two veins, down to that point, which intersects, is that right? A. That is the way I regard it.

Q. And they don't join until they reach a point—say they don't join on the course of the incline until they reach a point 40 feet below the collar of the winze? A. They join at that place, about that point.

Q. Well, what course do you take for the incline shaft, what degree, what angle of inclination? A. Well, from its collar down to the blue level; it is about as shewn on the plan there; I think about 65 degrees.

Q. No, no. I am talking about the incline shaft. I say, what do you take for the course of the inclination—the angle of inclination for the incline shaft? A. It is about 40 degrees.

Q. What is the horizontal distance between the incline shaft and the Iron Mask east winze? Take a point at the bottom of the incline shaft. A. It is about 20 feet—15—

Q. (Interrupting). Don't you know exactly? Haven't you got notes? A. You are not asking me any particular point.

Q. I think I am. I asked you what was the horizontal distance between the Iron Mask east winze and the incline shaft, at a point at the bottom of the incline shaft.

Mr. Davis—At what point?

Br. Bodwell—At the bottom.

Mr. Davis—You mean the extreme bottom?

Mr. Bodwell—I don't care where he takes it. Take it at the extreme bottom. A. Well, I think that the question that you want answered is, would be answered by about 15 or 17 or 18 feet—15 or 20 feet.

Q. Now, what is the horizontal distance between

the Iron Mask east drift and the incline shaft, just above the mud seam? A. I am afraid I don't understand your question.

Q. Take the top of the mud seam as a point? A. As a point?

Q. Yes. A. That is no point that I know of.

Q. There is a point, suppose, at the top of the mud seam? A. Yes, there might be a million of them.

Q. Now we are getting at something definite. Now we are getting to what you know what you are about. Take the centre of the incline shaft and take a place at the top of the mud seam, and give the horizontal distance between that point and the centre of the Iron Mask east winze. Can you do that? A. I can give it to you approximately.

Mr. Bodwell—It is about 4 o'clock. Perhaps you had better get those figures.

The Court—Let me ask you, the alleged intersection—I don't know whether you contend there is not—but it does not matter, so I understand—the downward intersection, is it not?

Mr. Bodwell—Yes, the alleged intersection.

The Court—It is not a lateral in this way (illustrating) but it is downward.

Mr. Bodwell—And intersects on the dip. They allege this vein dips into our vein.

The Court—I know what you are asking, these distances, of course; the first time it struck. The fact you are asking for is, take here and there, and whether the intersection can occur?

Mr. Bodwell—Yes, your Lordship sees the point. I don't care to explain it too plainly.

The Court—He knows it as well as can be.

The Witness—Certainly.

Thereupon an adjournment was taken to to-morrow, April 21st, 1899, at 11 o'clock a.m.

Clarence King: Sworn on the part of the defendants.

DIRECT EXAMINATION.

By Mr. Davis.

Q. Where do you live, Mr. King? A. New York.

Q. What is your age? A. Fifty-seven.

Q. What is your business? A. That of consulting geologist and mining engineer.

Q. You are a graduate, I believe, of Yale University? A. I am.

Q. What course did you take there? A. A scientific course, involving chemistry, mineralogy, physics and geology.

Q. What were you engaged in after leaving Yale? A. I graduated in 1862 and in the early spring of 1863 I crossed the continent, riding on horseback from St. Joe to San Francisco to join the geological survey of California, which I did join in September of that year.

Q. How long were you with the geological survey of California? A. Until the autumn of 1867, with a short interval, in which I was in the service of the United States Engineers.

Q. Did the geological survey of California involve at that time any mining questions or examinations of the country with reference to mining? A. It did, but they were incidental, in a measure, to the larger work.

Mr. Bodwell—Unless my friend especially wants this on the record, I am perfectly willing to admit that Mr. King is a perfectly qualified scientific man to speak on the questions involved in this case.

The Court—I do not suppose either party will be satisfied with my decision—I will pay myself that

compliment—the case will go to another tribunal, and that other tribunal would like to know exactly what this gentleman is. You had better have it all down, on both sides.

Mr. Davis—I know it is quite repulsive to Mr. King's modesty to have all this come out, but you cannot help it.

The Court—No, you cannot help it. It is the same as in the case of a medical man being examined. He states, in the first place, in so many words, that he is competent, by telling you where he got his degree.

Q. When did you leave the geological survey of California, Mr. King? A. In December, 1867.

Q. What were you engaged in after that? A. In the early spring of 1868 I was placed in charge of a geological expedition called "The United States Exploration of the 40th parallel." It was under the War Department, and particularly under the Bureau of Engineers of the army under which I received my appointment. This expedition was designed to cover the country being then opened by the then building Central and Union Pacific Railroads.

Q. Did the examination of the mineral resources of the country form any portion of that exploration? A. It did; that was a special portion.

Q. Who had most to do with that particular part? A. Mr. James Heyden.

Q. Were you engaged in that branch? A. I was, particularly in investigating the Comstock Lode, the greatest lode ever discovered in the United States, and on which as a result of that examination I wrote a memoir for the United States Government which was published in a portion of the report of the expedition which I made; also, other contributions to mining literature.

Q. When did you leave that employment, Mr. King? A. I think I concluded it in 1876 or '77; I can not quite remember.

Q. What were you engaged in then? A. In 1869, the government having previously confided its geological work to special chiefs who took the field under different departments of the government, concluded to unite, or rather, to discontinue expeditionary work under different departments, and instituted the United States Geological Survey which should be a permanent bureau of the government. In that inauguration, I was placed at the head of it and was the first director.

Q. That would involve, I suppose, more or less examination of the mineral resources of the country? A. It was left very much to me to decide the early policy of the survey, and my very first efforts were directed to making a series, or to ordering and preparing for a series of exhaustive studies of the great mining districts of the United States as they should develop into prominence. That policy has been to a certain extent followed by my successor.

Q. How long did you remain at the head of the Geological Survey of the United States? A. Two years.

Q. Since then what have you been engaged in? A. Partly in consulting mining work, and partly in travels on my private account, in geological study and investigation.

Q. In what different countries and what different portions of the United States as one of the countries, have you examined the mines, or many of the mines? A. I have visited nearly all the prominent districts in the United States and made more or less of a study of them, sometimes very slightly to get a hint of their structure, sometimes more carefully, but they involve

the leading districts of Nevada, like the Pecos, Virginia City, Eureka, and the leading districts of Utah—at least most of the leading district of Utah, Colorado and part of Dakota, parts of New Mexico, practically the whole of California and Arizona. Not absolutely the whole of any state, but most of the leading districts.

Q. And what countries outside of the United States? A. Europe and North Africa and the islands of the Pacific, parts of them all.

A. And Mexico also? A. And Mexico, very freely over Mexico.

Q. What experience have you had yourself in actual mining? A. I have been both president and directing engineer of mining companies. In particular, I was the first president of three companies which opened the Las Prietas in the State of Sonora, Mexico, of the Las Ye dras, in the State of Sinaloa, and Sombrete in the State of Zacatecas, Mexico.

Q. You have been in Rossland, I believe, before your present visit? A. Yes, calling the present visit a double one.

Q. No, I mean the one this month. A. I came here very early in February and passed a week and returned on the 6th of April.

Q. But prior to that time I believe you were in Rossland? A. Prior to that time in 1895, if I remember rightly, I was here, both in '95 and '96, or '94 and '95; I can not quite remember.

Q. At any rate— A. In the early stages of the district.

Q. In two separate years before? A. Yes.

Q. At that time did you make any examination of the mines of Rossland camp? A. I visited, but I did not make an extensive examination of any one; but I visited and passed many hours here, in the War Eagle and the Le Roi; I went through the Josie, through the Cliff, of the works that were then opening in the Monte Cristo, and some of the smaller claims like the Monita and No. 1, and that is about all. I took a general view of the district, not very precise or particular.

(To be Continued.)

BRITISH COLUMBIA IN LONDON.

(From Our Own Correspondent.)

ALTHOUGH business generally in the London Stock Exchange during the past month has been exceedingly limited in volume, towards the end of June some effort was made to infuse a little life into British Columbian issues, this being largely in connection with the flotation by the Whitaker Wright group of yet another of their Rossland properties; it being necessary to assist them in successfully carrying through this operation to make the market for Le Roi, Le Roi No. 2 and the British America Corporation as strong as possible.

Although it had been known for some time past that the British America group contemplated taking advantage of the first opportunity that presented itself to float off some of their properties which had been on their hands for a considerable time, it yet surprised most of us to find the issue of Le Roi No. 2 followed up so quickly by the flotation of the Rossland Great Western Mines, Ltd., the prospectus of which is before the public. In connection with this issue, it may be worth while my pointing out the very pronounced similarity between the prospectuses of the Le Roi No. 2 and the Rossland Great Western Mines. In many cases, the one practically paraphrases the other. As you will be largely interested in this latest effort of the Whitaker Wright group,

I have extracted a few points for the edification of your readers.

The capital of the Rossland Great Western Mines, Ltd., has been fixed at £500,000 in 1,000,000 £1 shares. It has been formed to work a group of mines some 78 acres in extent, formerly known as the East Le Roi, or Le Roi No. 3 Group, and consists of the Nickel Plate, the Golden Chariot, the Great Western, and the Oreonogo properties. The East Le Roi Mining Co., Ltd., which is the vendor company, has fixed the purchase price at £450,000, but the proportion of this which is payable in shares is not stated in the prospectus. Development work has already reached such a stage on the property that upon the completion of additional smelter plant, Mr. Bernard Macdonald, general manager of the Le Roi mine, anticipates an output of 250 tons per day. "Assuming the working expenses to be about the same as those of the Le Roi mine, this would mean," says the prospectus, "a return of 20 per cent. per annum on the capital of the company." It has been decided to appropriate £50,000 for the working capital of the company, and it is proposed to make Mr. Macdonald the consulting engineer.

As far as market movements are concerned the chief has been the manipulation of Le Roi No. 2, which were this week run up to 2½ premium, equal to an increase of 50 per cent. in the nominal capital value of the company. Of course, those of us who are behind the scenes do not pay much attention to market movements of this kind, but it is quite possible that this development may have materially assisted the flotation of the Rossland Great Western shares which in their turn have been run up to £1 premium. I need not remind you that premiums of this kind although often wholly unwarranted have material influence upon the minds of those who may contemplate taking an interest in a new company. The wisdom, however, of so prematurely discounting the future cannot be for one moment maintained, for good as may be the prospects of both the Le Roi No. 2 and the Rossland Great Western themselves, it can hardly be argued that the capital value of the properties taken over have actually intrinsically increased by respectively 50 per cent. and 20 per cent. in a few weeks. We are, however, so accustomed to these manipulations in connection with the flotation of Whitaker Wright companies that such developments as these are the rule rather than the exception in connection with their projects.

B. A. C. have improved in sympathy with Le Rois, etc. Hall Mines, after hanging about at 6d., have hardened to about 1-16th, and Ymir have also been rather better. London & B. C. Goldfields remain steady, but New Goldfields of B. C. have not been favourably influenced by the reconstitution of the Velvet Company. It may be of interest to your readers to know that the derelict Lillooet & Fraser River grant have removed their offices to College Hill Chambers, College Hill, London, E. C. B. C. Development Association, which are said to be contemplating an increase of capital, remain steady. The Hastings British Columbia Exploration Company have issued a report dealing with their operations which will be presented to the shareholders to-morrow. This company is little known, and there is practically no market for its shares. In connection with the Athabasca company the secretary announces that the reconstruction has been carried out successfully. Here,

also, however, dealings are very limited in extent, although the company has been regarded rather favourably.

Meanwhile with a strong government in power, a determination to assist the industry in every possible way, and better markets at home, there is no reason why there should not be a material increase in public interest displayed by the British public towards B. C. as a mineral producer. At the moment the mining market in London is generally dull and apathetic, and although there has been a flutter in the West Australian section the Chinese crisis and the continuance of the campaign in South Africa have kept interest in mining securities in subjection, and it is very doubtful even whether despite the strength of those behind the West Australian market the present advance in these shares will be maintained.

THE MONTH'S MINING

KAMLOOPS.

(From Our Own Correspondent.)

SCHMES for dredging on the North Thompson River continue to attract more than ordinary attention. The Jamieson Creek property has been sold and Mr. Taylor, of Vancouver, engineer for the company which has acquired the property, is making arrangements for the commencement of dredging operations. The bed of the North Thompson is now

DREDGING ON THE THOMPSON.	Kamloops to the junction of the Thompson and Clearwater Rivers, a distance of nearly ninety miles.
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staked from a few miles above several engineers have been examining different leases during the last few weeks on behalf of syndicates having options on these properties. As the Jamieson Creek property is probably the best on the river a season's dredging here should clearly demonstrate the possibilities of the business and the chances for the rest. Operations proceed steadily on the several active properties on Coal Hill. At the Python a large body of magnetite carrying a low percentage of copper is being explored. At the Truth the cross-cut at the 75-foot level is in 81 feet all in ore, carrying from 2 to 6 per cent. copper with several dollars in gold and silver values; in this cross-cut several lenses of solid chalcopyrite have been cut through. One of these is now being drifted on and some remarkably fine ore is being brought out. Work is being done on the Rose group south-east of Jacko Lake. This is a gold quartz proposition with a paystreak of several inches carrying much free gold. Assays run as high as \$200 per ton in gold and silver. A fine body of copper ore is being shown on the Laura group, owned by Messrs. Dillon and Herod, and a good amount of high-grade chalcopyrite is being taken out. The B. C. Exploration Syndicate are pushing work on the Lucky Strike and Josie properties. The faulted vein of the former has not yet been caught up, but the Josie, a property which the syndicate bonded a few months ago, is locking remarkably well and is improving with depth. A large low-grade ore body has been cross-cut on the Delaney group, and this property is bonded to the same syndicate which recently purchased the Kimberly group. The tunnel on the latter property is being pushed on with a force of six men and some considerable bands of low-grade ore have been cut through. The owners expect to meet a body of high-

grade ore, shown near the surface, within the next thirty feet.

REVELSTOKE.

(From Our Own Correspondent.)

It is with very great pleasure that we are able to state truly that the Big Bend district (contiguous to and reached from Revelstoke) is again becoming productive. Years ago, much surface work was done and very good values extracted, but it was merely surface work, and when, as is natural, DEEP PLACER the gold gave out, the workings MINING were abandoned. Some people, IN BIG BEND. however, had faith that with deeper work much more could be found, and in that belief work has been carried on steadily at Smith Creek (opposite Goldstream) for years, with the most gratifying results that one of the chief partners in the concern came down a few days since to Revelstoke with a very handsome bag of "dust" from his claim. The shaft is now 115 feet deep, and has not yet reached the middle of the old channel, but the values have steadily improved till now the yield is fully \$20 per cubic yard. This naturally has stimulated others in the neighbourhood, and in the district generally, so that a good deal of work is expected to be done this season; and it is considered by a well known mining man, Mr. E. A. Bradley, that the gold produce of the Big Bend with more systematic and deeper work will very much astonish those who believe the district dead and worked out. If we add to this that there have been wonderful returns from the Cariboo lately, it really seems almost unnecessary to try the somewhat inhospitable regions of Klondike and Nome in search of the precious metal.

Want of efficient transportation facilities has always kept back the Big Bend, but we are almost sure now of a waggon road which will be begun at once, and will give access to the various properties all the year round. So much for the mining territory north of Revelstoke. Looking now to the south—or rather southeast—we find all the Lardeau district

THE
LARDEAU
DISTRICT.

a hive of industry, and the claims on which work is being done may represent the swarm. In the Fish River division, an enormous amount of development will be done on the innumerable properties, and if one-tenth of them turn out as well as their surface indications lead one to expect, it will be a very rich division. The Silver Cup is still doing well and taking out good ore ready for rawhiding when snow comes again (this, as your readers will remember, is near Ferguson, Trout Lake district) and the Nettie L., near by, where they have recently struck an unexpected large and rich body of ore during development, is obliged to do the same thing. Ore can be extracted, sorted and sacked, but it cannot be transported to the smelter except in winter. Possibly the C. P. R. may see their way to complete the promised railway to Trout Lake; if so, it would vastly decrease the difficulty, or in other words, the expense, of shipping, but that corporation has a habit of pleasing itself without much regard for the convenience of others, so the branch may not be built yet. To enumerate the properties in the Trout Lake division would be an endless task. Let it then suffice to say that all known metals can be found there except, perhaps, nickel, though that also is reported to exist, and it was remarked lately by a pioneer in the district that if he lost all his claims

to-morrow, he could go out and stake as many more in the following week that would be just as good. Most sincerely is it to be hoped that the good properties undoubtedly there will be so intelligently managed that those who have stood by the country "for better or worse, in sickness and in health," so long, will reap the pecuniary reward they so well deserve.

BOUNDARY CREEK.

(From Our Own Correspondent.)

The B. C.—At the B. C. ore is being regularly shipped to Trail. For a few days early in July a temporary stoppage in shipping took place, but since then an average shipment of about 70 tons per day has been maintained. Now that the larger air compressor and hoist are in use the mine is in shape to increase its daily output, which it will probably do after the patent safety cage just received from the East shall have been installed. By August 1 there should be no difficulty in turning out 100 tons per day. The work now being done in the mine is drifting south in expectation of meeting at a lower depth the ore shoot that occurs in the level above, and raising the third level to the second level. This raise is in good ore. No regular stoping is in progress at present, but ore is being taken out in cutting out sill floors for the timbers now being put in preparatory to stoping. Sinking will shortly be resumed on the third level, which is 272 feet from the surface. A trestle, the highest bent of which is 41 feet from the ground, has been constructed from the shaft house to the ore bins, now nearly completed, and a double line of tram rails has been laid. The size of the structure containing ore bins and sorting floor is 28x65 and 64 feet high to the ridge cap. The sorting floor occupies nearly all of the upper part of the building. Under this are the ore bins 65x20 and 16 feet in depth, with a holding capacity of about 450 tons. There are four chutes at the rear for waste rock from the sorting floor, and five ore chutes in front from the bins to the railway cars. This building has been substantially constructed, having 12x12 timbers in frames and supports and 3x12 planking. The bins are double-lined, first with 3x12 and then with 2x12 laid across. The walls are double boarded, with building paper between and the roof is of corrugated iron. Provision has also been made for plenty of light and warmth for winter. Superintendent S. F. Parrish, C. E., who has charge of the mine, returned on July 20 from Montreal, P.Q., whence he had been to confer with the owners respecting future operations.

The Mountain View, adjoining the B. C. on the northwest, and the R. Bell are two more Summit Camp properties now at work, the former employing five men and the latter seven. A cross-cut is being run at the 50-foot level in the Mountain View to prospect an ore body which crops out and which where opened on the surface is freely mineralized with iron and a little copper. It is considered probable by the owners that this will prove an extension of the contact in which ore occurs on the B. C. The R. Bell is understood to be under option to the Miner-Graves people. A small boiler and steam hoisting engine are now in use here and cross-cutting from the vertical shaft at the 100-foot level is now in progress. A tunnel started higher up the hillside and run towards the old prospect workings has cut a vein of nice looking copper-gold ore of similar character to that opened up in the prospect shaft above. The Oro Denoro,

owned by the King Mining Company, of Rossland, remains closed down, which is to be regretted, for judging by the appearance of the ore dump of a couple of hundred tons or so the showing in the three cross-cut tunnels, the property is a very promising one. It is stated though that the treasury is exhausted, so that operations can not be resumed until after money can be raised for additional plant and further development work.

The Golden Crown operations for July did not include any new development work, but were restricted to stoping at the 100-foot level and sending out ore. The shipments to the Trail smelter for May and June aggregated 27 cars. It was intended to ship 35 to 40 cars during July, and up to the 19th of the month 22 cars had been got away. The Win-

GOLDEN CROWN WINNIPEG. nipeg was shipping ore from the three-foot vein cut by the railway grade and from stopes above the 50-foot level and it was expected

that the month's shipment would total about 350 tons. The development work in hand was cross-cutting at the 100-foot level. A small vein of ore has been passed through by this cross-cut, but at the time of writing the main ore body cut above at the 50-foot level had not been encountered. It was considered probable, though, that this would shortly be met with. A railway spur has been put in to the mine, so that the shipment of ore has been facilitated. A few men are at work at the Athelstan, also in Wellington Camp, and two carloads of ore were sent out, but there is no new development of any importance to note. The Hartford is idle just now, an accident having disabled the horse when used for hoisting. Some nice ore has been uncovered on a claim lying between the Hartford and Golden Crown, but as it is near the surface it is too early yet to attach much importance to the find.

The Old Ironsides commenced shipping ore to the Granby smelter at Grand Forks during July. At the time of writing shipments are restricted to five carloads (about 125 tons) per day, notwithstanding that the ore bins at this mine and the neighbouring Knob Hill were filled with ore to a stated total of about 8,000 tons and that the stopes in the mines are blocked up with ore broken down but not yet taken out. The reasons assigned by the mine superintendent for not yet sending away more ore are that first the railway track is not quite completed between the mines and smelter and so is not yet in shape for heavy

THE OLD IRONSIDES AND KNOB HILL loads to be hauled over it, and next the smelter is not ready to receive ore from these mines in larger quantities than is now being shipped. When these obstacles shall have been overcome it is expected

that the daily shipments will be increased to between 300 and 400 tons. This will include ore from the Old Ironsides, Knob Hill and the Granby Company's mine, all three properties adjoining and being operated under the one management. A reduction in the number of men working in these mines had to be made a short time ago, but now that ore-shipping has commenced about half the full force are at work again stoping on a small scale at the 200 and 300 foot levels of the mines and in getting out the ore previously stoped. The 10-drill air compressor, boilers and other new plant for the Knob Hill, the ordering of which was mentioned in last month's RECORD, have been shipped by the Eastern manufacturers and are expected to shortly reach the mine.

About the middle of July another visit to the Snowshoe was paid by Mr. Anthony J. McMillan, managing director of the British Columbia (Rossland and Slocan) Syndicate, and by Mr. J. W. Astley, C.E., also of Rossland, who is the syndicate's consulting engineer. Development work is being continued on the Snowshoe with a force of 30 to 35 men. The

THE SNOWSHOE. main tunnel is now in a distance of about 250 feet and it is being further extended. This tunnel passed through a big deposit of ore, the value of which in bulk has yet to be ascertained. The ore taken from this working and now lying on the dump near the mouth of the tunnel looks well and will probably return values in gold and copper that will leave a fair margin of profit above cost of mining, freight and treatment. No work is being done just now in the cross-cut from the shaft at the 200-foot level, the water being troublesome at that depth. More power will be available for pumping after receipt of the 70-horsepower boiler daily expected to reach the mine, and thereafter this lower level will again receive attention. Meanwhile an upraise is being made, in good ore, from the 100-foot level to the usrface. A carload of ore is to be sent from the mine to the Trail smelter for test purposes and experiments are to be made at several ore-reduction works in the United States with the object of determining the most suitable method for treating the general output of this mine. The chairman of the syndicate, Mr. G. S. Waterlow, is expected to shortly arrive from England on a visit to the mine.

Other mining properties in Greenwood Camp that should be mentioned are the Brooklyn and Stemwinder, owned by the Dominion Copper Co., of Toronto, Ont.; the Gold Drop and the War Eagle. It was expected that the Brooklyn and Stemwinder would have resumed work ere this, but now it appears likely that they will remain idle for some time longer. The Gold Drop was closed down after last month's correspondence had been sent forward. There are big showings of ore here and nearly 2,000 feet of development work have been done in the mine. The ore on the dumps has a promising appearance for good copper values, but nothing definite is known to the writer as to the actual smelter values of the carload sent out for a bulk test shortly before work was suspended. The War Eagle, situated southeast of and near the Old Ironsides and Knob Hill, and which is owned by an Eastern Townships, Quebec, company, is reported to be steadily doing development work at the 100-foot level and to have cut some nice ore in one of the cross-cuts at that depth, but as it has not lately been visited by the writer further reference to it will be deferred until after information respecting it shall have been obtained first-hand.

THE CITY OF PARIS. The City of Paris is the only mine in Central Camp now doing work of any importance. On its neighbour, the Lexington, owned by the Majestic Company, (one of the Miner-Graves organizations), some surface prospecting is being done to expose a fourth lead found on the claim, but the cross-cut tunnel is just now too wet for work to be continued in it to advantage. The anticipated increase in shipments of City of Paris ore from 25 to 40 tons per diem has not yet been made, the stopes from which the ore is being mined not being accessible enough to admit of the larger quantity be-

ing conveniently handled. Two raises, 500 feet apart, are being put up from the main level to the level of the ore stopes 100 feet above. One is in ore, but not the other. The latter is for the purpose of intersecting the ore body occurring above. Whilst this development work is in progress the ore output is smaller rather than greater, but after its completion more ore will be mined. Meanwhile shipments from the mine to the Granby smelter are being continued temporarily on a reduced scale, until the raises just mentioned provide the requisite better outlet for the ore from the stopes.

There is not much that is new to chronicle this month regarding the Mother Lode mine, in Deadwood Camp. Difficulty has been experienced in obtaining coal, the supply from the Crow's Nest Pass mines having lately been so intermittent that three times work has had to be suspended at the 200 and 300-foot levels, pending the receipt at the mine of more coal. Cord-

THE
MOTHER LODE.

wood could not easily be obtained at this mine on short notice, so there was no alternative to stopping work below ground. The drainage tunnel from the 200-foot level to the neighbouring gulch down which a creek flows has been completed as, too, has the 10-foot deep excavation to get a firm bottom for the foundation for the large new air compressor ordered several months since. Notwithstanding the unavoidable stoppages above alluded to, the total number of feet of work that will have been done during the month in the cross-cuts at the 200 and 300-foot levels will be approximately 300. Such good progress is being made with the construction of the nine ore bins that these will be completed before this letter appears in print. The site for the ore sorting plant, between the ore bins and the shaft, is being prepared and a trestle will shortly be erected for a tramway from the shaft to the ore bins, for the direct transference of such ore as will not require sorting. A new two-story building is to be erected at once, the ground floor of which will be used as a men's dining room, private dining room, kitchen, pantry and store-room and the upper floor partly for bedrooms and partly for a 26 foot 6 inch by 26 foot hall. The men's dining room will be 42 feet 6 inches by 50 feet and there will be ample room at the tables for 200 men. Bedroom accommodation for 50 additional men will also soon be provided.

Five or six men are employed at a station for a steam hoist on the 175-foot level, which has a lower outlet by means of tunnel run into the hill from near the creek level. An incline shaft is to be sunk from this level in the ore, which is stated to be 14 feet in width. A cross-cut tunnel is being driven on the Great Hopes, on which a little ore giving good values in gold occurs near the surface.

OTHER
DEADWOOD
PROPERTIES

The vertical shaft being sunk on the Greyhound, which has a promising showing of copper ore, should be down to the 100-foot level by the end of July. Cross-cutting at the 200-foot level of the Buckhorn, owned by an Eastern Townships company, is being continued. The cross-cut to the south lately ran through a bunch of nice chalcopyrite ore, but there was not a great deal of it. Indications are considered encouraging, however, that a permanent ore body will yet be found. A local newspaper reports that lately "the Crown

Silver shaft ran into ore at 88 feet and continued in ore to the bottom of the shaft, 95 feet," but this report has yet to receive confirmation from a reliable source. The Crown Silver is one of a group of claims owned by the Montreal Boundary Creek Mining Company. This company is understood to be also doing some work at what is known as the 200-foot level of the Sunset, but no information has lately been received by the writer respecting this property.

There is practically no actual mining work being done in the remaining Boundary Creek mining camps. The intimations received last month of a probable early resumption of work on the Republic and Golconda groups respectively, in Smith's Camp,

NOTES OF
OTHER CAMPS

is there any news of renewed activity at the Jewel, in Long Lake camp, much as it is desired to see work resumed in that very promising gold-quartz mine. The news from the West Fork of Kettle River includes a report of progress on the Carmi, above Beaverton, and on the Sallie near that town, but the neighbouring Washington and Idaho have suspended work, presumably for lack of funds. Local newspapers give occasional prominence to reported new strikes, but investigation does not as a rule prove them of much importance from other than a prospect point of view.

The directors of the Granby Company, owning the smelter at Grand Forks, are at present in the district and the president, Mr. S. H. C. Miner, has announced his intention to remain until after that smelter shall have been blown in. As he expects to leave on his return East by August 20th it

SMELTERS

would appear that the smelter is intended to be in operation before that date. Perhaps it will be—if so, all the better for this district, the mining industry in which needs very much the impetus that should follow the demonstration by profits from actual production that it will pay to mine ore in it. The British Columbia Copper Company's smelter at Greenwood is not likely to be running continuously until October or November next, and readers of the RECORD may accept the assurance that statements to the contrary, no matter how positive nor how often reiterated, are not warranted by the facts of the situation. The conditions at the Mother Lode mine—that is in respect of making the indispensable provision for a sufficiently large and continuous output of ore—are such that even should the smelter plant be all received and in position earlier, the mine will certainly not be ready to maintain an adequate supply of ore until after the larger plant and machinery—ordered but not yet shipped by the manufacturers—shall have been received and installed at the mine. And as to the announcement that a pyritic smelter will shortly be established in the district, well notwithstanding the definite statements of those "in the know," the writer, remembering the unforeseen delays that have been the almost universal experience in the district in connection with the several enterprises already established, takes the liberty of doubting that the promised pyritic smelter will be in regular operation before the snow flies.

The surfacing gang is at last ballasting the previously uncompleted portion of the Columbia and Western Railway to its present terminus at Midway, but no announcement has yet been made officially as

to when the passenger trains will regularly run beyond Greenwood. The several branches or spur lines to mining camps are now practically completed, so that it may be assumed that for the

RAILWAYS.

time the end of railway construction work in the district will soon be reached. The spur lines constructed are as follows: From the main line near Grand Forks to the Granby smelter; from the main line at Eholt to Hartford Junction, whence one spur runs northwest to Phoenix, where there are sub-spurs to the Old Ironsides, Knob Hill and Stenwinder mines, and another about east branching to the Golden Crown and Winnipeg respectively. About three miles from Eholt a spur leaves the Hartford Junction branch and connects with the B. C. mine. From Greenwood a spur runs to Deadwood Camp, passing the Sunset and ending at the Mother Lode mine. These several spurs admit of ore cars being run under the ore bins of the B. C., Old Ironsides, Victoria, Knob Hill and Mother Lode mines, and too, pass close to the ore dumps of the Oro Denoro, Gold Drop, Snowshoe, Brooklyn, Stenwinder and Sunset mines. It is, therefore, quite evident that the C. P. R. Company has well done its part towards providing most of the better developed mines of the district with adequate transportation facilities.

The following are the records of the Kettle River mining division for the six months ended June 30th, 1900. The figures include the records of the sub-recording offices of the division located at Rock Creek, Westbridge and Vernon respectively. It should be explained that although there is at Vernon a sub-recording office for the convenience of prospectors making locations in the vicinity of the head waters of the Kettle River, that town is not situate in the Kettle River division, but the office there is the chief office of its own mining division. The books of the Mining Recorder at Greenwood show the following as the six months' records:—

MINING RECORD STATISTICS.

Free miners' certificates	1,175
Free miners' certificates, special	8
Location records, mineral	435
Location records, placer	15
Certificates of work	725
Certificates of improvements	39
Conveyances and agreements	266
Abandonments	15
Water grants	2

The mining receipts at Greenwood and sub-offices for the six months were \$10,087.70, as under:—

1900.	Free Miners' Certificates.	Other Mining Receipts.
January	\$ 113 50	\$365 40
February	121 00	389 15
February	121 00	389 25
April	721 50	743 40
May	4,068 50	849 25
June	822 92	875 95
	<u>\$6,341 67</u>	<u>\$3,745 40</u>

Besides the above there were miscellaneous receipts not connected with mining to the amount of \$3,059.50, so that the total of the provincial revenue received at Greenwood during the six months was \$13,146.57.

PERCY VERENS.

ROSSLAND.

(From Our Own Correspondent.)

What may be considered the expectant stage of this industrial community continues, and it is even increasing in intensity, for as communities are promised much, much is correspondingly expected. The local statistician has again appeared and his figures distance anything probable or possible. The folly of exaggeration has often been pointed out, but it is still fashionable.

Confidence in Rossland's future has been assailed but not shaken. On all sides are evidences of progress. It is perfectly true that the local stock market is very quiet, but there is no lack of confidence in the future. The management of the great producers and syndicates do not—and no doubt very properly—take the press into confidence. Meanwhile the question of output here is always an interesting one and the interest, like the output, is ever on the increase, though it will take at least 5,000 tons of a weekly output to the end of the year to come up to last year's tonnage, the official figures placing this at 172,665 tons. The output so far (April 20) amounts to 80,000 tons, of which the Le Roi contributed about 60,000, the War Eagle 10,600, the Centre Star 7,000, the Iron Mask 1,500

THE MINE OUTPUT TO DATE.

tonns and the remainder by occasional shippers. The Evening Star is making small shipments. This, with the Le Roi, are at present the only shippers. The management of the latter is putting out the ore at a lively rate. Cars of ore go out on the Red Mountain train to Northport at all hours—whenever a train is made up—so that ore laden cars are becoming a familiar sight at all times. As to the value of the ore, it may be said that it runs all the way from \$13.50 to \$20.00 per ton. If the average be placed at \$15.00 per ton this would give a total value of \$1,200,000. I am not prepared to defend these figures. This will have to be left until the time of official report. One fact, however, is very evident. There is a decided promise of an increased output, and it is said that there is a deficiency in the lack of car service, which is not unlikely. In view of the possibility of a greater output, it is, I believe, in contemplation to increase the capacity of the Trail smelter as well as that at Northport to 1,200 and 1,500 tons respectively. The present output of the Le Roi mine is, at least, 600 tons per day if not 650 tons. This output is doubtless equal to the present output facilities of the Le Roi mine, but these are being increased, and when the capacity to put out more ore is improved by this mine, and added to by other mines such as the War Eagle, Centre Star, Nickel Plate and Josie, the output will at least be 1,200 tons daily, though it may reach 1,500 tons daily for a time at least. Thus a steady increase in the output of Rossland mines may be looked for in the near future, but it may be September before this increased output will begin.

The RECORD has been furnished with some information under the heading of "Recent Surface Improvements on Red Mountain," and it will not be necessary to reiterate this information. The chief work done here is, of course, on Red Mountain. Little or nothing is being done on what is locally known as the south belt. The area of activity is chiefly confined to Red Mountain, the underground workings of which have now assumed formidable dimensions.

A large quantity of ore was accumulated on the ground of the Centre Star, the bunkers of which are filled. In the Le Roi I am credibly informed the showing in many directions is very encouraging, and although little is said about the War Eagle, it is well known in well-informed circles that there is a large ore reserve which will be shipped sooner or later.

Civic improvements go on apace with this progress, and often it anticipates it, for the typical Rosslander that takes an interest in the progress of this mountain city does not permit every little breath to frighten him as to the future. Building improvements are noticeable on all sides, and some very cosy homes are among the ties that bind the Rosslander to his familiar mountains.

A growing interest is being taken by Rossland people in the district of East Kootenay. A recent venture by a number of Rossland men, amongst whom may be mentioned Messrs. C. S. Wallis, J. A. Kirk, F. W. Hinsdale, L. H. Moffat and others, is the Kootenay Land and Exploration Company (Limited). This company has a capital of \$50,000. It has been formed for the purpose of acquiring the assets and privileges of the Kootenay Land Exploration Syndicate in the Windermere district of East Kootenay. According to Mr. Hinsdale, among the assets are the townsite of Peterborough comprising 160 acres, a saw mill valued at \$6,000, etc. The population of Peterborough is about 250 and is increasing. The town is surrounded by very promising mineral prospects and some partially developed mines. The Delphine group recently made a shipment of 200 tons of ore, which went as high as \$127 per ton, to the Trail smelter. The company is well managed and has still half its capital in the treasury after spending a large amount—at least \$30,000—in improvements. Peterborough is named after Peterborough, Ontario, and its promoters are men of stability and enterprise.

YMIK.

(From Our Own Correspondent.)

I regret to state that mining in this section is at present somewhat quiet. It is difficult to find a reason, but we are living in hopes that the cause (whatever it is) will soon be removed and that steady work will soon be started. I am pleased to state that the Ymir Gold Mines, Limited, are now operating with a full battery of 80 stamps, and the result should greatly assist this camp on the London market. Mr. Wm. Dodd, representing a Winnipeg syndicate, has a force of men at work on the Snowslide claim, situated on Wild Horse Creek, and a very fine lead carrying good values, has been opened up. The Broken Hill Mining and Development Company, to which I referred last month in the RECORD, have decided to install a mill on their property, and that will give the camp yet another producer. I understand that the deal of the Dundee Gold Mining Company has gone through involving an investment of about \$250,000 in developing the property and placing it in a productive position. It is also stated that the Tamarac, operated by the Kenneth Mining and Development Company, will soon commence operations. Mr. Vernon, who is operating for an Owen Sound syndicate, has a number of men at work on the Big Four group and he has uncovered a fine grade of copper ore which will give big results in silver, some assays that I have seen showing values of over \$500.

SLOCAN.

(From Our Own Correspondent.)

The general situation here remains practically as it was, a very material increase in the output of some of the more prominent mines, however, furnishing cause for congratulation. The Payne, Slocan Star, Last Chance, Queen Bess, Whitewater and Ruth have all been doing well in this direction, while the Bosun created a record for itself by shipping seven cars during the month of June. Just at present the mines of East Kootenay are overshadowing all others by their doings and if they are able to maintain shipments continuously at their present rates the Slocan may find itself hard run for supremacy. They will comprehend better in a few months, however, the difficulties in the way of uniform production, added to which, of course, the difference between tonnage and value will doubtless be forcibly brought home when they come to examine the smelter returns closely. That great mines really exist in that region there can be no question, the class of ore being sent to the St. Eugene concentrator comparing very favourably with any in the Slocan undergoing similar treatment, although the mill at the Whitewater is evidently receiving excellent feed or it could not possibly turn out a carload of concentrates daily as it is doing.

Work of a substantial nature is going on all around Sandon and consequently we are in no way surprised to see that town commencing to rebuild in earnest. About \$80,000 is expected to be divided amongst the shareholders of the Payne at their forthcoming meeting, but with this exception, the majority of managers are so engrossed in planning and carrying out further developments that dividends are forgotten for the nonce. Both the Ivanhoe and Slocan Star are engaged in driving long tunnels, the latter projecting one which is to be over 2,000 feet in length when completed. It is in work of this nature that the advantages of machine drills over hand labour can best be demonstrated and needless to say both companies are adopting this means of quick driving. A departure from ordinary usage will be followed in the case of the Star, the intention being to make the tunnel large enough to admit of horses being employed for purposes of haulage, a procedure, of common occurrence in coal mines but comparatively rare in metalliferous workings albeit sometimes in use in the Silver King mine near Nelson. What is needed more than anything else in the Slocan at the present stage is economy of working and the substitution of mechanical processes for the wasteful methods now in vogue, but it is obvious that there are many difficulties in the way or they would have been adopted long since. While the ore is high grade, the tonnage is barely sufficient to warrant the introduction of machinery and methods without which successful mining would be an utter impossibility in less favoured regions, but the time may arrive, and that sooner than many people imagine, when some such course will become inevitable if profitable returns are to continue; in other words, the question of tonnage will become relatively as important as that of values if the maximum of economy is to be obtained.

There is no great stir in the lake district, the customary excitement over new finds at this season of

the year being confined to one of considerable promise near the Mountain Chief. What gives every indication of developing into something remunerative has been unearthed by the simple process of ground sluicing, and I may as well remark now that this system is destined to become an increasing factor in the discovery and location of veins. Hitherto it has been considered quite the proper thing to locate your claim first and then look for the vein afterwards, and where as in the instance above cited its existence is merely a matter of conjecture the proof of which involves considerable labour on the part of the locators, one can hardly blame them, perhaps, for pursuing the course they do.

The cry of waggon roads and public improvements is still being dinned in our ears, and while deprecating on principle the reckless expenditure of government funds nobody will deny that there is urgent and adequate need for the construction of a waggon road up Silver Mountain, the many promising properties in that section being quite willing to provide a quota of the funds necessary. The final payments on the Hartney and Marion bonds will fall due in a couple of weeks, the continued operation of both properties meaning much to residents of New Denver.

The Kettle River excitement seems almost to have died a natural death as so many before it have done, but this is attributable in part at least to the prevailing dullness in mining elsewhere and the check which has been put to speculative investments of all kinds. Those interested must wait patiently and see what another season will bring forth.

PRODUCING MINES.

NELSON.

A MONG the exports from the port of Nelson for the month of June, were the following mine products:

	Tons.	Value.
Ore	2,187	\$105,233
Gold bullion		36,559

We are indebted to Mr. Nelson Fell, manager of the Athabasca Gold Mine, Limited, for the returns of the mill run for June. The run stands as a record for a ten-stamp mill in Canada:—

Period of run	29 days 9 hours
Number of tons milled	475
Value of bullion recovered	\$21,675 00
Value of concentrates recovered	5,919 75

Total values recovered	\$27,594 75
Value of bullion per ton of ore crushed . .	\$45 63
Value of concentrates per ton of ore crushed	12 44
Total recovered per ton of ore crushed . .	58 09
Percentage of weight of concentrates to ore crushed	10.8%
Percentage of recovery in mill	80.6%

MOYIE, EAST KOOTENAY.

At the St. Eugene mine for June 9,000 tons of high-grade galena ore was crushed, producing 1,937 tons of concentrates, the value of which is estimated at nearly a quarter million dollars. The North Star and Sullivan also shipped 130 carloads of iron ore.

ROSSLAND.

Our Rossland correspondent telegraphs: "Ore shipments from Rossland mines to smelters for the

seven months ending July 31st approximate 90,000 tons gross. Le Roi management has commenced the shipment of ore from the old dump to the Trail smelter.

SLOCAN.

The Kaslo *Kootenian* publishes the following interesting figures showing the total shipments of ore from this district for the year to date as compared with the returns for the like period last year. The result is eminently satisfactory so far as this year's output is concerned:—

The total shipments for the year to date are as follows:

Month.	Pounds.
January	1,498,000
February	794,000
March	1,717,000
April	1,550,000
May	3,036,000
June	4,573,000
July 1 to 9	610,000

For the first five months of last year the total shipments reached 18,845,900 pounds as shown below:—

Month.	Pounds.
January	2,646,700
February	3,268,000
March	3,819,000
April	4,933,000
May	2,514,000
June	1,665,200

Total 18,845,900

The shipments from Sandon for June were as follows:—

	Tons.
Payne	550
Slocan Star	480
Last Chance	260
Ruth	152
American Boy	20
Augusta	20

CARIBOO.

As the result of 62 days' operations the Consolidated Cariboo Hydraulic Mining Co. produced a gold brick valued at \$135,000.

COAL EXPORTATIONS.

DURING the month of June the following tonnage of coal was shipped from the Vancouver Island collieries:—

	Tons.
New Vancouver Coal Co.	39,985
Ladysmith (Extension and Wellington)	36,440
Union	21,107

For the three weeks ending the 20th July, the consignments from the New Vancouver Coal Co. were:

Date.	Vessel.	Destination.	Tons.
3—	SS. Titania,	San Francisco	5,784
6—	SS. Mineola,	Port Los Angeles	3,452
7—	SS. Vigilant,	Port Townsend	15
14—	SS. R. Adamson,	San Diego	4,621
14—	SS. Aztec,	San Francisco	5,496
17—	Washtenaw,	San Francisco	4,231
19—	SS. Titania,	San Francisco	5,828

Total 20,427

THE METAL MARKET—JULY.

Compiled from special telegraphic quotations to the B. C. MINING RECORD from the *Engineering & Mining Journal*, New York.]

SILVER, at from $61\frac{1}{4}$ to $61\frac{5}{8}$, has been very steady. The complications in China and other factors also point to a possible further advance of this metal.

COPPER.

While at the beginning of the month the American market was somewhat inactive, a notable improvement has since taken place which has resulted in advancing prices. Our latest quotations are Lake copper, $16\frac{1}{8}$ @ $16\frac{1}{4}$ c.; in cathodes, $15\frac{3}{4}$ @ $15\frac{5}{8}$ c.; casting copper, $15\frac{1}{8}$ c.

LEAD.

The extraordinary and unexplainable fluctuations of last month and the beginning of this, have given place to a general dullness, prices having declined very considerably. The quotations for the last two weeks have remained practically unchanged at 2.95 @4c. New York, and 3.90@3.95 St. Louis.

SPELTER.

A slight improvement is noticeable in spelter, New York quoting 4.30@4.35 and St. Louis 4.12 $\frac{1}{2}$ @4.17 $\frac{1}{2}$ c.

THE LOCAL STOCK MARKET.

A MOST marked improvement has taken place in the place in the tone of the local markets during the past month, and while the general depreciation of prices has as yet been little affected, the outlook from a speculative point of view is decidedly more encouraging. The opportunity afforded at the present time for really safe and profitable investment is undoubtedly good, and once confidence which from several causes with which the investing public is sufficiently familiar, has been so rudely shaken is again restored by the activity of an increased mineral production from the mining centres, many of the better class stocks, the quotations of which are now ab-

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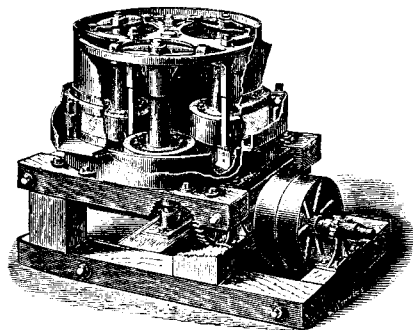
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surdly and unjustifiably low, will effect a rapid recovery. During the past four weeks, Athabasca, Noble Five, Van Anda, Rambler-Cariboo, Tamarac, Fairview and Crows Nest have been in most active demand, in this period Athabasca having advanced from 18 to 30, Noble Five from 2 $\frac{1}{2}$ to 6, Tamarac from 4 to 8, and Fairview from 5 to 6. On the other hand, from quite unexplainable reasons, Winnipeg, Brandon and Golden Crown and other equally good securities have still further declined. We propose commencing next month to publish in more useful form for reference purposes the monthly stock quotations appearing under another column. In the new list only producing and dividend-paying mines will appear, and the highest and lowest price for each week will be given.

MACHINERY CATALOGUES.

WE shall be pleased to mail catalogues of any of the undermentioned firms to our readers free of charge, on application:

Ainsworth & Sons, Wm., fine balances; Armstrong & Morrison, riveted steel pipe ore cars, etc.; B. C. Assay & Chemical Supply Co., assayers' supplies; Braun & Co., T., assayers' supplies; Beatty & Sons, M., cables and tramways, dredges, pumps, etc.; Bennett & Co., Wm., fuse safety couplers, etc.; California Wire Works, cables and tramways; Canadian Rand Drill Co., drills and compressors; Canadian General Electric Co., electrical plants; Cooper Mfg. Co., The James, compressors, power and hand drills; Denver Fire Clay Co., assayers' furnaces, etc.; Fraser & Chalmers, mills, pumps, hoists, engines, etc.; Fairbanks, Morse & Co., steam and gas engines, compressors, etc.; Gates Iron Works, engines, boilers, crushers, etc.; Hamilton Mfg. Co., The Wm., crushers, mills, hoists, etc.; Hendy Iron Works, Joshua, modern mining machinery; Hinton & Co., Geo. C., electrical supplies and machinery; Hearn & Harrison, engineering, mining and surveying instruments; Hamilton Powder Co., explosives; Howells Mining Drill Co., drills, all kinds; Jeffrey Mfg. Co., elevating machinery; Jenckes Machine Co., hoisting and milling machinery; Krupp, Fried. Grusonwerk, mills, engines, pumps, etc.; Lexow, Theo., carbons; Link Belt Machinery Co., conveyors, elevators, etc.; McLennan, McFeeley & Co., belting, etc.; Mitchell, Lewis & Staver, compressors, drills, hoists, etc.; Perrin & Co., Wm., filter presses; Royal Electric Co., electric power, all kinds; Robertson & Co., James, wrought iron pipe, paints, etc.; Stur-

tevant Mill Co., ore breakers and mills; Stilwell—Bierce & Smith-Vaile Co., water wheels; Taylor & Co., John, assayers' supplies; Trenton Iron Co., cables and tramways; Taylor Air Compressor Co., drills, compressors, etc.; Union Gas Engine Co., gas engines, hoists, etc.; Whitstock, P. & R., mining engineering and surveying instruments; Wilfley Ore Concentrator Co., Ltd., concentrators.

E. JACOBS,
Accountant, Auditor, Etc.
GREENWOOD, B.C.

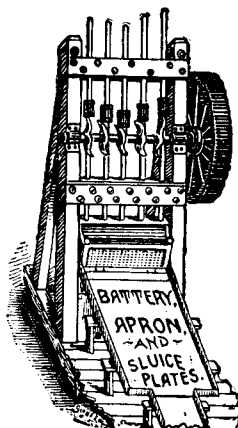
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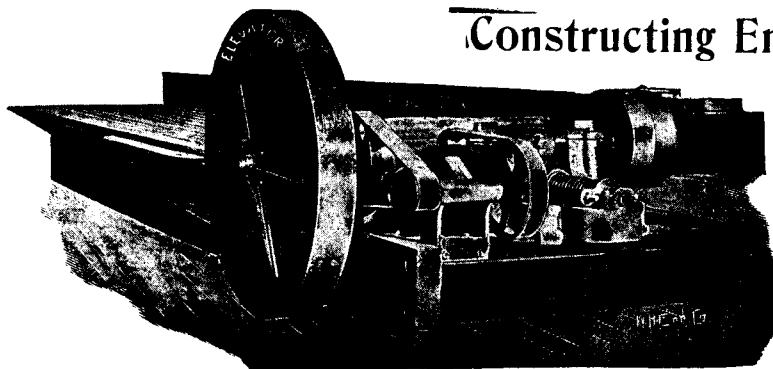
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