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## BRITISH COLUMBIA MINING RECORD

Devoted to the Mining Interests of the Pacific Northwest.

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## THE MONTH.

If the report be true that the Dominion Government proposes to shortly create a Department of Mines at Ottawa, and appoint in connection therewith an expert mineralogical and metallurgical staff, the Canadian Mining Institute, which was first to urge the matter on the authorities, should receive the warm thanks of the mining communities upon this satisfactory result of its efforts, while the Provincial Mining Association, which also made a suggestion on similar lines, making it the subject of a special resolution, will have also cause for further congratulation. Heretofore it has been urged that there was little object in the establishment of a Federal Mining Department, as, the Yukon excepted, the Dominion could exercise no special jurisdiction in dealing with mining in the respective provinces. But this excuse is surely a very lame one, for if it applied there would equally be no justification for many of the other departments, such for instance, as that devoted to agriculture. By the establishment of a Dominion Department of Mines, British Columbia, as the most important of the mineral producing areas of Canada, would of course be the first to benefit largely.

As bearing upon the necessity for the establishment of a Federal Department of Mines the following statements and arguments of officers of the American Mining Congress, which through its predecessor, the International Mining Congress, originated the main movement in the United States for the establishment in that country of a National Department of Mines and Mining, are reproduced from a mining journal published in the United States. The officers mentioned propose, by the creation of such a department:

"To place the executive branch of our Government in close touch with the entire field of mineral production, just as it is now, through the Department of Agriculture, in close touch with the whole field of agricultural production.

"To utilize our consular service in foreign lands to assist in finding new and better markets for our mineral products, just as it is now utilized in enlarging the world market for the products of our agriculture.

"To establish experimental stations for expert investigation as to the best and cheapest methods of mining and treating the great variety of valuable ores which exist throughout our country, just as government experimental stations have been established for the benefit of agricultural interests.

To assist in removing, as far as possible, mining enterprises from the speculative basis which so often underlies them, by the systematic publication of scientific facts concerning the various mining districts of the United States.

"To assist in disseminating among mining prospectors the latest scientific information with reference to the different classes of mineral deposits and how to recognize them, just as the government, by its bulletins from the Department of Agriculture, disseminates the latest information among farmers.

"To assist in elevating the occupation of mining generally to the dignity of a scientific profession, by affording better educational facilities to those engaged in it, in the same way that the Department of Agriculture has done so much to lift agriculture from the ruts of chance, ignorance and tradition to the plane of an exact science.

"To assist in paving the way for national legislation, which shall give us more satisfactory mining laws, and thereby lessen the waste of time, energy and money which are now dissipated in mining litigation.

"To administer a properly devised system of government in pecton of all mines and the conditions surrounding mineral productions of all kinds, including coal and petroleum, in the interests of those employed therein.

"To collect statistics covering the whole field of mineral production which shall be an exhaustive and therefore as authoritative as those collected by the Department of Agriculture with regard to agricultural production.

"We submit that by the aid of suitable legislation appropriating the proceeds of the sales of the mineral lands of the United States to the uses of the proposed department of mines and mining, such a department can be made self-supporting, and need not be in any sense a burden upon the taxpayer.

"We urge upon your attention the fact that the same reasons which have made the creation of the Department of Agriculture of the greatest utility to the whole country, exist for the creation of a department of mines and mining, and that these reasons must be apparent to every candid mind.

"First—In the magnitude of the industrial field to be covered.

"Second—In its primary importance and necessity to every branch of trade, manufacture and transport, as the supplier of raw material.

"Third—In the amount of capital invested.

"Fourth—In the number of men employed.

"Fifth—In its relations to our foreign commerce.

"Sixth—In its general effect upon a more intelligent and effective direction of all these energies."

The argument that similar good reasons exist for the establishment of a Department of Mining as for a Department of Agriculture, the usefulness of which is beyond all doubt, should commend itself to all interested in the advancement of Canada by the fuller utilization of its great natural resources. As British Columbia's proportion of the total mineral production of Canada is now larger than that of any other province of the Dominion—is in fact nearly as large as the production of all Canada east of the Rocky Mountains, it is evident that the interest of this Province in a movement of this kind is a very considerable one. If a Department of Mines be a necessity for the United States, one is equally needed for Canada, and particularly for British Columbia, the mineral resources of which are enormous. The foregoing arguments are therefore earnestly commended to the attention of all desirous of assisting in the development of the natural resources of the Province, whether directly interested in mining or not.

It is doubtful whether the mining sections of this Province are, on the whole, taking anything like an adequate interest in the collection of minerals and are making other necessary preparations to ensure the mineral resources of British Columbia being well represented at the St. Louis World's Fair next year. It should not be forgotten that the Exhibition Branch of the Department of Agriculture, Ottawa, which will have charge of all exhibits from Canada, is already appointing the space at its disposal, preparing catalogues, and otherwise getting into shape the arrangements for the Canadian exhibit. The purpose of this reference to the St. Louis Exhibition is to impress upon the mining districts of the Province that no time should be lost in getting their mineral collections together and in notifying the Exhibition Department at Ottawa of the nature and extent of the exhibits they intend sending through that department. Professor Joseph A. Holmes, in a paper he recently read before the American Institute of Mining Engineers, submitted for the consideration of members some important facts connected with the proposed mining exhibits at this Exposition. He stated that one of the great purposes of the Mines Department of the Exposition will be to show the nature of the underground expansion that has taken place in the United States, the equipment used in the mining operations of today, and the metallurgical equipment and processes employed in the preparation of mineral products for use by the people at the present time. The larger part of the exhibits in the American section of the Mines Department will therefore be arranged so as to show the condition of the mineral industry as it is to-day, and to illustrate its development during the past century. He gave much detail relative to the five groups—these in turn divided into fifty-three classes—the exhibits in the mining department will be arranged in, and stated, in brief, that "as far as this may be possible of attainment, these exhibits are all planned and will be installed with a view of having them tell the whole story as to our mineral resources; how they are mined and brought to the surface, and how they are transformed by the metallurgist and manufacturer, and thus made ready for use by the people." In mineral and mining exhibits from foreign countries the Mines Department of the Exposition is asking that special prominence shall be given to those branches of the mining industry which are prominent in that particular country, and also those that are largely exported from that country. And in the metallurgical exhibits it asks that each country's exhibit shall show especially the processes and products of those branches of metallurgy which are being largely promoted and developed in that country. Of course any exhibit, in-

cluding the contributions to it from all the leading mining sections of the Province, that British Columbia is likely to make will be small in comparison to those of the big mining states of the Republic, yet this fact need not, nor should it, debar our mining districts from doing their utmost to make a creditable showing. In gold, silver, copper and lead, the annual production of British Columbia is greater than that of all other provinces in the Dominion combined, so it would seem to be the duty of this Province to make a special effort in the direction of making as large and representative an exhibition as it is practicable. In view, too, of the repeatedly published statements that smelting costs are exceptionally low in the Boundary, it would be well if the metallurgical establishments of that district were worthily represented at St. Louis. But whatever is to be done, whether by mines, smelters, branches of the Provincial Mining Association, or private individuals, must be done soon, otherwise the space at present at disposal for Canadian mineral exhibits will likely be apportioned for other purposes.

The Prospectors' Association of Nelson, to which reference was made last month in these columns, has had another meeting at which, according to the published report of the proceedings, "it was decided that representations should be made to the department at an early date by the Association for the appointment of an Inspector of Claims, whose duty it should be to inspect all assessment work done, and in the event of the same not having been carried out according to the affidavit filed when recording the same, to report the fact to the department." The report further stated that it was felt by all the members present that this was the only way by which the present falsifying could be stopped. The intention of the association in passing this resolution is praiseworthy enough, but the remedy it recommends does not appear to be an effective one. If "all assessment work done," in the Province is to be inspected, then not only one inspector only, but a score or two would be required to do this work thoroughly. Even should these be appointed there would still be difficulties in the way of the desired result being attained. Leaving out of present consideration the question of whether or not it would be desirable to prosecute for perjury where it could be shown that a false affidavit has been made, the importance of preventing the issue of a certificate of work in cases where a claim owner is not entitled to it should be kept well in view. As the law now stands once a certificate of work has been issued it is unchallengeable, notwithstanding that it might be shown that the work had not been done as sworn to. The intention of the law to secure the due performance of work

on mineral claims is in such a case thus defeated. Besides an insistence upon the making of a fully detailed statement, giving measurements, days and dates worked, and rate per day worked, suggested last month, it would be well to require that every application for a certificate of work shall be posted for a month in a conspicuous place in the office of the Mining Recorder for the mining division in which the claim concerned is situate, before the applicant shall be entitled to obtain such certificate. Further, let each Mining Recorder be appointed chief inspector for his own mining division, with power in any and every instance in which he may have good reason to doubt the truth of the affidavit presented to him on application for a certificate of work or of improvements, to appoint some suitable person to visit the claim to ascertain whether or not the work has been done as sworn to. In the event of its not having been done as alleged, the cost of inspection to be recoverable from the person making the false affidavit, and the certificate to be withheld. If it should happen that owing to the non-performance of the assessment work required by law the claim, during the time intervening between the making of the application for the certificate and the inspection on behalf of the mining recorder, shall have run out, then let it revert to the Crown and be open for re-location by any one other than the person making the false affidavit, but, on the other hand, in all cases where no inspection shall have shown that the work has been done as stated, then let the certificate be issued, whether the year for which the assessment was recorded shall at the end of the month have expired or not, provided, of course, the application for the certificate shall have been made within the year for which the work shall have been done. Given the requirement, without exception, of full particulars, of the work done, as above recommended, and the knowledge that the mining recorder is empowered to have an inspection made if he deem it necessary, it would appear probable that evasions of the law, such as are admittedly frequent under existing lax methods, would then be few and far between.

The last issue of the *Engineering Magazine* contains a very interesting and comprehensive account of the Alaskan auriferous areas with special reference to the Klondike gravel deposits. The author of this paper, Mr. J. D. McGillivray, is not only a clever journalist, having been at one time editor of the *Mining and Scientific Press*, of San Francisco, and subsequently a member of the staff of the *New York Herald*; but he is also an experienced and practical miner and consequently his treatment of the subject

may be regarded as that of an expert. Mr. McGillivray commences then with the statement that the Alaskan gold-bearing areas so far discovered are very much more extensive than those of California, there having been located to date considerably more than 150,000 acres of auriferous ground, in addition to the concessions covering even more extensive areas specially granted by the Dominion Government. That this ground is generally rich is demonstrated by the fact that very little gravel in the Klondike costs less than \$2 a cubic yard to work, this rather excessive cost being due to the crude methods employed and without water under pressure, the last being charged to a short-sighted policy on the part of the Canadian Government. Meanwhile, it is shown that though Eldorado, the most important creek, has been worked out, the output from the Klondike is as large as ever, and this output comes from the lower grades of gravel that would not have paid profits under the conditions existing a few years ago. Referring to the output in recent years, Mr. McGillivray states that the yield during 1902 was probably equal to that of 1901, official returns to the contrary notwithstanding, but the change in the royalty from a direct tax on the output to a tax on the export of gold made the figures appear considerably less, and as a result the reports made by the United States authorities and the Canadian Government show only about \$18,000,000. Including this year's yield from a gold area having a thirty-mile radius from Dawson, a production valued at nearly a hundred million dollars will have been made, this enormous amount of gold will have been obtained by miners without capital, the few incorporated companies operating in the field being responsible for a very limited proportion of the whole. The mines that are now being worked at a profit are mines which three or four years ago would not have paid under conditions then existing. Indeed, few of the mines now being operated would have been profitable even two years ago, so greatly have conditions improved. Mr. McGillivray estimates that at the very least the Klondike region in the vicinity of Dawson is capable of producing well over three hundred million dollars in gold before the richness of the area becomes exhausted. The article concludes as follows: "The Canadian Government placed upon mines most difficult, and in point of fact, ridiculous regulations which tended to retard mining or any other industry. However, in spite of all this, on account of the very good values found in the gravel of the Klondike country, a great many of the experienced miners who went there in the early days made money. The result was then, as it was in California in 1849-50,

that a very few, and only those who were capable of doing good work in any direction, succeeded. Nineteenth of those who went to the North were unfitted for the work that it was necessary to do there, and they returned to the States or other parts of the world from whence they came. These men condemned the Klondike; condemned the whole Yukon, and told the rest of the world that there was up there no opportunities for miners. This has done much to give the Yukon a bad name. Yet never a miner who understands gravel has gone into the North who has not said that it is one of the best gravel regions in the world. The best proof of this is that a large proportion of the mine owners of the Klondike who have made fortunes, and most of the miners of experience on the Alaskan side, all the way from the boundary line to Nome, return to that country every year and say that they know of no country in which they would rather live and do business in than along the Yukon. It will be said, perhaps, that the climate is bad. I have spent five winters in the Yukon and the past winter in London and New York, and I must say that we have a better climate on the Yukon in winter and in summer than either in New York or London. With us the air is dry. There is no wind. And while the thermometer goes down in winter to as much as 70 degrees below zero (though it is seldom more than 50 degrees below), having no wind and having no dampness in the atmosphere, we wear less clothes and suffer less inconvenience than we would in New York or London in the colder days of winter, or in San Francisco with its fogs and winds."

Although conditions in the Yukon have in the last two years greatly improved, mining costs are still relatively high. In early days it is estimated that no gravel was worked for less than \$15 per cubic yard. Wages at this time were \$1.50 per hour and freight was from 10 to 20 cents per pound from Dawson to the mines only. Wages are now about 50 cents per hour and owing to the wagon roads built by the Canadian Government, the freight rate from Dawson to the mines is not in excess of 1 cent per pound. Likewise the royalty has been reduced from 10 per cent to 2 1-2 per cent. Steam thawing replacing wood fires has resulted in further economy. The cost of drifting on bench claims on Bonanza Creek for the year ending October 10, 1902, is given in the following table. With the exception that little timbering is required here, the drifting is similar to that on the Forest Hill divide.

Mining expenses, including board . . . . .	\$38,573 52
Mining stores . . . . .	1,796 52
Fuel . . . . .	5,957 00

Timbering—Labour with timber . . . . .	2,355 34
Foreman's salary, with board . . . . .	2,483 00
Management with board . . . . .	3,464 96
General maintenance . . . . .	2,819 70
October expenses . . . . .	3,322 87

Total operating expenses . . . . .	\$69,772 89
Square yards worked . . . . .	10,490
Cost, actual mining and sluicing per sq. yd. . . . .	\$5.79

The square yard, however, was equal to about one and one-third cubic yards. This was an extreme case, as many mines were working under similar conditions at considerably less. A comparison with hydraulicizing on the same property is interesting. The company purchased water rights for \$30,000 and sluiced their ground. The following is the result of their first washing:

Total number cubic yards sluiced . . . . .	29,000
Total number square yards bed-rock cleaned . . . . .	5,188

Gold recovered:

Gross output . . . . .	\$35,978 10
Less bank charges . . . . .	594 82
Mint charges . . . . .	133 41
Export tax . . . . .	781 95

Net bank returns . . . . .	\$34,467 92
Average value per cubic yards (gross . . . . .)	1 24
Average value per sq. yd. of bed-rock (gross) . . . . .	6 93

Costs:

Installation of hydraulic plant, sluices, etc. . . . .	\$4,221 90
Operating (including cleaning bed-rock) . . . . .	5,960 11

Total cost . . . . .	\$10,182 01
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The cost per cubic yard of operating, including cleaning of the bed-rock, was \$0.205; the cost per cubic yard of operating, including cost of plant and cleaning bed-rock, 0.35; cost of operating per square yard of bed-rock, \$1.148; cost of operating, including cost of plant, cleaning bed-rock, etc., per square yard of bed-rock, \$1.96. The actual number of days (of 24 hours) hydraulicizing, was 22; the quantity of water used (miners' inches), 200; the number of cubic yards sluiced per day of 24 hours, 1,318.18; the duty of miners' inch per day of 24 hours was \$6.59; the average output per day (of 24 hours) \$1,635.36.

The opinions of two British Columbians just returned from a visit to England entirely coincide in respect to the means necessary to revive interest among British investors in the mines of the Province. Thus both Mr. F. W. Rolt, of Rossland, and Mr. Clermont Livingstone, general manager of the Tyee

Copper Company, at Mount Sicker think, that there is little likelihood of a change from the apathetic if not hostile feeling as regards mining investment in B. C. now—certainly not without due cause—entertained in London financial circles, until such times at least as the Province can show half a dozen or so mines, in which British capital is already interested, to be on a regular dividend paying basis. As there are now surviving at the most half a dozen British-owned and operated mines of any great importance in the country, all, it would seem, must become profitable ere investment opportunities in the Province are again regarded as tempting. There is, however, a reasonable chance that several of these properties will make a fair showing in the next year or so. It is more difficult for a resident of the Province to get reliable information of what is going on at the Le Roi, than it is for a resident of London, but there are reasonably good grounds for believing that the mine is in a more satisfactory condition than ever before, and that substantial monthly profits are being made, at any rate, production was never so large. At the Le Roi No. 2 much depends on the success—apparently assured—of concentration operations now soon to be commenced. But if by this means the vast reserves of low-grade ores there may be profitably handled, the mine should become enormously profitably, and the same may be said of the other big British-owned Rossland mines. The development of the Snowshoe in Boundary has been but recently fairly started—the opening up and equipment of a mine of this class being a slow and arduous undertaking. The property is one, however, of undoubted value and promise, and has not been handicapped by extravagant or incompetent management, which is very much in its favour. Consequently the Snowshoe should at no very distant date be in a position to begin the regular earning of dividends. More favourable reports have been received of late of developments at the Ymir, and it is not too much to expect that this property will again pay well. Then there are several English-owned mines in the Slocan, the Ruth, Whitewater and others, the outlook for which, thanks to the lead bounty, is very different to what it was a year ago. Last but not least the Tyee has already shown that it is a profitable enterprise. In addition, too, there are a number of smaller concerns, such as the Boston and the Monitor in the Slocan, the Iron Mask at Kamloops, the Nettie L. and Silver Cup, in the Lardeau, all of which are making excellent showings. But the Englishman certainly seems to have missed it in B. C. He has rarely secured the plums, and he will assuredly wait now, being naturally disgruntled and sulky at his losses—in nine cases out of ten the result of his

own folly or unbusiness-like conduct—and allow others to pick up all the new things going. Then later he will buy these at twice their value. Meanwhile B. C. is managing to exist without British capital, and all things considered, she is not making a bad fist of it.

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Evidence of the revival of mining in the Province is accumulating rapidly, and it would almost seem that there were about to be a return to the "rushing" times of '96. But with this difference, that whilst in 1896 we had no mines but much talk, now there are some mines and less talk. In other words, the boom of '96 was largely hysterical. There was much foolish jubilation and afterwards vain tears. Our mining industry is no longer in the school-girl stage. It has matured and settled down sedately to business. Investors no longer will look at an undeveloped prospect, but they are beginning again to enquire for mines. In all the mining sections word comes of greater activity. Nelson a year ago dead so far as mining was concerned has now half a dozen mines in operation on Morning Mountain alone; there is decidedly more activity at Ymir, where six or seven properties have become steadily productive. Slocan is actually booming," and very shortly all the mines idle the past year or more, will be again in steady operation; the Lardeau is attracting unusual attention not only on account of the rich new discoveries at Poplar Creek and elsewhere, but also in consequence of the satisfactory results now attending the operation of the free milling quartz mines in the Fish River Camp; developments in the Big Bend are being more actively prosecuted this season, both in respect to hydraulic and quartz mining; in Rossland and Boundary production is largely on the increase; arrangements have been completed for the immediate resumption of operations at the big East Kootenay silver-lead mines, and the coal mining industry in the same field has of recent months made great forward strides; Kamloops mines have commenced to send out ore, and on the Coast two smelters are in operation, production being greater than at any previous time; the settlement, too, this month of the labour troubles at Cumberland has further improved the industrial situation. In short, all present indications point to the advent for mining in British Columbia of an era of unprecedented prosperity, a re-awakening of interest among investors in the mines of the Province, and a realization generally of those sanguine expectations which despite frequent disappointments, sets-backs and long-drawn-out periods of industrial depression, many British Columbians have continued to steadfastly hold.

At a meeting recently in Sandon of the Associated Silver-lead Miners, an organization represented by twenty-nine mine company and three individual operators, a marketing committee, Messrs. G. Alexander, Byron N. White, A. C. Garde, W. E. Zwicky and D. C. Forbes were nominated to undertake the disposal of the Slocan's silver-lead product and control the local market. This plan for the marketing of the ores has been adopted in order to guard against any possible discrimination on the part of the smelter against individual mines, and the arrangement is that the members of the association will sell their output to the committee, who in turn will market it to the best advantage. Slocan mine operators have, meanwhile, been somewhat exercised by a report that a contract has been entered into between the St. Eugene mine at Moyie, and the Trail smelter for the marketing of the whole of the mine's product at the Canadian Smelting Works. The report appears, however, to be premature, but nevertheless some difficulty is likely to arise in connection with the home marketing of ores, which it will be remembered is one of the stipulations under which the Canadian Government bounty is offered. At the present time the two smelters in operation have certainly not the facilities to handle a product equal to that of 1900, the record year, or the rate of production which under existing favourable conditions it is expected to maintain. The St. Eugene mine is in a position to make as large a monthly output as can be accomplished by all the Slocan mines in combination. Hence the apprehension on the part of the Slocan producers. In the event of a difficulty arising on these grounds it is possible, however, the Government might be induced to relax the regulation in force and allow for a period the marketing of a proportion of the lead production in the United States, pending the relieving of the situation by the completion of the Marysville smelter now under construction. It is also possible that with the improvement in conditions it may be found profitable to resume smelting operations at Pilot Bay.

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In a recent issue the *Rossland Miner* published a very interesting account of the progress of deep level mining in that locality. Our contemporary rather optimistically remarks: "In Rossland the really big mining has yet to be done. The deep levels have yet to be opened. It is impossible to estimate the untouched wealth that lies below the 1,500-foot workings. We only know that all ore bodies in the north belt increase in width with depth. It is therefore not unreasonable to suppose that additional sinking will expose a proportionate amount of paying ore. This

is indeed a bright prospect for Rossland and should, in itself, be sufficient to build great expectations for everybody concerned." Meanwhile two Rossland mines have now been well developed below the 1,000-foot level, the Le Roi being now engaged in opening up a level at a depth of 1,350 feet, while the Kootenay has attained in its lowest workings a depth of 1,200 feet. The White Bear has a level at 850 feet, the Nickel Plate at 800 feet, and the War Eagle and Centre Star mines are developed to a depth equivalent to 600 feet at the Le Roi. From present indications there appears to be every promise that the values as depth is attained will be fairly maintained at a profitable margin, although not generally equal to the values obtained from immediate surface ores. The difference in this respect, however, has and continues to be largely discounted by the successful efforts that have been put forward to decrease operating and treatment costs, and the time is not far distant when even five-dollar ore will be mined at Rossland at a considerable profit. In itself a statement such as this does not sound very remarkable or startling; but it means nevertheless that the treatment of this grade of ore by the application of successful concentration methods will result in Rossland taking possibly equal rank in point of productive importance with such camps as Butte, Montana. No one meantime can doubt that Rossland has before it a very promising future.

Poplar Creek still continues to attract a great deal of notice, and many new "strikes" and discoveries of importance are reported to have made during the month in near-by localities, notably that of Copper Creek. Meanwhile a correspondent, a mining engineer of very high standing locally, in a personal letter to the editor of this periodical thus refers to the district: "There have been undoubtedly discoveries of very high-grade quartz—there are well defined veins of good size. This is good—very good so far as it goes—but that type of ore is notoriously irregular and uncertain and no man can predict what may result after the showings have been opened up. They may be better, they may be worse, or—nothing at all. For the present the discoveries are doing the country much good; they are putting fresh heart into the prospector. Where one man was out last year, there are ten this, and working with much more energy. Also it looks as if this might again direct the attention of capital to this country. We have been waiting quietly and patiently for some time. There is evidence of a very healthy progress. This may be what was required to start matters. But I don't think there will

be much of a wild-cat boom—everybody has been too badly bitten in the past."

One of the most interesting reports from the district in August was that platinum had been discovered in the ores, a sample from a claim adjoining the Gold Park property, having been forwarded to a well known assayer of Salt Lake, Utah, a return was received giving five ounces of platinum to the ton. The owners of the Gold Park subsequently had some ore tested, the result in this case being one ounce of platinum to the ton. Platinum in quartz has already been found in the Similkameen district and also in the Burnt Basin, but although these occurrences have been known some time, no determined attempt has been made to turn the discoveries to commercial account.

The *B. C. Review* (London) in two recent issues refers editorially to the extraordinarily unbusinesslike manner in which the affairs of the Slough Creek Company are being conducted, and from the evidence adduced it would certainly seem that our contemporary's strictures are most justly bestowed. At the statutory meeting of the re-organized company held in London last month—the concern has, by-the-way, been twice re-constructed—some very remarkable admissions were made by the directors, one to the effect that since February last the engineer in charge of the mine had disappeared altogether from the scene, operations having since continued under the direction of a foreman, who was either incapable or indisposed to furnish reports of progress to the Board. This the shareholders were unable to obtain any information of how their money had been spent during the past five months, and other instances were given in proof of the carelessness and imbecility of the directorate. As the directors, without exception, are notorious guinea-pigs, it is merely astonishing that matters are no worse than they are, and personally we have no sympathy to waste on the shareholders of the Slough Creek Company. The only cause for regret in connection with this miserable fiasco, is that the undertaking itself is one of undoubted significance, and if carried to a successful issue, as under proper auspices well might be the case, it is impossible to over-estimate the importance to the district as a whole if the ancient river channels in Cariboo are demonstrated by this plan of deep level mining to be highly auriferous. Hence in British Columbia there is a great desire that the enterprise should succeed; but it is quite plain that unless the shareholders take immediate steps for the removal from executive office of the men who in the past have so culpably ignored their responsibilities, no such consummation may ever be expected.

Since the above paragraph was penned late advices from London announce that at a special meeting of the Slough Creek Company a resolution introduced by shareholders to relieve the present Board of Directors of office was defeated. The more's the pity.

It is reported that the Legislature of the State of Washington has passed an Act as follows, with a view to restricting wild-cat mining operations:

"Any superintendent, director, secretary, manager, agent or other officer of any corporation, or anyone pretending to be such superintendent, director, secretary, manager, agent or other officer, who shall wilfully subscribe, endorse verify or otherwise assent to the publication, either generally or privately, to the stockholders or to other persons dealing with such corporation or its stocks, and wilfully make untrue and fraudulently exaggerated report, prospectus, account or statement of operations, values, business, profits, expenditures, or prospectus or other paper or document intended to produce or give or having a tendency to produce or give to the shares of stock in such corporation a greater value than they really possess, or with the intent to defraud any party, person or persons generally, shall be deemed guilty of an offense against the laws of the State of Washington, and upon conviction thereof shall be punished by imprisonment in the penitentiary not less than one or more than five years, or in the county jail for not more than one year or by a fine not exceeding \$2,000, or by both."

The aim herein is, of course, irreproachable, but it is one thing to legislate on a matter of this kind, and another to give effect to it. Besides, generally in the most flagrant instances of wild-catting that have come to our notice, the originators have been clever enough to confine themselves to *suggestio falsi* methods, rather than commit themselves to downright statements the correctness of which might be without much difficulty disproved. If the press could always be relied on to do its duty in a fearless and honest manner, the public would require little other protection.

The plan by which the New Fairview Corporation expects to raise necessary additional capital for the liquidation of existing liabilities, and for the further equipment of the property, by an issue of 8 per cent. cumulative preference shares to the extent of \$125,000, is perhaps as good an expedient as under the circumstances could be devised. But—and this is a question to which many shareholders would like an answer—was the present unsatisfactory position of the company in being now compelled to practically mortgage its property a preventable one, and what guarantee is there of a better showing being made in future? Judging more particularly from recent events, the manner in which the affairs of the Fairview Corporation have been conducted is, we fear, certainly not above criticism. We are reliably assured that several

costly mistakes have been committed of late in connection with the development of the mine, in fact, our correspondent suggests, that had the property during the last three or four years been under the direction of a competent and otherwise qualified mining engineer, it would to-day be earning profits instead of requiring to borrow money. The shareholders have only themselves to blame, however, that they did not insist long ago on a suitable appointment being made, and they have really now no just cause for complaint if the management of the mine, having been thus entrusted to honest enough but practically inexperienced hands, has been unsatisfactory. It is to be hoped that at the meeting to be held shortly for the purpose of confirming and passing a resolution authorizing the proposed issue of preference shares, the opportunity will not be lost of remedying the mistake made in this respect by arranging for the immediate appointment of a properly qualified engineer to assume charge of the property.

It is satisfactory to learn that providing the small additional capital required can be raised, and it appears that little difficulty need be anticipated on this score—there is every reason to believe that the Omineca and Peace River Mining Company, erstwhile the Arctic Slope, will in the future be a profit-earning concern. In the past, it must be admitted, the mine has not been well managed, and money has been spent to poor advantage, but the ground itself is rich, as is quite clearly shown by the returns obtained this season, when with a very inadequate plant and the restriction, through shortage of water, of actual washing operation to but a month, the manager, a pioneer Omineca miner, succeeded in earning a small profit after paying running expenses and in addition doing much dead work. It is thought that by an expenditure of a further sum of \$15,000, the water supply may be so improved and equipment perfected to admit of the property being operated hereafter for the full working season, and it is estimated making regular profits at the rate of ten thousand dollars annually. Meanwhile capital is already beginning to give increased attention to the Omineca district in anticipation of not-far-distant railway building, and especially in the Bulkley Valley the coal and mineral areas are being acquired by representatives of both American and Canadian moneyed men.

A reminder is given to the mining sections directly concerned that during September two parties of representatives of commercial and manufacturing interests are expected to make excursions to parts of this



Province. The "All Canada" party of delegates to the Fifth Congress of Chambers of Commerce of the Empire, held last month in Montreal, Quebec, is scheduled to reach Victoria on the 8th inst., visit Crofton and Nanaimo on the 10th, Revelstoke 13th, the Boundary 14th, Nelson 15th, and thence return eastward *via* the Crow's Nest Pass on the 17th. This party will be composed chiefly of visitors from Great Britain, and will number about 100, travelling in two sections. The second party is to consist of members of the Canadian Manufacturers' Association and friends, whose itinerary provides for Toronto being left on the 19th inst., Coast cities being visited from September 28th to October 2nd, Rossland, October 3rd, Nelson, 4th and Fernie, 6th. It would be well to take full advantage of these favourable opportunities of impressing visitors from Great Britain and Eastern Canada, few if any of whom have any personal knowledge of British Columbia, with the great extent and enormous possibilities of the mineral resources of the Province. Their visit will necessarily be a hurried one, and being so but few mines, smelters, etc., will be visited during the very limited time they will be in any one section of the Province, but any available literature giving straight facts and statistics relative to the mining industry should be freely provided for the information and use of the visitors.

Commenting the other day on the effect the lead bounty would exercise on production in the province, Mr. Cronin, manager of the St. Eugene mine, at Moyie, expressed the view that the bonus was, after all not so considerable as might appear, although of course, it would serve the purpose for which it is granted in stimulating industry. He instanced that when the price of lead in London advances over £12 10s. is equal to about \$2.67 a hundred pounds; which plus the bounty of 75 cents a hundred, makes a quotation of \$3.42 a hundred. Therefore \$3.42 a hundred is the highest price which the lead producer could receive for lead under the benefits of the bounty. Again the home smelters to which the miner sells his product deduct an arbitrary charge of \$1 a hundred from the London quotations, to make up for alleged expenses in exporting the lead. Therefore all the B. C. producer hopes to realize is \$2.42 a hundred pounds, while the American operators receive 31-2 cents. As a matter of fact, with London lead worth about £11 6s., as at present, the local settlement including the bounty on lead ores, is approximately \$2.20.

The practice of mine leasing is gradually becoming more prevalent in British Columbia, and recent instances have thoroughly demonstrated the practical advantages of the system. Many of the properties now being successfully operated under lease are owned by British corporations, under whose management operations were not profitable. The reason for success in the one case and failure in the other is easily explained. The difference frequently between profit and loss in the working of a mine is found under the head of general expenses. The leaseholder does not require to maintain an expensive suite of offices; he has no staff of clerks or ornamental board of directors to pay; cable expenses to meet or the stock market to consider. Moreover, he is as a rule a practical miner well versed in local conditions, and consequently he wastes neither time nor money in experimenting. It may be also added that he has never been known to erect costly plants to treat his ore before he has any ore to treat.

A further favourable sign of returning prosperity in the mining districts is the increasingly large demand for mining machinery, which is now most noticeable. Hardly a week passes without one or more important installation being made, while the number of mine equipments, more or less considerable, immediately contemplated makes a quite formidable list. Last week no less than five carloads of machinery were taken into the Lardeau, and stamp-mills and concentrators have been or are about to be ordered for half a dozen other properties in that district. There have probably been more installations of mills this year in British Columbia than ever before and there seems to be every probability that the branch of free-milling quartz mining heretofore never very successfully followed in the province, except in one or two isolated cases, will ere long assume very considerable proportions.

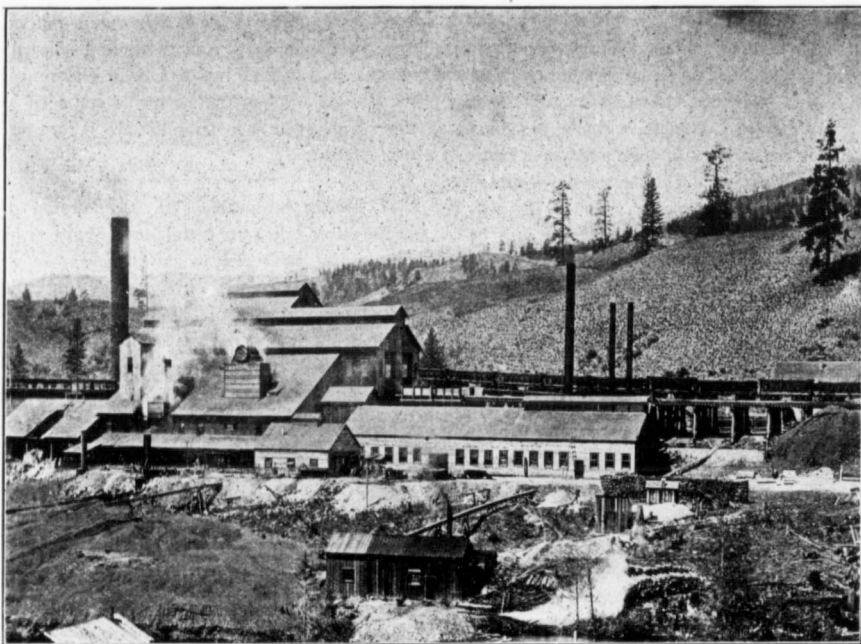
Much gratification is expressed locally at the satisfactory results attending the operations of a syndicate engaged in hydraulic mining on Thibet Creek in the Cassiar district, a first clean-up of the season after a twenty days' run, having resulted in a yield of 780 ounces, valued at \$13,000. The syndicate is chiefly composed of men who were formerly connected with the Cassiar Central Railway, whose plans, however, failed to mature. The operators of the Thibet Creek mine, nevertheless, have steadfastly maintained a confidence in the resources of the country, and in their undertaking, and although a landslide and other unlucky incidents have heretofore interfered with success, it would seem at length persistency and faith are about to reap their reward.

MONTREAL & BOSTON COPPER COMPANY'S  
SMELTER, BOUNDARY FALLS.

(By E. Jacobs.)

**U**NDER the energetic management of Mr. A. I. Goodell, the Montreal & Boston Copper Company's smelter at Boundary Falls, in the Boundary District, is steadily increasing in importance among the industrial establishments of that part of the Province. Its first furnace was blown in on June 19th, 1902; its second was ready early this year, but owing to the coke supply failing it was not put in operation until May 25th; and now a third is being erected—this having last month been received from the manufacturers. This increase of furnace capac-

The company's works, usually known as the Boundary Falls smelter, are situate on Boundary Creek, not far from Boundary Falls and about three miles south of Greenwood. The main building, as originally erected, was 182 feet long, 120 feet wide, and 64 feet high in the centre measuring from the feed floor, or from the furnace floor about 80 feet high. Through the centre of this building were placed two parallel rows of ore-storage bins, eight in a row and each bin 34 x 10 feet. South of these bins were others for the storage of coke and, if necessary, of lime. At a lower level than the floor of the main building the furnace floor extended east from a substantial stone retaining wall 60 feet, and it had a length of 140 feet. At its south end was the power house, since removed. The



General View of the Smelter at Boundary Falls.

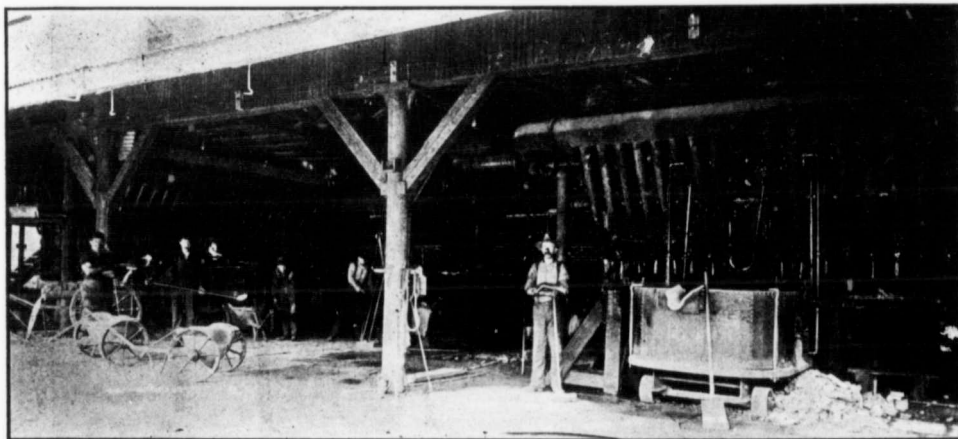
ity has, of course, involved a corresponding increase of other plants. Two blowers are in use to-day, and a third has been received at the works and is now being got ready for work. Additions have also been made to the sample mill plant, as well as considerable changes to and enlargement of the sample mill, railway trackage, and buildings and appliances generally. It is planned to double the sampling capacity and install a copper converter by the early part of next year. There appears to be ample custom ore offering to warrant the further extension of the works, and, what is equally important, assurances have been received that there will also be an adequate supply of coke obtainable to admit of all three furnaces being kept continuously in full blast.

dust flue, of stone walls with arched brick roof, built on this level, runs about 200 feet to the steel smoke-stack, which is 9 ft. 6 inches in diameter, and 112 feet high above a 14-ft. brick base. Among the alterations and additions made after Mr. Goodell took charge are the erection of a new power house 49 x 136, new receiving bins, the considerable enlargement of the sample mill building, and other improvements already referred to.

The machinery and plant now includes the following: On the furnace floor, two furnaces each 40 inches by 176 inches inside the tuyere line and having a nominal capacity of 300 tons every 24 hours, in operation and a third of like capacity being erected. In the power house, two Connersville blowers, one No.

7 and one No. 7 1-2, each having its own direct-connected 75-h.p. Erie steam engine, and one No. 8 blower with a 125-h.p. engine now being installed, the last being large enough to provide blast for two furnaces; also a condenser, and a 250-light Siemens-Halske dynamo run by a 15-h.p. high-speed Atlas engine, for electric lighting purposes. In the adjoining boiler house are two 125 and two 75-h.p. horizontal return tubular steam boilers and a water heater. In the pump house below are three Stilwell-Bierce & Smith-Vaile Co.'s pumps, which pump water direct from Boundary Creek to the furnaces, for cooling the jackets and granulating the slag. In the sample mill are a No. 5 Gates rock crusher, a 7 x 10 Blake rock crusher, two sets of 12 x 20 rolls, two 36-inch and two 48-inch automatic samplers, a Bridgman sampler complete, two belt elevators, etc., the power for driving these being furnished by a duplex engine of 85-h.p. Seven slag trucks having a holding capacity of

stoppage of a few hours for repairs, No. 1 furnace was run continuously from the time of blowing in until the coke supply again gave out after the strike at the Crow's Nest Pass Coal Company's collieries last February. Meanwhile No. 2 furnace had also been running for a short time. Up to January 1 there were treated at these works 33,433 tons of ore from the Snowshoe, B. C. and Sunset mines, and there were shipped 1070 tons of matte of about 45 per cent. copper, 1.5 oz. gold, and 18 oz. silver. The strike kept down the tonnage materially, for both furnaces were idle for several weeks, and after operations were eventually resumed at the coal mines it was not until early in July that sufficient coke was received to admit of both furnaces at the smelter being run at the same time. Ore is now being received from the Snowshoe, B. C., Athelstan, Oro Denoro, Providence, and Sunset mines, the last-mentioned mine being owned by the Montreal & Boston Copper Company. All



Furnaces, Boundary Falls' Smelter.

about five tons each have lately been received from the Union Iron Works, Spokane, Wash., where two of the furnaces were also manufactured, and a locomotive for hauling same has been ordered to arrive shortly, the intention being to in the future dump the slag hot, instead of granulating it as at present. The smelter has its own railroad scales (Fairbanks) and other necessities.

The assay office and laboratory are equipped with modern apparatus and appliances suited to the requirements, for assay and analysis purposes, of a custom smelter. Offices, storehouses, mechanics' shops, residence accommodation for officials, etc., are all provided on or near the works, which are easily accessible, being situate but a short distance from the larger mines and alongside the Columbia & Western Railway to Midway.

During 1902 a failure of the coke supply necessitated a suspension of smelting operations from July 12 to September 17, otherwise, save for an occasional

these are Boundary mines. Not much ore has yet been received at this smelter from Republic camp situate south of the international boundary line, in the adjoining State of Washington, but after the capacity of the smelter shall have been further increased the shipment of the ores from that camp will no doubt also be encouraged.

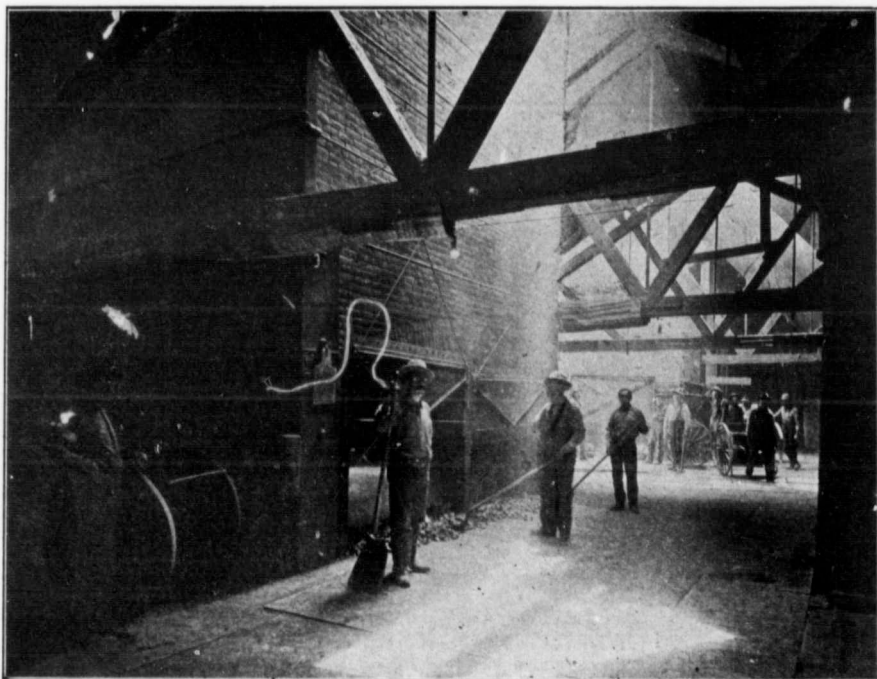
It is understood that the management of the company has under consideration plans for a considerable enlargement of its operations so soon as conditions shall be favourable to the investment of the additional capital this will require. At the time of writing Mr. Goodell is in the East, having last month gone to Montreal to consult with the directors upon this and contingent matters. It is evident that either existing smelters must have their treatment capacity enlarged or another smelter must be built, for not only is the output of the mines owned by the two companies operating at or near Greenwood being restricted so as to allow of custom ores being treated instead, but

the supply of the latter is steadily being augmented, both by the gradual increase of production at several mines that have been shipping for some time past and by shipments from other properties now being opened up and that are becoming regular shippers. By the close of this year there will be no difficulty in maintaining a daily minimum output of 2,000 tons from mines now shipping to the two smelters on Boundary Creek, this leaving out of account the Granby Company's mines, which ship to that company's works at Grand Forks. At the present time the first-mentioned mines could together easily main-

#### ELECTROLYTIC LEAD-REFINING AT TRAIL, B.C.\*

(By Anson G Betts, Troy, N.Y.)

**A** SOLUTION of lead-fluosilicate, containing an excess of fluosilicic acid, has been found to work very satisfactorily as an electrolyte for refining lead. It conducts the current well, is easily handled and stored, non-volatile and stable under electrolysis, may be made to contain a considerable amount of dissolved lead, and is easily prepared from inexpensive materials. It possesses, however, in common with other electrolytes, the defect of yielding a deposit of lead lack-



Another Interior View, Boundary Falls' Smelter.

tain a daily output of 1,500 tons, while the two smelters cannot treat much more than 1,300 tons per day, so that it is clear more furnaces will be required, even after the Montreal & Boston Company shall have blown in its third furnace. It will likely be found, though, that both this company and the British Columbia Copper Company, operating at Greenwood, will in good time, enlarge their works sufficiently to meet the growing demand, and thus contribute to the further development of the smelting industry in the Boundary district.

ing in solidity, which grows in crystalline branches towards the anodes, causing short circuits. But if a reduction action (practically accomplished by the addition of gelatine or glue) be given to the solution, a perfectly solid and dense deposit is obtained, having very nearly the same structure as electrolytically-deposited copper, and a specific gravity of about 11.36—that of cast lead.

Lead-fluosilicate may be crystallized in very soluble, brilliant crystals, resembling those of lead-nitrate and containing four molecules of water of crystallization,

\*From a paper read before the American Institute of Mining Engineers.

with the formula  $PbSiF_6 \cdot 4H_2O$ . This salt dissolves at 15 degrees C. in 28 per cent. of its weight of water, making a syrupy solution of 2.38 sp. gr. Heated to 60 degree C., it melts in its water of crystallization. A neutral solution of lead-fluosilicate is partially decomposed on heating, with the formation of a basic insoluble salt and free fluosilic acid, which keeps the rest of the salt in solution. This decomposition ends when the solution contains, perhaps, 2 per cent. of free acid; and the solution may then be evaporated without further decomposition. The solutions desired for refining are not liable to this decomposition, since they contain much more than 2 per cent. of free acid. The electrical conductivity depends mainly on the acidity of the solution.

My first experiments were carried out without the addition of gelatine to the fluosilicate solution. The lead-deposit consisted of more or less separate crystals that grew toward the anodes, and, finally, caused short circuits. The cathodes, which were sheet-iron plates, lead-plated and paraffined, had to be removed periodically from the tanks and passed through rolls, to pack down the lead. When gelatine has been added in small quantities, the density of the lead is greater than can be produced by rolling the crystalline deposit, unless great pressure is used.

The Canadian Smelting Works, Trail, British Columbia, have installed a refinery, making use of this process. There are 28 refining tanks, each 86 in. long, 30 in. wide and 42 in. deep, and each receiving 22 anodes of lead-bullion with an area of 26 by 33 in. exposed to the electrolyte on each side, and 23 cathodes of sheet-lead, about 1-16 in. thick, prepared by deposition on lead-plated and paraffined-iron cathodes. The cathodes are suspended from 0.5 by 1 in. copper bars, resting crosswise on the sides of the tanks. The experiment has been thoroughly tried, of using iron sheets to receive a deposit thicker than 1-16 in.; that is, suitable for direct melting without the necessity of increasing its weight by further deposition as an independent cathode; but the iron sheets are expensive, and are slowly pitted by the action of the acid solution; and the lead deposits thus obtained are much less smooth and pure than those on lead sheets.

The smoothness and the purity of the deposited lead are proportional. Most of the impurity seems to be introduced mechanically through the attachment of floating particles of slime to irregularities on the cathodes. The effect of roughness is cumulative; it is often observed that particles of slime attract an undue amount of current, resulting in the lumps seen on the cathodes. Samples taken at the same time showed from 1 to 2.5 oz. silver per ton in rough pieces from the iron cathodes, 0.25 oz. as an average for the lead sheet cathodes and only 0.04 oz. in samples selected for their smoothness. The variation in the amount of silver (which is determined frequently) in the samples of refined lead is attributed not to the greater or less turbidity of the electrolyte at different times, but to the employment of new men in the refinery, who require some experience before they remove cath-

odes without detaching some slime from the neighbouring anodes.

The shape of the electrodes, and the method of handling them to and from the tanks, are shown in Fig. 1.

Each tank is capable of yielding, with a current of 4000 amperes, 750 lbs. of refined lead per day. The voltage required to pass this current was higher than expected, as explained below; and for this reason, and also because the losses of solution were very heavy until proper apparatus was put in to wash thoroughly the large volume of slime produced (resulting in a weakened electrolyte), the current used has probably averaged 3000 amperes. The short circuits were also troublesome, though this difficulty has been greatly reduced by frequent inspection and careful placing of the electrodes. At one time, the solution in use had the following composition in grammes per 100 c.c.: Pb, 6.07; Sb, 0.0192; Fe, 0.2490;  $SiF_6$ , 6.93, and As, a trace. The current passing was 2800 amperes, with an average of about 0.44 volts per tank, including bus-bars and contacts. It is not known what was the loss of efficiency on that date, due to short circuits; and it is, therefore, impossible to say what resistance this electrolyte constituted.

Hydrofluoric acid of 35 per cent. used as a starting material for the preparation of the electrolyte is run by gravity through a series of tanks for conversion into lead fluosilicate. In the top tank is a layer of quartz 2 feet thick, in passing through which the hydrofluoric acid dissolves silica, forming fluosilicic acid. White lead (lead carbonate) in the required quantity is added in the next tank, where it dissolves readily and completely with effervescence. All sulphuric acid and any hydrofluoric acid that may not have reacted with silica settle out in combination with lead as lead sulphate and lead fluoride. Lead fluosilicate is one of the most soluble of salts; so there is never any danger of its crystallizing out at any degree of concentration possible under this method. The lead solution is then filtered and run by gravity into the refining tanks.

The solution originally used at Trail contained about 6 per cent. Pb and 15 per cent.  $SiF_6$ .

The electrical resistance in the tanks was found to be greater than had been calculated for the same solution, plus an allowance for loss of voltage in the contacts and conductors. This is partly, at least, due to the resistance to free motion of the electrolyte, in the neighbourhood of the anode, offered by a layer of slime which may be anything up to half an inch thick. During electrolysis, the  $SiF_6$  ions travel toward the anodes, and there combine with lead. The lead and hydrogen travel in the opposite direction and out of the slime; but there are comparatively few lead ions present, so that the solution in the neighbourhood of the anodes must increase in concentration and tend to become neutral. This greater concentration causes an E. M. F. of polarization to act against the E. M. F. of the dynamo. This amounted to about 0.02 v. for each tank. The greater effect comes from the greater resistance of the neutral solution with which the slime is saturated. There is, consequently, an ad-

vantage in working with rather thin anodes, when the bullion is impure enough to leave slime sticking to the plates. A compensating advantage is found in the increased ease of removing the slime with the anodes, and wiping it off the scrap in special tanks, instead of emptying the tanks and cleaning out, as is done in copper refineries.

It is very necessary to have adequate apparatus for washing solution out of the slime. The filter first used consisted of a supported filtering cloth with suction underneath. It was very difficult to get this to do satisfactory work by reason of the large amount of fluosilicate to be washed out with only a limited amount of water. At the present time the slime is first stirred up with the ordinary electrolyte several times, and allowed to settle, before starting to wash with water at all. The Trail plant produces daily 8 or 10 cu. ft. of anode residue, of which over 90 per cent. by volume is solution. The evaporation from the total tank surface of something like 400 sq. ft. is only about 15 cu. ft. daily; so that only a limited amount of wash water is to be used—namely, enough to replace the evaporated water, plus the volume of the slime taken out.

The tanks are made of 2-in. cedar, bolted together and thoroughly painted with rubber paint. Any leaks are caught underneath on sloping-boards. Solution is circulated from one tank to another by gravity, and is pumped from the lowest to the highest by means of a wooden pump. The 22 anodes in each tank together weigh about 3 tons, and dissolve in from 8 to 10 days, two sets of cathodes usually being used with each set of anodes. While 300-lb. cathodes can be made, the short circuiting gets so troublesome with the spacing used that the loss of capacity is more disadvantageous than the extra work of putting in and taking out more plates. The lead sheets used for cathodes are made by depositing about 1-16 in. metal on paraffined steel sheets in 4 of the tanks, which are different from the others only in being a little deeper.

The anodes may contain any or all of the elements, gold, silver, copper, tin, antimony, arsenic, bismuth, cadmium, zinc, iron, nickel, cobalt and sulphur. It would be expected that gold, silver, copper, antimony, arsenic and bismuth, being more electronegative than lead, would remain in the slime in the metallic state, with, perhaps, tin, while iron, zinc, nickel and cobalt would dissolve. It appears that tin stands in the same relation to lead that nickel does to iron, that is, they have about the same electromotive forces of solution with the consequence that they can behave as one metal and dissolve and deposit together. Iron, contrary to expectation, dissolves only slightly, while the slime will carry about 1 per cent. of it. It appears from this that the iron exists in the lead in the form of matte. Arsenic, antimony, bismuth, and copper have electromotive forces of solution more than 0.3 volt below that of lead. As there is no chance that any particle of one of these impurities will have an electric potential of 0.3 volt above that of the lead with which it is in metallic contact, there is no chance that they will be dissolved by the action of the current. The same is

even more certainly true of silver and gold. The behaviour of bismuth is interesting and satisfactory. It is as completely removed by this process of refining as antimony is. No other process of refining lead will remove this objectionable impurity so completely. Tin has been found in the refined lead to the extent of 0.02 to 0.03 per cent. This we had no difficulty in removing from the lead by poling before casting. There is always a certain amount of dross formed in melting down the cathodes; and the lead oxide of this reacts with the tin in the lead at a comparatively low temperature.

The extra amount of dross formed in poling is small, and amounts to less than 1 per cent. of the lead. The dross carries more antimony and arsenic than the lead, as well as all the tin. The total amount of dross formed is about 4 per cent. Table I shows its composition.

TABLE I.—Analyses of Dross.

Analyses of the lead from which this dross was taken, see Table II.

No.	No. in Table II.	Cu. per cent.	As per cent.	Sb. per cent.	Fe. per cent.	Zn.
1	2	0.0005	0.0003	0.0016	0.0016	None
2	3	0.0010	0.0008	0.0107	0.0011	"

The electrolyte takes up no impurities, except possibly, a small part of the iron and zinc. Estimating that the anodes contain 0.01 per cent. of zinc and soluble iron, and that there are 150 cu. ft. of the solution in the refinery for every ton of lead turned out daily, in one year the 150 cu. ft. will have taken up 93 lbs. of iron and zinc, or about one per cent. These impurities can accumulate to a much greater extent than this before their presence will become objectionable. It is possible to purify the electrolyte in several ways. For example, the lead can be removed by precipitation with sulphuric acid, and the fluosilicic acid precipitated with salt as sodium-fluosilicate. By distillation with sulphuric acid the fluosilicic acid could be recovered, this process, theoretically, requiring but one-third as much sulphuric acid as the decomposition of fluor-spar, in which the fluorine was originally contained.

The only danger of lead-poisoning to which the workmen are exposed occurs in melting the lead and casting it. In this respect the electrolyte process presents a distinct sanitary advance.

A plant for the operation of this process will consist of a power plant, furnishing an electrolyzing current of several thousand amperes, with a voltage depending on the number of tanks; a tank-house, with electric cranes for handling a tank-load of anodes or cathodes at once; apparatus for making "starting" cathodes of sheet lead; preferably of lead cut from sheets rolled at the refinery; pumps and storage tanks for handling the electrolyte; and a cellar beneath the tanks for the passage of tank cars removing that part of anode slimes which falls from the plates. The finished cathodes, after rinsing, would be carried off to the lead-casting kettle. The casting room would con-

tain either a rotating or belt-conveyor, for passing the open anode moulds beneath the end of the siphon through which lead is flowing from the bullion kettle. The bars of lead would be molded, as is usually done in refining works, by siphoning into a semi-circular row of moulds. There would be either a washing, drying and sampling plant for the slime, in case it is sold, or a reduction mill, if it is worked into bullion. The latter is much the best, if the location of the plant is not so remote that the express charges on the bullion will balance the saving.

For the treatment of slime, the only method in general use consists in suspending the slime in a solution capable of dissolving the impurities and supplying, by a jet of steam and air forced into the solution, the air necessary for its reaction with, and solution of, such an inactive metal as copper. After the impurities have been mostly dissolved, the slime is filtered off, dried and melted, under such fluxes as soda, to a pure bullion.

The amount of power required is calculated thus: Five amperes in 24 hours make 1 lb. of lead per tank. One ton of lead equals 10,000 ampere days, and at 0.35 volts per tank, 3,500 watt-days, or 4.7 E.H.P. days. Allowing 10 per cent. loss of efficiency in the tanks (we always get less lead than the current which is passing would indicate), and of 8 per cent. loss in the generator increases this to about 5.6 H.P. days, and a further allowance for the electric lights and other applications give from 7 to 8 H.P. days as about the amount per ton of lead. At \$30 per year, this item of cost is something like 65 cents per ton of lead. So this is an electro-chemical process not especially favoured by water power.

The cost of labor is not greater than in the zinc desilverization process. A comparison between this process and the Parkes process, on the assumption that the costs for labour, interest and general expenses are about equal, shows that about \$1 worth of zinc and a considerable amount of coal and coke have been done away with, at the expense of power, equal to about 175 H.P. hrs., of the average value of perhaps 65 cents, and a small amount of coal for melting the lead in the electrolytic method.

More important, however, is the greater saving of the metal values by reason of increased yields of gold, silver, lead, antimony and bismuth, and the freedom of the refined lead from bismuth.

Tables II., III and IV. show the composition of bullion, slimes and refined lead.

Tables V., VI., VII. and VIII. give the results obtained experimentally in the laboratory on lots of a few pounds up to a few hundred pounds. The results in Tables VI. and VII. were given me by the companies for which the experiments were made.

TABLE III.—Analyses of Slimes.

Fe. per cent.	Cu. per cent.	Sb. per cent.	Sn. per cent.	As. per cent.	Pb.	Zn.	Bi.
1.27	8.83	27.10	12.42	28.15	17.05	None	None
1.12	22.36	21.16	5.40	23.05	10.62	"	"

TABLE II.—Analyses of Bullion.

No.	Fe. per cent.	Cu. per cent.	Sb. per cent.	Sn. per cent.	As. per cent.	Ag. per cent.	Au. per cent.	Pb. per cent.	Ag. Oz. P. T.	Au. Oz. P. T.
1	0.0075	0.1700	0.5400	0.0118	0.1450	1.0962	0.0085	98.0200	319.7	2.49
2	0.0115	0.1500	0.6100	0.0158	0.0950	1.2014	0.0086	97.9098	350.4	2.52
3	0.0070	0.1600	0.4900	0.0474	0.1330	1.0738	0.0123	98.1665	313.2	3.66
4	0.0105	0.1400	0.7000	0.0236	0.1320	0.8914	0.0151	97.9914	260.0	4.42
5	0.0120	0.1400	0.8700	0.0432	0.2250	0.6682	0.0124	98.0882	177.4	3.62
6	0.0055	0.1300	0.7300	0.0316	0.1030	0.6600	0.0106	98.2603	192.5	3.10
7	0.0380	0.3600	0.4030	.....	tr.	0.7230	0.0180	98.4580	210.9	5.22

TABLE IV.—Analyses of Refined Lead.

No.	Cu. Per cent.	As. Per cent.	Sb. Per cent.	Fe. Per cent.	Zn. Per cent.	Sn. Per cent.	Ag. Oz. P. T.	Ni. Co. Cd. Per cent.	Bi. Per cent.
1	0.0006	0.0008	0.0005	.....	.....	.....	.....	.....	.....
2	0.0003	0.0002	0.0010	0.0010	None	.....	.....	.....	.....
3	0.0009	0.0001	0.0009	0.0008	"	.....	.....	0.24	.....
4	0.0016	.....	0.0017	0.0014	.....	.....	0.47	None	.....
5	0.0003	.....	0.0050	0.0003	.....	.....	0.22	.....	.....
6	0.0020	.....	0.0010	0.0046	.....	.....	0.22	None	.....
7	0.0004	None	0.0066	0.0013	None	0.0035	0.14	.....	.....
8	0.0004	.....	0.0038	0.0004	"	0.0035	0.25	.....	.....
9	0.0005	.....	0.0052	0.0004	"	0.0039	0.28	.....	.....
10	0.0003	None	0.0050	0.0003	"	0.0049	0.43	.....	.....
11	0.0003	"	0.0042	0.0013	"	0.0059	0.32	.....	.....
12	0.0005	"	0.0055	0.0009	"	0.0049	0.22	.....	.....
13	0.0005	"	0.0055	0.0007	"	0.0091	0.11	.....	.....
14	0.0004	"	0.0063	0.0005	"	0.0012	0.14	.....	.....
15	0.0001	"	0.0072	0.0003	"	0.0024	0.24	.....	.....
16	0.0006	"	0.0052	0.0012	"	0.0083	0.22	.....	.....
17	0.0006	"	0.0072	0.0011	.....	0.0080	0.23	.....	.....
18	0.0009	"	0.0057	0.0010	.....	0.0053	0.24	.....	.....
19	0.0005	"	0.0050	0.0015	.....	0.0110	0.35	.....	.....
19	0.0005	"	0.0044	0.0011	.....	0.0108	0.35	.....	.....
20	0.0004	"	0.0047	0.0015	.....	0.0072	0.22	.....	.....
20	0.0004	"	0.0034	0.0016	.....	Trace	0.23	.....	.....
21	0.0022	"	0.0010	0.0046	none	0.0081	0.38	None	None

TABLE V.—Analyses of Bullion and Refined Lead.

	Ag. Per cent.	Cu. Per cent.	Sb. Per cent.	Pb. Per cent.
Bullion.....	0.50	0.31	0.43	98.76
Refined Lead.....	0.0003	0.0007	0.0019	99.9971

TABLE VI.—Analyses of Bullion and Refined Lead.

	Cu. per cent.	Bi. per cent.	As. per cent.	Sb. per cent.	Ag. Oz. P. T.	Ag. per cent.	Au. Oz. P. T.	Fe. per cent.	Zn. per cent.
Bullion.....	0.75	1.22	0.936	0.6832	358.89	.....	1.71	.....	.....
Refin'd lead	0.0027	0.0037	0.0025	0.0050	.....	0.0010	None	0.0022	0.0018

TABLE VII.—Analyses of Bullion, Refined Lead and Slimes.

	Pb. per cent.	Cu. per cent.	As. per cent.	Sb. per cent.	Ag. Oz. P. T.	Ag. per cent.	Fe. Zn. per cent.	Bi.
Bullion.....	96.73	0.096	0.85	1.42	about 275*	.....	.....	.....
Refined lead	.....	0.0013	0.00506	0.0028	.....	0.00068	0.0027	Trace
Slimes (dry sample)	9.05	1.9	9.14	29.51	9366.9	.....	0.49	Trace

TABLE VIII.—Analyses of Bullion, Refined Lead and Slimes.

	Pb. per cent.	Cu. per cent.	Bi. per cent.	Ag. per cent.	Sb. per cent.	As. per cent.
Bullion.....	87.14	1.40	0.14	0.64	4.0	Trace
Lead.....	.....	0.0010	0.0022	.....	0.0017	Trace
Slimes.....	10.3	9.3	0.52	4.7	25.32	44.55

\*Silver not given. This was the case, also, with the gold in the bullion. The slimes contained 0.131 per cent of gold, or 59.1 oz. per ton.

The process here described has been patented in the United States, Canada, Mexico, Belgium, France, Great Britain, Germany, Italy, Spain, New South Wales, Victoria and South Australia.

The success thus attained in the electrolysis of lead, generally accepted hitherto as impracticable, may give some encouragement to the employment of similar methods in the treatment of some of the other metals, especially as it is shown to be possible to apply simple means to obviate the chief trouble, spongy deposits.

I wish to express my thanks to Mr. W. H. Aldridge, Dr. Edward F. Kern, and Dr. William Valentine, of the Canadian Smelting Works, for their kindness in giving information and analyses.

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#### SLAVS AS MINERS.

IT is stated upon reliable authority that many of the mine owners of Arizona have decided to give employment hereafter only to such miners as can speak the English language. They believe that this is "a wise decision conducive to harmony, peace and prosperity, in the ranks of the miners as well as in mining circles generally."

The most serious troubles among the coal miners of Pennsylvania are traceable to men of the Slavic races of Europe, who can not speak or understand the English tongue, and who have no idea of the laws of the land or of the rights of others. They profess to believe that this is a free country as they understand freedom, and with them freedom is but the name for lawlessness. They are either anarchists or imbued with anarchical principles. Believing that might makes right, they refuse to listen to reason or justice; they are opposed to all restraints of law or government, and ready to resort to strikes, riots and destruction of property upon the most flimsy pretexts. When their blood is up they are ready to kill anybody, and no mine owner, mine manager, or foreman within their reach can call his life his own. The same conditions prevail in the mineral mining regions of the United States, northwest, west and southwest, the only difference being that the miners of Latin races are less violent and brutal than those of Slavic origin. It is very generally recognized that wherever riots and the destruction of life and property in strikes of miners can be traced home to their incitors, these prove to be men of little or no intelligence or education, as American or English people understand those terms. They are men who cannot read or speak English, who are leaders of others only because they are the most turbulent and violent of the dwellers in the mining camps.

It may well be that this movement of the mine owners of Arizona will prove to be a laying of the axe to the root of the tree of trouble; that it will be very generally adopted as years go by and be productive of great good to the miners themselves as well as to all those who have mining interests.

#### PROPOSED LEAD REFINING AND MANUFACTURING PLANT AT VANCOUVER WITH LEAD ORE WORKING.

(By Henry Sherwood, C.E.)

IT is proposed to establish at Vancouver, B.C., a business consuming B. C. lead by converting it into white lead, lead colors, etc., with pipe and sheet lead, etc., beginning with white lead as a chief staple of the trade. This is to supply B. C. and the Northwest as far East as Winnipeg or Ontario, and for export to foreign ports on or across the Pacific. At present these ports of Canada are supplied from Eastern Canada, drawn chiefly from imports from continental Europe. This home consumption will relieve B. C. of a little of her surplus lead, which must otherwise pay freight to Europe or to Asia. The U. S. tariffs on lead and its products are prohibitory.

In white lead making, it is always desirable to refine at home the lead used to ensure regularity and purity. Therefore lead refining would follow just as soon as white lead making is set agoing. The demand for lead products is constant.

Refining for home use opens a straight path to refining all lead bullion produced in B. C., which now largely goes to San Francisco to refine in bond. The pig lead is thence usually shipped to Asia. Vancouver offers advantages for all this work, and has regular steamers to Asia and Japan and the antipodes.

But in a young country it is difficult to find capital for the safest of enterprises. The proposed business is as yet kept from beginning by a shortage of \$8,000 in the initial capital required, the rest being arranged by business men of the city. Yet the business can ensure a net 50 per cent. per annum on capital employed. Whilst profits to the miner may be uncertain, profit to the user of the miner's produce for manufacturing is steady and certain.

The lead mines of B. C. are developed to produce not under 300 tons of metallic lead a day were they operated. Should 100 tons a day be refined in Vancouver for Canadian consumption and for Asia, this would leave 1,500 tons a week for export to Europe. (The U. S. wants none, except they can stealthily influence their government to allow lead to be received from B. C. and manufactured under bond, then dumped back on Canada or Europe or Asia, keeping the profit of manufacturing themselves.) This 1,500 tons would be lead bullion, to have the silver separated by the buyers, a trade worth bidding for and finding the capital to secure it. The Province proposes to bring her output to this magnitude.

To refine 100 tons a day will require large motive power. But it is lead to refine—not copper, which would follow. The same amperage required to deposit one pound of copper will deposit three and a quarter pounds of lead. It is not supposed here that any other lead refining will be used but by electrolysis. The objection against lead refining by electrolysis giving spongy lead is an advantage in making white lead, and if needed to cast into pig, oxidized scums in melt-



ing are not hindrance in making other lead products, as litharge, red lead, etc.

It will not pay to carry the lead to water power and back, nor will it pay to bring current across wooded mountains amidst the vicissitudes of winter. Vancouver has coal near at hand, cheaply laid down on any of her extensive salt water frontages; coke ovens are constantly at work; wood, girdled and killed by fire, standing up as far as eye can reach around the city in hundreds of thousands of tons, on slopes to salt water navigation, can be had for the labour of getting. In this abundance of cheap fuel lies the certainty of cheap power on any desired scale, not through steam, but by producing "water gas" by the improved and now assured European methods to operate gas engines of large cylinder. By these engines the largest powers can be developed with great economy at a cost for power not exceeding one-fifth of that by steam, and by a cost of plant not one half of the corresponding steam plant. There is also developing petroleum of good quality which must find its way to Vancouver at low price. Engines are now making using gas from crude petroleum, from a small generator alongside the engine which give one horsepower per hour by consuming one-ninth of a gallon of petroleum—value, three cents a gallon. These engines may be seen in constant use; they are made from four horsepower to 125, set in pairs with a centre fly-wheel, giving 250 horsepower, very steady for running dynamos. By the best European gas generators, any quality of fuel can be consumed. They are uncostly to build, are not large, and anywhere that fuel is cheap, large powers are easily provided and attended. This arrangement for power removes the difficulty attending all electric work in Vancouver or generally in B. C. where it may be said that there is a combination of much to refine, little refined, and power to refine at very low cost—assuring to capital a steady unceasing income.

But refining goes after ore reduction. Ore must be made to pay reducing expenses. The conditions attached to lead mining in B. C. are very disjointed. Figure on 20 per cent. lead ores—leave silver out of mind. The present London value of lead contained in this ore is nearly \$10, and this has to pay \$11 smelting charge, and freight to market. Take ore of 45 per cent. content of lead. The lead is worth at London price \$22.30. The smelting charge on this is \$16. Balance, \$6.30. This sum has to bear the cost of concentrating and its loss of silver in slimes; and the freight to market. To refine this gives the miner all the silver contained, to get which costs him in refining (900 lbs. at \$12 a ton) \$5.40, leaving him 90 cents per 900 lbs. of metallic lead production. Not a fat trade! The Government will add \$15 on the lead per ton smelted, and \$4 per ton on the lead refined—until the appropriations are exhausted. The taxpayer has to bear this bolstering up of business. It is a poor grovelling way. A better should be in work before the term of the bounties becomes exhausted.

The first step of the better way undoubtedly is to concentrate the ores as rich as they will bear with little loss. Take now the money—result from lead ore concentrated to 65 per cent.—which is equal volumes of galena (mixed with a little zinc in the ore and little iron) and of gangue of 2 1-2 sp. gr. The lead in this concentrate is worth \$31.18. The smelting charge is \$16. The balance is \$15.18 for the lead, in place of \$6.30, showing that it is more costly to melt off gangue than to concentrate it off. The extra concentrating is merely arrangement, not cost, for the same work done. Concentrating is therefore the first step to advance in. Wet concentrating will always carry off rich slimes. It has been computed that in the silver-copper ores of Montana 20 per cent. of the values are carried off by water as slimes, which are many times richer than the concentrates left behind. By dry concentration every particle of this is saved, through using the lighter menstruum, air, in place of heavy water. Thus 90 to 95 per cent. of the whole values of mineral can be saved. And further, although the crushing and its necessary power is the same in all cases, the dry concentrators are not one-fourth of the cost of wet, and any mechanic can so construct it that the ore may be taken from the ore dump, and passed without handling until it is roasted ore ready for the smelter, which will now be described.

The cost of lead smelting as practised on this continent is excessive. Lead can be smelted more cheaply than copper is put into rich matte. Every British engineer from Europe knows the old Scotch or Cumberland hearth for lead: its low cost of building, its uncostly working for a small scale of operators. Less than \$500 has built many a one. To work the same principle of smelting on the large scale, a tower roaster getting through about 40 tons a day has to be used. With this adjunct the cheapness of the Scotch hearth in working has been imitated, aided by the electric current, forming a furnace not dissimilar to that employed for many years past in smelting aluminum at Pittsburg, Pa., and at various places in Europe, but with a very moderate current, smelting a large volume of rich concentrates of lead; 100 tons to 400 tons of such concentrates is easily reduced to metal, and having roasting towers of proportionate capacity. The economy is great. Zinc contained in the ore is not wasted, but recovered in chambers as fumes from the roasters. Silver and gold are taken up by the lead. The slag is clean, except at times a little sulphate of lead, which easily unites with slags. The cost of plant is not one-third of the American smelter. The cost of labour is considerably less. The cost of current is the greatest item, but is not more than that of fuel unusually employed. The roaster requires little other fuel than the sulphur of the ore. The totally new work of this age necessitates cheap power for electric current, which is shown above to be within the grasp of every individual mine. None of the processes need a gigantic scale of working, but can be built up from small uncostly beginnings, doing the work with no other freights or handlings except for finished metal.

## THE ROSSLAND PYRRHOTITE DEPOSITS.\*

(By Charles W. Dickson.)

**A** WORD about the Rossland, B.C., pyrrhotites may not be out of place. The writer has to thank Mr. R. W. Brock, of the Geological Survey of Canada, who has been one of the chief workers in this Province, for the latest data.

The ore bodies here, while not carrying nickel in any quantity, have the same general associations as at Sudbury; and it is now fully established that they are of secondary aqueous origin.

During the trial of the suit of the Iron Mask Mining Company against the Centre Star Company, in 1899, evidence was submitted by Messrs. Clarence King, Waldemar Lingren and R. W. Raymond as to the nature of these deposits.

Stated briefly, the Rossland district forms part of a huge system, reaching from Cape Horn to the Arctic, and has been involved in the enormous dynamic and volcanic effects which this region has undergone from early geological times. Following the folding of the dynamic periods, the deposition of mineral matter in the fissures and along lines of weakness took place. In connection with most of the ore bodies three types of rocks are represented.

1. A monzonite, often carrying pyrrhotite, and with the original structure more or less obliterated.
2. A darker, coarse-grained rock of the gabbro family, consisting of augite and triclinic feldspar, with little or no orthoclase.
3. The third is composed largely of hornblende and orthoclase. These types are doubtless local variations of the same magma, but of successive flows.

The veins are considered as distinctly of the fissure type, and many of them are of the "shear zone" variety—*i. e.*, consisting of a number of more or less parallel seams, with little displacement and no open fissures. The depth of the fissuring permitted a circulation of deep-seated thermal waters and a deposition of the chemicals carried in solution along the lines of weakness by a decomposition and replacement of the rock-minerals. The final result is either: (1) a deposition of the ore on one plane or fissure of the "shear zone," or (2) a replacement of the rock between two planes, or (3) the replacement of a whole zone, and so on with endless variations. The replacement of the rock-minerals by ore (largely chalcopyrite and pyrrhotite) took place molecule by molecule, producing what is really a pseudomorph. The replacement is well seen near the Iron Horse mine, where large diallages or augites have changed to ore, while the surrounding country rock was only partially transformed.

The replacement has, at times, been so intense that an almost solid body of sulphides (with quartz and calcite) results. In other places the original rock,

more or less modified and silicified, has been only partially replaced and impregnated with ore.

Messrs. King, Lingren and Raymond were practically unanimous in their interpretation of the phenomena of the district, which agrees very closely with that of the Canadian Geological Survey, though the more recent work shows that slight modifications of the rock relations are necessary.

Briefly, the geology and relative ages of the rocks of the mining districts are as follows:

1. The oldest series represented is classed as the Kootenay volcanic group, consisting of augite-porphyrates, tuffs, ash beds, etc., Paleozoic age.
2. Next comes a granite or grano-diorite (Nelson granite), probably Jurassic.
3. The Rossland monzonite, probably post-Jurassic.
4. Conglomerate, probably Tertiary.
5. Alkali (Rossland), granite and syenite.

The ores may occur in any of the rocks older than the alkali granite. This granite, whose main development is outside the limits of the Trail Creek sheet, is probably a tertiary eruption, and its dykes have penetrated all through the Rossland district.

As it happens, the principal mineralization is in the augite-porphyrates and monzonite, probably on account of the fracturing and cutting of these rocks by dykes, together with their relative solubility. The chief factor controlling the location of the mineralization seems to have been the alkali-granite contact and its system of dykes, the eruption of which *immediately preceded the formation of the ore bodies*. The deposits are found where the dykes are particularly abundant.

The monzonite is the chief centre of mineralization, but it is not to be considered as a volcanic neck, with the augite-porphyrates and tuffs as part of the cone. These latter are much older and are cut by the Nelson granite. The occurrence of the ore has no relationship to the contact of the monzonite, being found both *outside* and *inside* its boundaries and in the younger rocks.

While magmatic differentiation has gone on to some extent, the *sulphides* are not the result of it, as is proved definitely by the work of the Survey.

A peculiarity of the rocks in which the ore occurs is that, while sheared and fractured, they are not brecciated, the dynamic movement having doubtless taken place under an immense load.

With reference to the ore bodies themselves, some interesting points are brought out. The ore replaces the country rock, partially or completely, starting from some fissure or line of fissures and often fading out gradually, the only "wall" being a commercial (economic) boundary. It may end abruptly at a fissure, in some cases due to a slip, which brought an unmineralized face against the ore.

Deposits very similar to those in the eruptives are found in the conglomerate (No. 4), which cannot be regarded in any other way than as of secondary origin.

The marked similarity of the geological relations in Rossland and Sudbury help to make clear some of the more obscure points in the latter district. As the

\*Extracts from a paper on the ore deposits of Sudbury read before the American Institute of Mining Engineers, February, 1903.

conditions of metamorphism, however, were not identical, the dynamic movements have manifested themselves in different ways, and it is not surprising that there should be striking dissimilarities. This difference is seen in the characteristic structures of the ore bodies in the two districts. In Rossland, the fissure or shear zone type of vein is predominant, with little or no sign of brecciation. In Sudbury, on the other hand, where the dynamical movements probably took place under a very small load, a brecciation from faulting on a large scale and, probably with considerable movement, is characteristic. This will be brought out more clearly in speaking of the individual deposits.

This brief review indicates the wide differences of existing opinion as to the origin of pyrrhotite and the various interpretations which have been put upon the same phenomena.

Division should comprise that section of country within the Province forming the drainage areas of North Fork of Kettle River, of Fourth of July Creek, and of the main Kettle River below the junction of such creek. This re-arrangement removed the western boundary of the Kettle River Division westward from Rock Creek, its former western boundary, to the neighbourhood of Camp McKinney, and also included in the division the West Fork and other mining camps on creeks flowing into the main Kettle River from the west. A glance at a recent map of the district will serve to show the large area covered by the Kettle River Division, the name of which was, on May 1 of the current year, changed to that of the Greenwood Mining Division.

For years the office of the mining recorder for the Kettle River Division was at Midway, but eventually it was removed to the more important and populous



### GREENWOOD.

A MINING, SMELTING AND COMMERCIAL CENTRE.

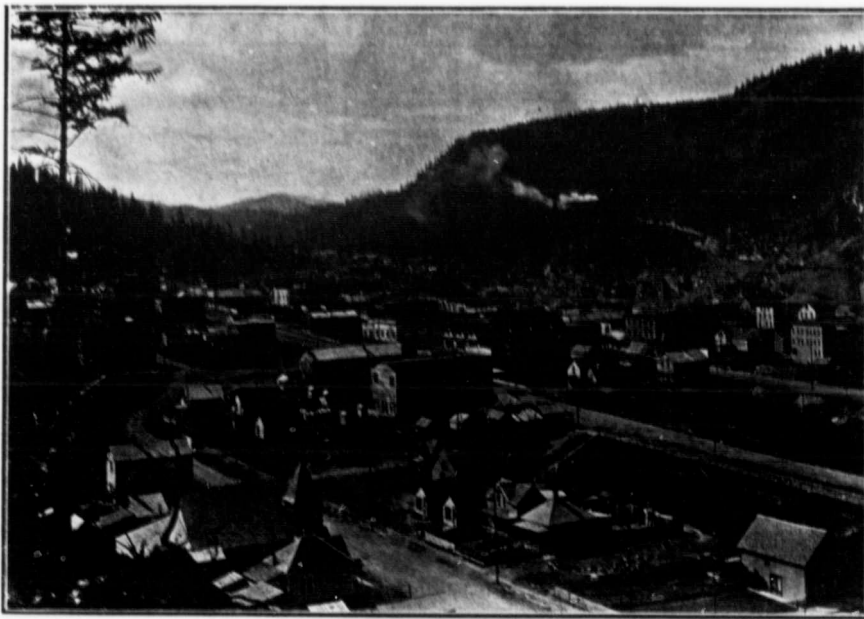
(By our Special Commissioner.)

**T**HE Greenwood Mining Division includes the greater part of the Boundary country. For many years it was known as the Kettle River Mining Division, and up till 1898 it included the Grand Forks Mining Division. On January 1, 1900, a general re-arrangement of boundaries of mining divisions took place, and under this it was provided that the Kettle River Mining Division should comprise that section of country within the Province forming the drainage area of the Kettle River above the point where such river is joined by Fourth of July Creek, near Carson, and that the Grand Forks

town of Greenwood. Owing to its extensive area this division has been given several sub-recording officers, for the convenience of prospectors and others, who might otherwise have to travel long distances to reach Greenwood. These sub-officers are at Beaverdell on the West Fork, at Camp McKinney, and at Vernon, and they have to report to the record office at Greenwood. The better known mining camps in this division are those of Camp McKinney, West Fork, Canyon and other creeks flowing into the upper main river, Rock Creek, Graham's part of Central, Smith's West Copper, Copper, Deadwood, Kimberley, Long Lake, Providence, Skylark, and part of Greenwood or Phoenix camps. The more prominent mines in these camps are the Cariboo-McKinney, a dividend-paying gold-quartz mine, at Camp McKinney; Carmi, up the West Fork; No. 7, in Central Camp; Ruby and Re-

public group, in Smith's camp; King Solomon and Copper Mine, in Copper camp; Mother Lode, Sunset and Crown Silver group, and Morrison, in Deadwood camp; Jewel, in Long Lake camp; Gold Bug, D. A., Strathmore, Providence and Elkhorn, in Providence camp; Defiance, Goldfinch, E. P. U. Mines and Skylark, in Skylark camp; and the Granby Co.'s Old Ironsides and Knob Hill group and the Brooklyn and Stemwinder, at Phoenix. Several of the mines in the Grand Forks Mining Division send ore to the Greenwood and Boundary Falls smelters, including the B.C., Emma, Oro Denoro, Golden Crown, Winnipeg, Athelstan and Snowshoe mines. In the Greenwood Mining Division the Mother Lode, Sunset, Morrison, Providence, and Elkhorn, also ship ore to local smelters.

mercantile business that has since developed into the important trading concern of Rendell & Co., in which the enterprising founder still retains an interest. In those days of tardy transportation and slow communication progress was not rapid, but the new town grew, Mr. Wood during the years immediately following throwing into the work of making it accessible to the several surrounding embryo mining camps much energy, and expending money freely, in both of which he was heartily supported by the pioneer residents of the town and neighbourhood. Trails were cut and wagon roads made, these connecting Copper, Deadwood, Greenwood (now Phoenix), Summit, Long Lake and Kimberley camps with Greenwood, which thereafter became the business centre of the district for many miles around.



Greenwood, looking south west, B. C. Copper Co.'s Smelter in background.

Turning now to Greenwood City, the financial and commercial centre of this mining district, it may be noted that the town is about eight years old. In the fall of 1895 Mr. Robert Wood, well known in the Province as an enterprising pioneer, journeyed from Armstrong, in the Okanagan district, down to the Boundary country, then coming into public notice. Sitting one day by a cabin at the junction of several trails near where Twin Creek flows into Boundary Creek, the idea occurred to him that here was a suitable site for a town. Having come to this conclusion he at once set about securing rights to the land, which had already been taken up either by pre-emption or as mineral claims. Before the winter closed in he had erected a store building wherein was established the

On July 12, 1897, Greenwood was incorporated as a municipality, and shortly afterwards Mr. Wood was, by acclamation, elected its first mayor. Having power to levy rates, money was raised wherewith to make public improvements, and during 1898 quite a transformation was made in the appearance of the growing metropolis by the grading of streets, making sidewalks, etc. Fire, police and health departments were established, and a water supply system was put in. The first valuation roll for assessment purposes showed a total value of property within the city limits of \$211,035. To-day the total value is between six and seven times that amount, so a considerable increase has taken place during the intervening five years. The present mayor is Mr. Ralph

Smailes, managing partner in the firm of Rendell & Co., and the aldermen are Messrs. D. A. Baunerman, H. Bunting, Thos. M. Gully, W. J. Kirkwood, Kenneth McKenzie and Duncan Ross. Mr. G. B. Taylor is city clerk, and Mr. I. H. Hallett, police magistrate. The city some time since purchased 320 acres of land situate north of the town for park and cemetery purposes. The population was given in the last Dominion census returns as 1,350, but there were numbers residing just without the city limits not included, so that the actual population of Greenwood and vicinity was larger than these figures showed.

The Dominion Government is represented in the town by customs and inland revenue offices, with Mr. Hugh McCutcheon as collector, and by a post

Mr. F. M. Elkins, deputy sheriff. A fine court house was recently built in Greenwood at a cost of about \$20,000.

Greenwood makes a creditable showing in financial, commercial and industrial matters. The Bank of Montreal, Bank of British North America and Canadian Bank of Commerce each has a branch here. The Bealey Investment & Trust Co., Ltd., is a local institution, whilst other loan, investment and insurance companies have agencies in the town. The Greenwood Board of Trade is one of the most active organizations of the kind in the interior of the Province, and its record of work done during the half year ended June 30th last, was one that would do credit to a much larger town. The Greenwood mercantile establish-



General View B. C. Copper Company's Smelter at Greenwood.

office, Mr. K. C. B. Frith being postmaster. The Provincial Government offices here are in charge of Mr. Wm. Graham McMynn, who is Government Agent for the Boundary district, stipendiary magistrate and gold commissioner for the Greenwood Mining Division, and holds as well several other government appointments. Greenwood is a Supreme Court registry, and Courts of Assize are held here periodically by a justice of the Supreme Court. His Honour Judge Leamy, County Court judge, holds County Court sittings wherever necessary. Mr. McMynn is registrar of both Supreme and County Courts and he holds Small Debts Court whenever required. Dr. Geo. M. Foster is district coroner and

ments are large and well-stocked, and of the numerous hotels in the town the Imperial is the leading house. The local newspaper is the *Boundary Creek Times*, edited by Mr. Duncan Ross. The Canadian Pacific Railway Co. has a telegraph office here, and the Vernon & Nelson Telephone Co. makes Greenwood its chief office for the district, in which it has both local and long-distance telephone systems. There are several industrial establishments in the town, which also has electric light works and a water supply system. There are several labour unions here, and delegates from these bodies constitute a Trades and Labor Council.

The professions—medical, legal, civil and mining

engineering, surveying, etc.—are together more numerously represented in Greenwood than in any other Boundary town. The churches are, Church of England, Roman Catholic, Presbyterian, Methodist and Baptist, and each has its own church building. The public school is a large building, provision having been made for an increasing attendance as the town shall grow in size. There is a public reading room provided by the W. C. T. U. Secret societies having lodges are the A. F. and A. M., Odd Fellows, Knights of Pythias and Eagles. Cricket, football, tennis and baseball for summer, and skating and curling for winter provide amusement in variety. The Sisters of St. Joseph of Peace have a hospital at which medical and surgical attendance and good nursing are always available in case of need. Villa residences are numerous in and around the town, and the residents are generally sociable and hospitable. The Greenwood Club freely extends welcome to visitors.

The B. C. Copper Co.'s smelter, at Greenwood, and the smelting works of the Montreal & Boston Copper Co., at Boundary Falls, three miles away, constitute with their tributary mines the most important industry of the vicinity. The former is running two blast furnaces and is preparing to install more furnaces and a copper converter. The manager, Mr. J. E. McAllister, took charge about four months ago, after several years at the Tennessee Copper Co.'s reduction works in Tennessee, and he is stated to be well maintaining the earlier reputation of the Greenwood smelter for a big average tonnage and low costs. Similar good work is being done by Mr. A. I. Goodell, superintendent of the Boundary Falls smelter, where two furnaces are in operation and a third being put in. It is planned to install a converter plant here too, and other improvements and extensions will be made as soon as a regular and sufficient supply of coke is assured.

The biggest mine near Greenwood is the B. C. Copper Co.'s Mother Lode, which has been in continuous development ever since the company's present general manager, Mr. Frederic Keffer, M.E., first took charge of it as a mere prospect in the fall of 1896. Now it is equal to a daily output of 800 to 1,000 tons of ore per diem. The gold-quartz properties in the immediate vicinity of Greenwood have come into prominence during the past twelve months. The Providence has made a remarkable showing for a small mine, having shipped nearly 500 tons of ore, most of which ranged from \$150 to \$245 per ton in all values—gold, silver and lead. The property was bought last year for \$50,000, which sum has been paid to the seller. The owning company is now out of debt and is confident of hereafter making good returns to its comparatively few shareholders, who are chiefly local or Chicago men. Nearby is the Elkhorn, which is also doing well, having similar ore to that occurring on the Providence and also being free from financial difficulties. Within half a mile is another high-grade claim, the Gold Bug, from which ore sent to the smelter has yielded returns up to \$150 per ton. These several claims are just outside of the town to the northward. On the east and within half a mile of

the business centre are the Gold Finch and the E.P.U. Mines, adjoining properties that have ore of a high grade and that pay a good profit above cost of mining and treatment. A dozen more quartz claims situate in the vicinity of the town are being prospected, with promise of developing into paying propositions. Of these the Defiance is best known, and it is in the hands of Mr. Wm. Fowler, who has been successful in opening up other like properties.

The greater part of the district for miles around Greenwood is located as mineral claims, many of them having good showings of mineral and wanting only the requisite capital to develop them into shipping mines. Besides the business from prospecting and mining the town gets much trade from smaller towns in the district, and from farming sections to the south and west. Anaconda, Deadwood, Boundary Falls, Midway, Rock Creek and Camp McKinney all do business with Greenwood, whilst market gardeners about Boundary Falls and Midway, and farmers along the Kettle valley, and up in a flourishing agricultural section known as the Anarchist Mountain district, sell most of their produce in Greenwood, which they consequently make their market town. Then there are, besides, six stage lines running between the town and various parts of the district, and these bring travel and business to benefit the stores and hotels of Greenwood. Altogether there is much to back up Greenwood's claims to be the metropolis of the Boundary and it will not be the fault of the townspeople if it does not become so.

## GRAND FORKS.

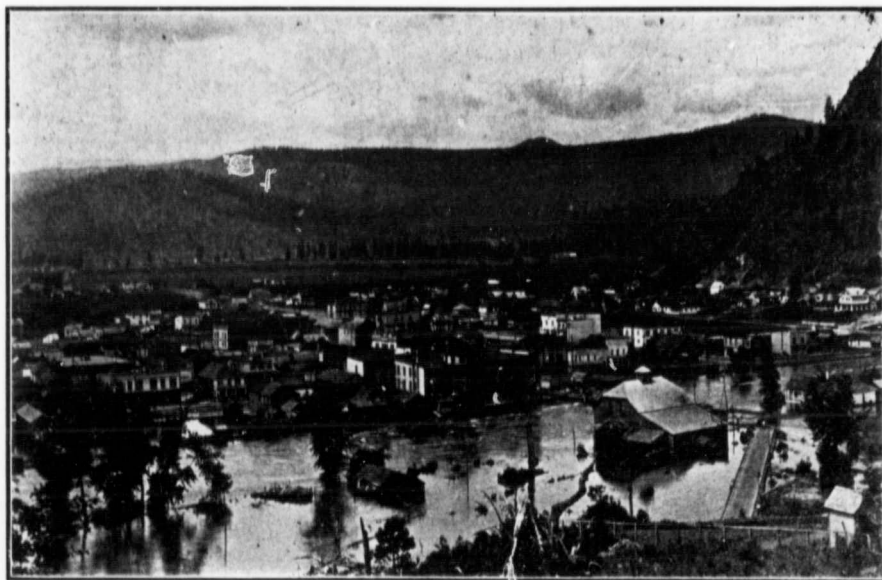
THE "GATEWAY CITY" OF THE BOUNDARY DISTRICT.

(By our Special Commissioner.)

THE towns of Grand Forks is picturesquely situated at the confluence of the North Fork with the main Kettle River. It is the commercial centre of a wide and fertile valley, having an estimated area of about 20,000 acres, much of which is suitable for agricultural and horticultural purposes. This valley, surrounding what is now the thriving town of Grand Forks, was long known as Grand Prairie, and it was not until after pioneer prospectors had begun to call insistent attention to the promising nature of mineral outcrops in the mountains to the north and west that, eight to ten years ago, the nucleus of the present town was formed. Gradually it increased in size and population as the mining resources of the district were developed, until eventually the construction of a railway and the establishment of smelting works together gave it an impetus that has continued, until now it has grown to be the largest and most populous town in the district. A few years ago another town was started on an adjoining site immediately north of Grand Forks, and for some time there was much opposition and rivalry between the two towns, both of which became incorporated. Finally, though, an amalgamation of the two towns, Grand Forks and Columbia, was arranged, and now they are combined under the better-known name of the larger and older town.

Grand Forks has a population of about 2,000. Its leading business men are energetic and enterprising, and its residents generally are confident that it will more and more, as time passes, prove its right to be called the metropolis of the Boundary district. It certainly possesses many advantages that assist in building up a town. The site of the town is a most favourable one in its physical conformation, the climate is bracing and healthful with no great extremes of heat or cold. Spring opens early; summer is not excessively hot in the daytime, whilst the evenings are pleasantly cool; autumn is generally marked by a month or two of delightful weather known as "Indian summer," and winter is comparatively short with a light snowfall and but few very cold days. As a residence town it is in much favour in the district, as evi-

was \$275,143; in 1899, \$506,667; in 1900, \$964,645; in 1901, \$1,003,900; in 1902, \$1,037,710, and in 1903 (including Columbia), \$1,399,650. Of this last sum \$844,135 was the value of the land in the city, and \$555,515 that of the improvements. Including in the city's assets are the following: Waterworks plant and material, \$73,666; electric light plant, \$38,000; schools, \$25,300; fire department equipment, \$8,000, and city real estate and buildings, \$7,000. Power for operating both electric light and waterworks plants is obtained from the Granby Company's works nearby. The City Council for 1903 consists of Mayor Martin Burrell, and Aldermen M. R. Feeney, Robt. Gaw, M. S. Martin, Neil McCallum, Norman McLellan and Jno. Peterson. Mr. W. B. Bower is city clerk, and Mr. J. A. McCallum, city treasurer.



Grand Forks—North Section.

denced by the comparatively large number of pretty villas and other comfortable home-buildings erected in it. Good water and electric light systems, excellent educational and religious advantages, several fraternal organizations, clubs and societies for outdoor pastimes or indoor amusements, and the social advantages usually found in provincial towns—these combine to encourage home-making here, with the result that resident families are becoming numerous.

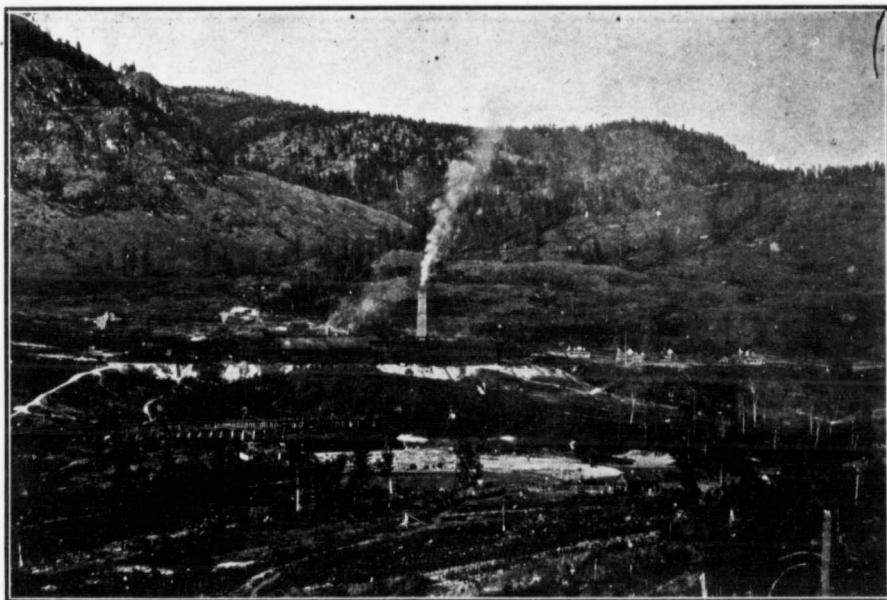
Whilst an increase in the valuation for assessment of city property is not necessarily a thoroughly dependable evidence of enduring progress, the large advance in the total value for purposes of civic taxation is very significant, and may in this instance be taken as demonstrating in some measure the marked advance the town has made during the six years for which figures here follow. In 1898 the total value

The principal local industry is that carried on at the smelting works of the Granby Consolidated Mining, Smelting & Power Co., Ltd. This company owns the biggest copper mines in the Province, situate near Phoenix, in the mountains west of Grand Forks. The aggregate output of these mines from the time ore-shipping commenced in July, 1900, to June 30 of the current year, was 769,686 tons, or more than three-fifths of the total ore production of the whole of the Boundary district, and all this ore besides custom ores received from other mines, was smelted at Grand Forks. The Granby Co.'s smelter, with its six blast furnaces and two stands of copper converters, is the largest and most modern industrial establishment of its kind in the Province, and its economical methods and unusually low smelting costs have attracted much attention. The smelter plant is operated by electric-

ity, partly generated at the company's own power works and partly obtained from the Cascade Water Power & Light Co.'s works at Cascade, a dozen miles east of Grand Forks. Other industries established in or near the town are a sawmill, sash and door factory, well equipped foundry and machine shop, brick yard (which turns out the best bricks made anywhere in the Boundary), two breweries, bottling works, etc.

Two chartered banks—the Eastern Townships and the Royal Bank of Canada—have branches here, besides which the British-American Trust Company, Ltd., a local company having an authorized capital of \$100,000, does a general financial and trust business in the district and is arranging to extend its op-

new district. Mails are received and despatched twice daily by the postmaster, Mr. Geo. H. Hull. The town has several large general stores and a number of other places of business. Its big leading hotel, the Yale, was built and furnished at a cost of about \$50,000. Two telegraph and one telephone (long-distance and local) systems facilitate speedy communication. Three railways add to the importance of the town—the Canadian Pacific Railway Co.'s Columbia and Western road connecting with Greenwood and Midway to the westward, and Rossland and Nelson in the opposite direction; the Great Northern giving rail communication with Spokane and Republic, respectively; and the Kettle Valley and Republic line providing a competing road between Grand Forks and Republic. Two weekly



Granby's Co.'s Smelter, Grand Forks.

erations to outside places promising good business. Grand Forks is the customs "port" for the whole of the Boundary, the "sub-ports" of Cascade, Greenwood, Midway, Sidley, Osoyoos and Keremeos, having to report to it. Collector of Customs R. R. Gilpin was one of the early settlers in the Kettle River valley. The office of the gold commissioner and mining recorder for the Grand Forks Mining Division is here, these positions being filled by Mr. Sydney R. Almond, who is also registrar of the Supreme and County Courts and holds as well other Provincial Government appointments. The County Court judge, His Honour Judge Leamy, resides in Grand Forks, and here, too, are the headquarters of the chief license inspector for the Boundary License District. The local post office does a surprisingly large mail, postage stamp and money order business for a comparatively

newspapers are published locally, and much publicity is given the town in outside newspapers of the Province and elsewhere. The town also has a Board of Trade.

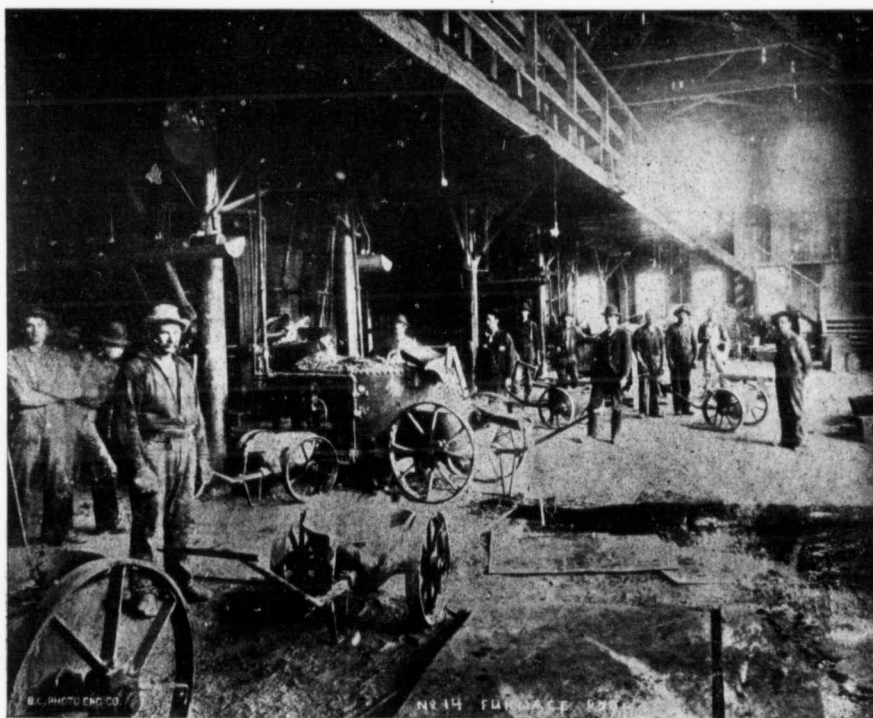
Reference has already been made to the many residences as a marked feature of Grand Forks. The local public school is the finest school building in the Boundary; a substantial and commodious stone and brick structure costing, with fittings and furnishings, more than \$20,000. There being the requisite number of pupils who have passed the necessary entrance examination, an application is being made for the institution here of a high school. Five churches have erected church buildings here, viz., the Church of England, Roman Catholic, Presbyterian, Methodist and Baptist. Fraternal societies are represented by lodges of Free Masons, Knights of Pythias, Odd



Fellows and Foresters. Athletics and other outdoor sports and pastimes, including skating in winter, are entered into with much zest, whilst in horse racing the town leads the district, holding important race meets periodically on its own improved half-mile track made on a 27-acre level purchased site, situate just across the river from the town.

Some of the early settlers in the valley acquired large holdings of land, and several have since sold small blocks until there are a number of small holdings in cultivation in the neighbourhood of Grand Forks. With the extension of the mining and smelting industries of the district that now seems assured, there must develop an increasing demand for agri-

The Riverside Nurseries contain all the best-known varieties of fruit and ornamental trees and shrubs suitable for the climate of the interior. It is a revelation to visitors to see here thousands of apple and other fruit trees, maples, lilacs, roses, etc., and the value of this industry cannot but be obvious to all interested. Commercial horticulture will undoubtedly assume considerable importance in the Kettle River valley in the near future. The climate and soil are admirably adapted for producing fruit of a high quality. At present only about 200 acres are devoted to orchard, but with a good local demand and an illimitable market in the North West Territories the acreage will undoubtedly be increased rapidly. Apples, pears,



Furnace Room, Granby Smelter, at Grand Forks.

cultural and horticultural products. The orchard of Mr. W. H. Covert is one of the show places of the district, and the farm properties of other early settlers in the vicinity are also object lessons as to the resources of the valley in this direction. One of the most interesting and valuable features of the valley is the large and well-stocked establishment known as the Riverside Nurseries, situate about four miles east of Grand Forks. The proprietor, Mr. Martin Burrell, for some years had charge of the Dominion Government Fruit Experimental Station in the Niagara District of Ontario. After about twenty years' horticultural experience in the East he settled in this valley.

plums, prunes, cherries, and all the small fruits, succeed admirably. The most prominent of the insect pests that so seriously hamper fruit-growing in the East are unknown here. Nor does the fruit-grower have to wait so long for his returns as does the Eastern horticulturist, for early bearing in the special characteristic of fruit trees in the West. Another immense advantage is the complete immunity in this valley from fungous diseases. This is due to the altitude, which is about 1,700 feet above sea level. The "rot" of the plum and cherry, the "apple scab," and the various mildews are unknown, and this fact tells heavily in the final results of orchard work. It

will not be many years before the great possibilities of the Kettle River Valley in a horticultural direction will be recognized to something like an adequate extent.

Lumbering, too, will sooner or later attract capital and this industry be developed in the district as the immense timber resources of the North Fork and its tributary streams become known. Pine, spruce, fir, cedar, tamarac, and other valuable woods, grow in abundance well up the East Fork of the North Fork, and several extensive timber limits have already been secured. An effort is being made to obtain capital for the extension of the Kettle Valley Railway up the North Fork, the forest wealth of which added to the known mineral resources of the upper country would contribute a large freight traffic to a railroad.

There are in the Grand Forks Mining Division numerous mining properties, some producers on an extensive scale and many others full of promise for the future. The Snowshoe, Winnipeg, Golden Crown, Athelstan, B. C., R. Bell, Oro Denoro, Emma, City of Paris and Majestic mines have together contributed materially to the mineral production of the Boundary.



Grand Forks, South Section.

On Observation Mountain, close to the town, mineral locations have been made, and on Hardy Mountain, three miles distant, the Yankee Girl group is a well-known property. Recent developments on the Betts and Hesperus group, on the west side of the latter mountain, now being operated by the Hesperus Gold Mines Company, of Chicago, show the occurrence here of a big body of ore, the full extent of which has yet to be determined. Negotiations are now proceeding for the purchase by Michigan capitalists of the Volcanic, with its immense mineral showing, the Fantine group, Mr. W. Bentley's group of five claims, and other neighbouring properties. Other North Fork claims are the Humming Bird, which has shipped 600 tons of high-grade ore; the Seattle, now being worked by the Canadian Smelting Co., of Trail; Strawberry, Little Bertha, Golden Eagle, and, among many others, the Pathfinder on which a power plant has been installed and which has been extensively developed

with encouraging results. Only very brief mention may now be made of Franklin camp, up the East Fork of the North Fork, to which a much-needed wagon road is in course of construction. Among numerous locations, the Banner, McKinley, Gloster and Polard are prominent, and the camp for size of ore bodies, so far as shown by the limited amount of work done, and specimen assay values, compares favourably with older camps when at a similar stage. Up the West Fork of the North Fork the B. C. Coal Co. has coal lands on which two seams of coal have been exposed, but although the prospects are regarded as very favourable little will be known of this section until after the locality shall have been extensively prospected by means of a diamond drill.

Summing up the position in relation to Grand Forks, it may be stated that with its advantageous location—where three valleys converge—its varied resources, the facilities it possesses for industrial development, its mild climate, and the enterprise and energy of its citizens, there are good grounds for the confidence of its residents that it will continue to maintain its position as the largest town in the Boundary District.

#### GEOLOGICAL CHARACTERISTICS AT HOWE SOUND.

FROM an article recently contributed to the Vancouver *World* by Mr. Ellis Mallery on the subject of the geological conditions at the Britannia mine, we extract the following:

"The mineral belt in which the mines are located is some twenty miles long and has a general trend of south 70 degrees east and north 70 degrees west. The eastern and western limits show decided curves and the whole presents the appearance of a rude letter with the eastern extremity pointing south and the western pointing north. The present configuration of the country has but little influence on the general trend of the belt, which cuts across country regardless of elevation or depression; down under Howe Sound itself; out either side; up and through the tops of the highest mountains. The part of this belt that can and will be profitably exploited covers six to eight miles of its length. The part of which this paper treats most, is situated in Britannia Mountain and controlled chiefly by the Britannia syndicate. Along and across the apex of this mountain the ore bodies are the largest and are extensively developed over territory comprising the length of ten claims or nearly three miles.

"The rocks constituting the belt are much the oldest of any in the district. They are paleozoic sediments chiefly made up of slates and quartzites. The quartzites underlie the slates and belong to the Cambrian. They may be even older, at least, in part, but it is hardly safe to mark a division as yet. They are highly crystalline and very massive as are also the overlying Argelites. The slates, which are still considerable in the country, are the remains of strata, the original thickness of which we have no means of knowing; subsequent erosion and the en-

croachment of the granite having obliterated the evidences. But they were probably very thick as they were laid down during times that extended over several periods, beginning in the Silurian and reaching up into the Jurassic. Several unconformities mark different stages in the times intervening; but the present state of the country is too complex to allow of much more than conjecture concerning this interesting age. The schist which is the leader through the country and the principal horizon of the 'ores' is a highly altered product of these old sediments. They were formed chiefly from the upper levels of the quartzites although in places the lower margins of the slates were sheered and sheeted; this sheeting being along or very nearly along the original bedding planes.

"The ore bodies are contact metamorphic deposits and are the result of eruptive after-action. They are not contact deposits of the orthodox sort which require the 'ore' to be in the contact planes; but are adjacent to the contact and occupy positions in the schists conforming with them both in strike and dip, *i. e.*, south 70 degrees east to 74 degrees east; dip 65 degrees to the south. This is only approximately correct, as post-fracturing and faulting has localized differences. They are sulphide deposits, chiefly iron and copper, with some gold. Their development is very extensive even unto gigantic. In no other known part of the world have such enormous exposures of 'ore' been laid bare by natural processes. The Mammoth Bluff, usually termed a 'mountain of ore,' is really the foot wall side of a true fissure vein exposed for 600 feet along its strike and with an average perpendicular height of 200 feet. Cross-cut tunnels at the base level have failed to reach the hanging wall in near 200 feet."

The writer arrives at the following conclusions:

1. That the largest ore bodies in Britannia Mountain are the result of general eruptive after-action, and were deposited as first concentrations by ascending mediums bearing metallic salts in solution.

2. That by metasomatic processes the schist for great lengths and widths was completely replaced by ore; thus necessitating a very strong and deep-seated circulation.

3. That such ascending mediums under lessening temperature and pressure deposit their burdens at different levels along the route and here that copper sulphides seek the lower horizons. These three deductions speak for the continuance in depth of the present size and tenor of the ore bodies with a gradual change in favour of copper. As further proof of copper below, post fractures in the ores of first concentration have been filled with sulphides of a second concentration; the latter caused by rising hot waters set in motion by the near approach of igneous rocks. These waters reached the lower bodies of some of their contents and carrying them upward re-deposited them on the unaltered sulphides above as secondary enrichments. Thus were the processes that have concentrated in Britannia Mountain ore bodies that rank with the largest and best in the world. The practical man has measured up two million tons of workable

ore; the theoretical man sees ten million and feels very sure of his ground. With the natural facilities at hand and the proper equipment, a conservative estimate of the profit per ton of this ore is three dollars, or thirty million for the whole. The profit represents less than one-third the actual value of the ore, or in other words one hundred million dollars as it stands in the mountain. It is sufficient to say that the extraction of this great wealth means the centering here of a copper camp unequalled on the Pacific Slope.

#### ELECTRICAL IGNITION OF MINERS' LAMPS.

**I**N a paper read before the Institute of Mining Engineers, on this subject, the author points out that the time taken up in cleaning and lighting of single lamps by hand is considerable, and the great majority must of necessity be lit hours before they are required, leading to a serious waste in the consumption of oil. In the lamp room of a colliery of any size there are 1,000 lamps probably, requiring the service of five or six men in the cleaning department, and a similar staff for the examining and preparing of the lamps, occupying from two to three hours in this latter operation alone. It will readily be understood that any arrangement whereby this waste of time and material can be minimized would be of great value. The speaker, in approaching the question, said that during the last four or five years his efforts had been concentrated upon this point. Whilst he had experienced no difficulty in igniting a spirit lamp or a very low flash-point oil, he had experienced great difficulty in electrically igniting an oil of the flash-point suitable for colliery use. This difficulty, however, had been overcome, as with the apparatus exhibited and described he could ignite an oil 300 or, if necessary, 500 flash point, but the latter high flash point he contended was unnecessary, as a good light can be obtained with a 300 flash point with absolute safety. The lamps were ignited in series of twenties; they were placed in shallow porcelain cups, through which protruded a single pole, fixed to the lamp rack. The current passed through the whole body of the lamp to the burner, which was of copper. At the bottom of the glass was a copper ring insulated by a porcelain cup, which passed under the glass to the burner; ignition was made by a combined switch and ignited, attached to the other pole, which, being brought into contact with the copper ring, induced sparking at the burner, igniting the oil. By this arrangement 1,000 lamps could be lit in something under fifteen minutes.

The chief advantages of this system of electric ignition, he pointed out, were that the lamp was ignited without the aid of platinum wire, or lighting pins, or insulating vulcanites passing through the lamp vessels. The arrangement of having only a single pole in the lampstand prevented sparking of the poles, which was sometimes present in other systems where the two poles were side by side. The system was usually installed by contract, 200 to 1,000 lamps and appliances being supplied at a charge of 3 cents per lamp per day, the contractor supplying everything excepting breakages of

glass and cleaning, including oil, wick, dynamos, switches and all apparatus, and doing all repairs.

### BRITISH COLUMBIA IN LONDON.

(By our Special Correspondent.)

**A**LTHOUGH interest here in British Columbian mining shares is of the feeblest, there have recently been quite a number of important evolutions in regard to what are usually supposed to be leading companies. One of the most notable of these was the slump in Nimrod Syndicates, which from about \$35 fell like a stone last week to about \$5 nominal. This concern, which according to statements made at its recent meeting, is still interested in B. C., has only a small capital, and it is probably owing to this fact that it was found possible to ever get up the price to such a ridiculously high figure. It paid a dividend once—4s. 6d., I think it was—but it gives you some idea of the way affairs are managed in the London Stock Market when it is explained that this result was considered good enough to run up the price to the exalted level of \$35 or so for the \$5 share. Although it was difficult to find out the seat of the trouble, this became apparent subsequently on the announcement that Mr. Frederick Lowy had been declared a defaulter upon the London Stock Exchange. This gentleman was interested in quite a number of syndicates, including the Nimrod Syndicate of which he was a director, and his downfall was no doubt chiefly responsible for the collapse of the shares in which he was of course so highly interested. According to Skinner's "Mining Manual" the following were Mr. Lowy's directoral engagements at the time of his default: Nimrod Syndicate, Limited; Chuquitambo Gold Mines, Limited; Kalulu Syndicate, Limited; Luna Syndicate, Limited; Peru Syndicate, Limited.

The London & B. C. Goldfields group attract little or no attention, and neither the parent company nor its offspring are much in favour at the present time. And small wonder in view of the dismal record of all the companies under the present *regime*. What is wanted here is new blood, and the sooner the shareholders awake to this fact the better will it be for their own interests. Le Roi have been under \$5 again, and the shares of the Le Roi No. 2 are little better. Tyee have not escaped criticism, but the shares keep fairly steady about \$10. New Goldfields of B. C., and Velvets have been very dull of late, and in this group's affairs the public display but an infinitesimal interest, which is perhaps not surprising when one remembers the wonderful promises in the prospectus, and compares them with the dismal performances attained to date. The whole market is in a parlous condition, and I am afraid Mr. Whitaker Wright's return to this country will not help matters, as it will only tend to re-open sores which were getting healed. Incidentally I may mention that Mr. Justice Buckley one of the best exponents of company law in this country—and who decided that Mr. Whitaker Wright

should stand his trial after the British law officers had refused to undertake proceedings, has just upset some of those gruesome bargains made between the boards of the London & Globe and the poor British America Corporation. This able judge decides that a lot of these transactions running into hundreds of thousands of pounds were bad and cannot be maintained. Many people in London said so at the date of the crash, but the wheels of our legal machinery move very slowly, and it takes a long time to get a pronouncement on what on the face of it was a very simple matter.

And now I am going to ask you to give a gratuitous advertisement. It is as follows:—

#### SHARES FOR SALE.

**H**ASTINGS (B.C) EXPLORATION SYNDICATE, LIMITED,—Capital, £100,000.

Directors: James Head, Sir Edward Birkbeck, Lord Hastings, and Bertram F. Ashley.

200 Fully-paid Shares of £1 each in the above Company for sale. Bids invited. Address, etc., etc.

Could anything prove more conclusively the deadly dullness of the B. C. market in London than this offer of a small parcel of shares in the columns of one of the financial dailies? And yet you have visitors from this country who say that there is nothing the matter with B. C., that it hasn't got a "black eye" in the London money market, and that there's plenty of money waiting to be asked for for the Province, etc. And you are all so pleased with yourselves that you fall on the neck of the person who tells you this, and you think him a fine fellow, and fete him. And all the while it would be so much more to the point if you subscribed to a decent London financial newspaper—there are a few left despite the bad times—and read fact instead of listening to fiction. Unfortunately the latter is so much more pleasant that it even appeals to people who are supposed to keep a close eye on things, and who should be prepared to sift information from whatever channel it may emanate.

One more note and I am done. A little while ago the Rossland *Miner* interviewed a gentleman who had been over to London, and who in the course of his journeying called at the office of the Agent-General. With the opinions of the gentleman interviewed upon general topics I have no concern. If they please the editor of your versatile contemporary and his readers that's not my fault, but when he attacks the agency here I think it is only just to administer a rebuke. For to say the least of it he is not quite fair to either Mr. Turner, or the building in which the London business of the agency is conducted. Salisbury House is one of the most magnificent buildings in the city of London, it is exceedingly central, and the suite of offices occupied by the Agent-General are all that could be required by the most fastidious caller. Whilst the fact that there are to my own knowledge seven lifts constantly running places the agency in quite as good a position as if they were on

the ground floor. I wonder what the gentleman in question thought such a suite of offices would actually cost on the ground floor of a centrally situated building like Salisbury House. Did he even give the matter a second's consideration? I should not have taken the trouble to refer to the matter were it not for the fact that silly interviews such as this are sometimes liable to mislead people. As a matter of fact the whole yarn is so much out of true perspective that it does not deserve serious attention, but appearing in the columns of a paper like the *Miner* it is perhaps worth while gently pointing out to the editor that to pass such "copy" is not likely to gain him much European kudos when his paper comes back in due course to London. No editor who knows his London even comparatively well would pass such rapid criticisms upon one of the most handsome edifices in the city of London. It was a magnificent opportunity for the gruesome use of the blue pencil.

The recently reported new finds in the Yukon, not far distant from White Horse, certainly appear to warrant further investigation, miners returning for supplies all agreeing that the locality is rich in gold, and that good pay is being taken from the surface in many of the claims already staked. It is now stated that the goldfields lie somewhat more distant from White Horse than was at first supposed, and that instead of a hundred and fifty miles by the route followed by the miners, the distance is over two hundred miles. There are three ways of entering the new country. One is from Pyramid Harbor *via* Dalton's trail, other from Carmack's Post on the Yukon, and the last and shortest is from White Horse by steamer up the Tabkeena River to Gardner's Falls, a distance of 85 miles, thence overland 180 miles, crossing the Mendenhall, Kakawash and Jarvis Rivers, which although swift running streams are fordable in most places at this season of the year.

#### PERSONAL.

**S**IR JAMES HECTOR, K.C.M.G., a well-known geologist, who in 1857 was attached to the Canadian Rock Mountain Expedition as surgeon and geologist and who whilst exploring the Rockies found the Kicking Horse Pass by which the Canadian Pacific Railway now crosses the mountains, arrived in Vancouver from New Zealand on August 6th. He is re-visiting British Columbia after an absence of 43 years. The explorations in the Rocky Mountains with which he was connected were made during the years 1857-1860. Whilst examining the pass Sir James met with an accident which afterwards led to the naming of the pass and river "the Kicking Horse." A horse carrying his instruments broke away and crossed the river. Sir James swam over, caught the horse and brought it back. Whilst engaged in tying it up another horse kicked him, breaking three of his ribs and rendering him unconscious. His Indian guides after trying in vain to resuscitate him concluded he was dead and dug a grave, but just as they were about to bury him he recovered consciousness. Now, as he facetiously remarks, he is about to visit his own grave, during a trip he plans to take in the Rocky Mountains. Sir James has been in New Zealand since 1861, having gone there after completing his exploration work in the Rockies

in 1860. For several years, until recently, he held the important position of Director-General of the Geological Survey of New Zealand. At the present time he is Chancellor of the New Zealand University, Director of the Colonial Museum and Observatory, and of the New Zealand Institute. He purposes returning to New Zealand, leaving Vancouver on September 18th.

Mr. P. Dermody, foreman of the Granby Co.'s mines, Phoenix, met with an accident last month. A lot of rock fell in one of the workings and some of it caught him, but fortunately his injuries were not serious. The same day Mr. Duncan McIntosh, manager of the Providence mine, Greenwood, and Mr. David Oxley, foreman at the Athelstan mine, Wellington camp, were both accidentally hurt, the former by a fall of rock which sprained the knee and ankle of his left leg, and the latter by falling about 30 feet down a raise in the Athelstan mine.

Mr. F. H. Oliver, of Spokane, managing director of the Morrison Mines, Ltd., was in the Boundary recently in connection with the shipment of ore from the dump at the Morrison mine to the B. C. Copper Co.'s smelter that has been in progress for several weeks. The ore has to be hauled in a waggon about a mile to a siding on the Deadwood branch of the Columbia & Western Railway, whence it is taken by rail to the smelter. By the middle of August about 1,200 tons had been thus shipped.

It is stated that Mr. A. H. Reeder, a coal expert from Pennsylvania, has been engaged by the Canadian Pacific Railway Company to assist Mr. C. M. Henretta in reporting on the company's coal lands in the Crow's Nest Pass district and that these gentlemen are making a thorough examination of those properties. It is understood that the company purposes doing extensive development work if it should appear that such will be warranted.

Hon. Clifford Sifton, Minister of the Interior, has informed the Canadian House of Commons that Dr. Bell, Director of the Canadian Geological Survey, will attend the International Geological Conference to be held shortly in Vienna. He added that if the Congress will hold its next meeting in Canada the Dominion Government will make a grant for its expenses.

During August Messrs. J. W. Palmer, W. A. Williams, assistant manager of the Granby Co.'s smelter, and H. W. Warrington, manager of the Kettle River Valley Railway, visited the Belcher mining camp, in the Republic district, south of Grand Forks, for the purpose of examining several mining properties and sampling their ores.

Mr. Paul Johnson last month came down from Hadley, Southeast Alaska, where he is building a smelter for the Brown-Alaska Company, of New York. He afterwards went to Nelson on a short visit to his family, who have been living there since they left Greenwood about three months since.

Mr. J. C. Haas, M.E., now of Spokane, but for years resident in the Boundary district, in which he still has mining interests, recently closed a visit to Greenwood and vicinity, and went thence to examine some coal property in Alberta.

Mr. A. C. Flumerfelt, of Victoria, and Mr. H. N. Galer, assistant manager of the Granby Con. M. S. & P. Co., went to Alberta about the middle of August to visit the coal mines a company with which they are connected is opening up near Blairmore.

Mr. S. Strap recently arrived in British Columbia from Paris for the purpose of examining and reporting on the Britannia and South Valley mines, Howe Sound, on behalf of a French syndicate now negotiating for the purchase of those properties.

Hon. E. J. Davis and Messrs. H. E. Irwin and Chas. C. Van Norman, of Toronto, and Mr. W. E. Blakemore, M.E., of Montreal, visited Nicola Valley to inspect some coal

lands owned by the British Columbia Coal Co., of Nelson and Grand Forks, B.C.

Professor Arthur Lakes, of Denver, Colorado, arrived in Nelson on the 16th ult., to pay a short visit to parts of West Kootenay. The Professor is mining editor of *Mines and Minerals*, published in Scranton, Pennsylvania.

Mr. Geo. S. Waterlow, deputy chairman of the Snowshoe Gold and Copper Mines, Ltd., and Mr. Anthony J. McMillan, managing director, are expected to shortly pay another visit to the Snowshoe mine, in the Boundary district.

Mr. Wm. Yolen Williams, superintendent of the Granby Company's mines, last month took a short vacation in Spokane, Wash., returning to Phoenix on the 14th.

F. Keffer, M.E., manager of the B. C. Copper Co., lately went from Greenwood to Fernie on coke supply business, and thence to look at a mineral claim in the Rocky Mountains.

Mr. Richard Plewman, of Rossland, has returned from England, and is now arranging to re-start work on the Winnipeg mine, in the Boundary.

Mr. Wynne Meredith, consulting engineer to the Vancouver Power Co., has returned to Vancouver from a visit to San Francisco, Cal.

Mr. S. F. Parrish, general manager of the Le Roi Mining Company, has returned to Rossland from a visit to a Washington health resort.

#### COMPANY NOTES AND CABLES.

**PORTO RICO (Ymir).**—Mr. G. H. Barnhardt, formerly superintendent of the Ymir mine, has acquired a lease of this property, which is to be re-opened immediately. The Porto Rico is equipped with a seven-drill compressor and a ten-stamp mill.

**RAMBLER CARIBOO (Slocan).**—At the annual meeting held on July 30th the directors announced that it was the intention to continue development operations on a large scale, and that for the immediate present it was not proposed to appropriate any of the funds in hand to dividend purposes. The manager's report was very satisfactory in respect to present conditions at the mines. The last two months' shipments were particularly encouraging, ore to the value of over fifty thousand dollars having been sent to the smelter. The benefit from the lead bonus will reach from fifteen hundred to two thousand dollars per month. Zinc products will be held for better market quotations.

**COPPER KING (Kamloops).**—A first shipment of a carload of ore was made to the Crofton Smelter in August.

**WATERLOO (Camp McKinney).**—Two gold brick weighing 343.9 oz., and valued at \$5,120, and concentrates valued at \$3,630 net, have been obtained since the commencement of crushing operations on June 16th last. The mill is crushing about 12 tons of ore daily.

**ATLIN GOLD M & M Co. (Ymir).**—The annual meeting was held on August 20th, and the following officers were elected: President, Pat Daly; treasurer, Wm. Coffey; secretary, Alfred Parr; directors, Ryan, Daly, Hughes, Coffey and Parr. It was decided to continue work on the company's property, which is looking exceedingly bright. Very recently a strike of \$100 ore was made.

**CARIBOO HYDRAULIC (Bullion).**—Again extremely unfavourable winter and spring weather conditions have militated against a successful gold yield in the Cariboo district. The Consolidated Cariboo Hydraulic, the most considerable undertaking of its kind in Canada, this year has made in consequence a but relatively insignificant clean-up, the value of which is placed at approximately \$50,000, as compared with \$300,000, realized three years ago under normally satisfactory conditions. It is likely that the company will be

compelled to make further provisions and expenditures in order to be more independent of the seasons in the future, as the shareholders who who have invested many hundreds of thousands on the property and its equipment are becoming naturally somewhat impatient at the delay in the realization of profits.

**THIBERT CREEK MINE (Cassiar).**—A first clean-up last month, at the Thibert Creek mine, after a run of about 20 days, resulted in the recovery of 780 oz. of gold, valued at approximately \$13,000.

**ATLIN MINING Co (Atlin).**—The returns from the last clean-up, after a run of eight days gave a gold yield of 600 ounces.

**PARADISE (Windermere).**—This mine has shipped 937 tons of silver-lead ore to date, and has 15 cars ready for shipment.

**YMR MINE (Ymir).**—The returns for June were: Seventy stamps ran 28 days and crushed 4,950 tons (2,000 lbs.) of ore, producing 1,163 ozs. bullion. The estimated realizable value (gross) of the product is \$12,850. Three hundred tons of concentrates, shipped, gross estimated value \$7,750. Cyanide plant treated 3,050 tons (2,000 lbs.) of tailings, producing bullion having estimated gross value of \$2,150. Sunday revenue, \$1,060—\$23,810; less working expenses, \$21,000; profit, \$2,810. There has been expended during the month on development, \$5,000.

**MOUNTAIN LION (Republic, Wash.).**—This mine, in which a number of Montreal people are interested, is to be reorganized as a Canadian company. All the financing has been completed, and the deal will not affect the minority shareholders, who will have their shares transferred to the new concern without any watering or freezing-out. The mine is fully developed to the 600-foot level, where there is 12 feet of ore in a shoot 400 feet long. Daily shipments of 200 tons will shortly be made. It is reported that there are 20,000 tons of ore broken above the tunnel level, which can be placed on cars at 75 cents per ton, and 30,000 tons more in place above the tunnel level, which can be broken down and loaded at \$1.25.

**GIANT (Rossland).**—The London office of this Company has issued a notice to the effect that shipments, which had been suspended for some months owing to the coal strike, have been resumed to the Trail smelter. A cable from the resident director, under date of July 26th, said: "Assay of samples gives \$20 and \$70 (gold). Present appearances most encouraging."

**LE ROI.**—The following cablegram has been received from the manager: "Shipped from the mine to the Northport smelter during the past month, 11,116 tons of ore, containing 3,776 oz. of gold, 4,011 oz. of silver, 191,600 lbs. copper; has resulted in a loss of \$7,000. Shipped from the dump to the Northport smelter during the past month 2,325 tons of ore, containing 716 ozs. of gold, 924 ozs. of silver, 30,127 lbs. copper; estimated profit on this ore, \$5,500." In forwarding the above information to the shareholders, the directors wish to add that the rumours which have been circulated concerning reconstruction and assessment are entirely unfounded.

#### MACHINERY NOTES.

**A**T the Montreal & Boston Copper Co.'s smelter at Boundary Falls the third blower has been installed, and the third furnace is on the ground.

Arrangements are being made for the erection of a ten-stamp mill at the Wilcox mine, at Ymir. The property is at present equipped with a two-stamp mill.

Mining machinery is pouring into the Lardeau, there being now fewer than 37 cars now *en route* to mines there laden with mine machinery.

A new wire cable was installed at the Payne mine, at Sandon during the month. In placing the cable in place some

remarkably quick work was done. It was received at noon on one day and by the same time the following day the tram was in perfect running order, taking just 24 hours to replace the old cable by the new. The total length of the tram is a little over 6,000 feet.

A triplicate three-stamp mill, having a minimum capacity of between 25 and 30 tons daily, and a compressor plant has been ordered by the owners of the Lucky Boy and Ethel groups on the west slope of Morning Mountain at Nelson.

It is proposed to install an aerial tramway at the Idaho mine in the Slocan to connect the lower adit with the loading station on the C. P. R. at Alamo.

It is reported that eight large dredges are to be placed on the Stewart River, in the Yukon, next season by the Ogilvie Company. The new dredges are each to have a capacity of 900 cubic yards in ten hours. Each dredge will cost approximately \$45,000. The big dredge on Discovery on Bonanza, the only large plant of the kind in operation in the territory, has a capacity of 500 yards in ten hours.

A concentrator is to be built at the Alice mine, near Creston, upon which property work is about to be resumed.

A new 55-ton blast furnace is being erected at Irondale, Wash., to treat the iron ores of Vancouver and Texada Islands.

Machinery is being hauled to the Cherry Creek Mines, near Kamloops. A stamp mill, it is expected, will shortly be ordered.

In a circular addressed to shareholders the Fraser River Gold Dredging Co. announce that a new dredge has been ordered from Fraser & Chalmers, Ltd., to be placed on the company's property on the Fraser River at Lytton. The dredge, it is expected, will arrive from England early in September.

It is stated that a project is under contemplation by Eastern capital to put in an electric plant to supply power and operate a seven-mile tram line to the mines in the McGuigan basin.

In an interview published in a Toronto paper, Mr. T. G. Blackstock, managing director of the Centre Star and War Eagle companies, is reported to have made the following statements in reference to the proposed erection of a concentrating mill at these properties: "We have been conducting a series of careful experiments during the last two years to devise a means of treating the ores by concentration first and afterwards by some chemical method which will extract the metals from the tailings. We have succeeded beyond our expectations. Our laboratory tests, followed by 100 experimental charges, put through the mill at Silica, on Sheep Creek, satisfies us that we can treat at a profit ores showing a smelter's gross assay value as low as \$5 per ton. This is about \$5 lower than ore that will stand the cost of smelting. As a result of the success of our experiments, our directors have decided to erect a 200-ton mill, as a preliminary, to be followed by such enlargements as will enable us to treat War Eagle and Centre Star ores by a process combining concentration and cyaniding. The mill is being installed as a unit, and new units can be easily added. This will enable us to double its capacity at a further cost of less than \$50,000. When we get this preliminary mill in operation we expect to be able to supply some 300 tons per day of smelting ore, at the same time sending 200 tons of low-grade ore to the mill. When we enlarge the mill we will, of course, be able to treat a much larger percentage of low-grade ore."

The Winnipeg mine, in Wellington camp, Boundary district, is to be re-opened forthwith, a new ten-drill compressor and other machinery having been ordered to replace that destroyed last year by fire.

#### RECENT MINING PATENTS.

WE are indebted to Mr. Rowland Brittain, patent attorney of Vancouver, for the following report: Method of Extracting Zinc and other Sulphides from their Ores.—Canadian patent No. 80,747, issued May 5th, 1903,

to Guillaume D. Delprat, of Broken Hill, N.S.W., Australia.

Claims: (1) In extracting zinc and other sulphides from their ores, subjecting such ores to the action of a heated bath consisting of a solution of salt cake, substantially as herein described and explained. (2) In extracting zinc and other sulphides from their ores, subjecting such ores to the action of a heated bath consisting of a solution of sodium sulphate and sulphuric acid, substantially as herein described and explained.

Canadian patent No. 80,748.—Method of Extracting Zinc Lead and Silver Sulphides from their Ores, granted May 5th, 1903, to the same inventor.

Claims: (1) In the extraction of zinc, lead and silver sulphides from their ores, subjecting such ores finely divided to the action of a bath consisting of a solution of nitrate of sodium and nitric acid, substantially as herein described and explained. (2) In the extraction of zinc, lead and silver sulphides from their ores, subjecting such ores finely divided, to the action of a bath consisting of a solution of nitrate of potassium and nitric acid, substantially as herein described and explained. (3) In the extraction of zinc, lead and silver sulphides from their ores, subjecting such ores, finely divided, to the action of a bath consisting of a solution of nitrate of zinc and nitric acid substantially as herein described and explained.

#### COAL EXPORTATION AND TRADE.

THE condition of the British Columbian coal mining industry has decidedly improved during the past few weeks, and the outlook for continued and increasing activity is decidedly promising. The Extension mines are now producing at the rate of over eleven hundred tons a day, and it is expected that ere long the daily output will reach sixteen hundred tons. At Nanaimo, shipping operations are being steadily maintained and much development work is in progress.

The resumption of work at Comox by the striking members of the local union has removed the last labour trouble, and the Union mines will now be worked to the fullest extent. Mr. James Dunsmuir, president of the Wellington Colliery Company, has stated that the output of these mines will be increased at once to nearly double the recent output of about 800 tons daily.

The output of coke from Comox is also to be increased to keep pace with the local demand. The output from the Crow's Nest last month was in excess of any previous achievement in this regard, the aggregate tonnage from the three collieries being 71,463 tons, of which Coal Creek was responsible for 24,793 tons, Michel for 28,569 tons, and Morrissey for 18,100 tons. This month a beginning will be made in the shipment of coke from the new Morrissey ovens, sixty of the two hundred and fifty under construction being now ready for use. The coal seams at Morrissey are so situated as to be more easily worked than those at either Michel or Coal Creek, and it is consequently believed that the output from these mines will soon exceed that of the other collieries. A very large electrical installation is now being made at the Morrissey mines to provide light in the mine buildings, workings and town.

#### RECENT PUBLICATIONS RECEIVED.

Ore Deposits: A Discussion re-published from the *Engineering and Mining Journal*, New York. Octavo. Cloth. *Engineering and Mining Journal*, New York and London: Price, \$1.00.

We congratulate the publishers on the happy idea of publishing in volume and therefore handy form a discussion by leading authorities of a subject possessed of so much interest, both from the practical and theoretical points of view to the mining engineering profession. This discussion took place early this year at the monthly meetings of the Geological Society of Washington, and was originally reported in the *Engineering and Mining Journal*. In the volume before us, however, the report has been amplified and corrected, while

there is also included a very able review of the subject by the *Journal's* editor, Mr. Rickard. The authorities taking part in this discussion are Messrs. Emmens, Wood, Spurr, Lindgren, Kemp, Ransome, Van Hise, Rickard and Purington.

Chemical Analyses of Igneous Rocks, published from 1884 to 1900, with a critical discussion of the character and use of analyses, by Henry Stephens, Washington; Government Printing Office, Washington, 1903.

The Mining Laws of Texas and Tables of Magnetic Declination. Bulletin No. 6. The University of Texas Mineral Survey, Austin, Texas.

#### IMPORTS OF MINING MACHINERY.

**T**HE imports of free and dutiable mining and smelting machinery for the first five months of the present year compared with 1902, are as follows:—

Months.	1903.			1902.		
	Free.	Dutiable.	Total.	Free.	Dutiable.	Total.
January	\$ 77,298	\$ 7,676	\$84,974	\$92,984	\$2,549	\$95,533
Feb'y	30,106	1,587	31,693	43,123	2,380	45,503
March	83,535	11,534	95,069	55,255	2,629	57,884
April	104,997	4,638	109,605	61,227	5,087	66,314
May	155,493	1,469	156,962	90,820	4,782	95,602

Total .. \$451,399 \$26,904 \$478,303 \$343,409 \$17,427 \$360,836

The principal sources from which this machinery has been imported were:—

MONTHS	UNITED STATES		GREAT BRITAIN		Other Countries	TOTAL
	Free	Dutiable	Free	Dutiable		
January	\$ 75,235	\$ 7,676	\$ 417	....	\$1,646	\$84,974
February	20,467	1,587	639	....	Nil	31,693
March	82,680	11,534	158	....	607	95,069
April	104,992	4,638	65	....	Nil	109,605
May	155,127	1,263	366	206	Nil	156,692
Total	447,411	\$26,698	\$1,645	\$206	\$2,343	\$478,303

#### MINING RETURNS AND STATISTICS.

**T**HE shipments from Dawson this year are shown by the records in the comptrollers office in Dawson to be as follows:—

THE YUKON.	
May	\$ 173,781
June	3,324,480
July	2,015,586

The shipments from Whitehorse this year were \$246 in May, and \$2,370 in June. The shipments from Forty-Mile this year amounted to \$1,082 in June, with no report for July.

Gold shipments made from Dawson last season for the first three months were as follows:—

May	\$ 19,890
June	3,550,324
July	2,313,130

The gold shipments from Whitehorse June of last year amounted to \$1,880, and from Forty-Mile during June of last year to \$4,652.

#### ROSSLAND.

Our shipments for the year ending August 21st, have been divided as follows: Le Roi, 126,707 tons; Centre Star, 50,962; War Eagle, 38,709; Le Roi No. 2, 17,305; Kootenay, 5,650; Velvet, 4,051; Jumbo, 1,000; Giant, 694; White Bear, 250; Silica concentrates, 85; Homestake, 80; I. X. L., 60; O. K., 20. Total, 244,973 tons.

#### BOUNDARY DISTRICT.

Returns from this district to August 22nd are: Granby, 223,707 tons; Mother Lode, 71,007; Snowshoe, 38,142; B. C., 19,365; Emma, 10,916; Sunset, 9,651; Oro Denoro, 2,758; Athelstan, 825; Providence, 645; Elkhorn, 129. Total, 377,235 tons.

#### SLOCAN.

The following returns to August 15th, are published:—American Boy, 502; Antoine, 101; Arlington, 40; Black Prince, 17; Bondholder, 2; Bosun, 790; Blue Bird, 20; Dayton, 4; Enterprise, 475; Fisher Maiden, 280; Hartney, 42;

Hamilton, 4; Highland Light, 2; Idaho, 21; Ivanhoe, 569; Lucky Jim, 105; Monitor, 436; Meteor, 12; Ottawa, 106; Payne, 1492; Queen Bess, 204; Rambler, 890; Reco, 153; Republic, 50; Ruth, 245; Rio, 9; Red Fox, 24; Slocan Star, 1174; Slocan Boy, 16; Silver Gance, 55; Surprise, 5; Vancouver, 20; Wonderful, 23. Total, 8007 tons.

#### LOCAL STOCK MARKET FOR AUGUST, 1903.

Prepared by the Stuart Robertson Co., Ltd., Stock Brokers, Victoria, B. C.

Cariboo McKinney	11¼	10½
Centre Star	28	23
Crow's Nest Pass C.	87 50	70 00
Fairview Corporation	5	4
Iron Mask	6	6
North Star	11	9½
Payne	17	15½
Rambler	39	31
Sullivan	5½	4½
War Eagle	12	10
Waterloo	7½	5½
St. Eugene	45	35
Granby	5 50	3 75

#### SALES FOR THE MONTH.

American Boy, 11,000 at 4¾; 6,000 at 4¾.  
 Cariboo McKinney, 2,250 at 11; 500 at 11¼c.  
 Centre Star, 1,500 at 25; 2,000 at 25½; 1,000 at 26c.  
 Fisher Maiden, 3,000 at 2; 2,000 at 2¼; 2,500 at 2½c.  
 Giant, 9,500 at 2½; 3,000 at 2¾; 10,000 at 2¾c.  
 Mountain Lion, 500 at 23; 500 at 23½; 3,000 at 25; 1,500 at 25½; 3,000 at 26¼; 3,000 at 26½c.  
 Morning Glory, 3,000 at 1¾; 3,000 at 2c.  
 North Star, 1,000 at 10; 1,500 at 10½c.  
 Payne, 2,700 at 16; 1,000 at 16¼c.  
 Rambler Cariboo, 1,000 at 36; 1,500 at 37¼c.  
 Sunset Copper, 2,000 at 4½c.  
 Sullivan, 5,000 at 5c.  
 War Eagle, 2,500 at 11c.  
 White Bear, 4,000 at 4c.

#### THE METAL MARKET.

The feature of the month has been the improvement in copper which has been very active of late, due, it is alleged, to better conditions prevailing in the financial markets. In consequence prices have advanced appreciably, and large transactions both for spot and future delivery are reported. The latest New York quotations are Lake, 13¼ to 13½; electrolytic in ingots, cakes and wire bars, 13 to 13¼; cathodes, 12¾ to 13; casting copper, 12½ and 12¾.

Lead is in good demand, and, however, practically unchanged prices, New York quoting 4.05 to 4.10, and St. Louis 4 to 4.2½. European quotations range from £11 5 s. to £11 8s. Spelter is firm, and the enquiry is good, spot metal being somewhat scarce, St. Louis 5.65 to 5.70; New York, 5.82½ to 5.87½.

The price of silver this month has been higher than for some time past, having reached 55¾, after which a slight falling back is reported, Indian requirements having been satisfied.

#### CATALOGUES AND TRADE CIRCULARS.

Catalogue No. 11, (fifth edition) issued by the Allis-Chalmers Co., Chicago, describes and illustrates in detail the Treman Steam Stamp Mill, its construction and operation.

The Jeffrey Manufacturing Company, Columbus, Ohio, have published a new and very handsomely printed catalogue of coal mining machinery, drills and electric locomotives.

The Denver Fire Clay Co., of Denver, Colorado, call particular attention to a new catalogue containing a very complete list of assayers' and chemists' supplies and accessories.

A. O. Norton, of Boston, Mass., and Coaticook, Quebec, issues a circular describing the Norton Patent Ball-Bearing Jacks and "Sure Drop" Track Jacks.

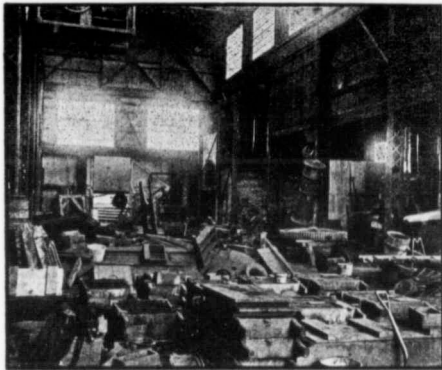


## Industrial Supplement.

### LOCAL INDUSTRIES—VANCOUVER.

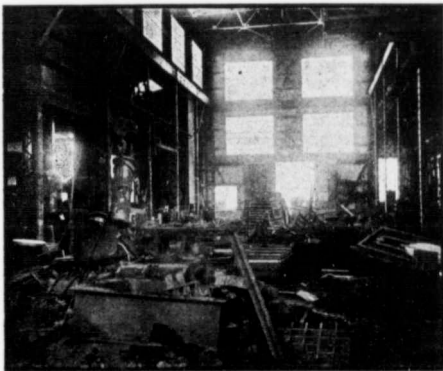
#### THE VANCOUVER ENGINEERING WORKS.

**T**HE Vancouver Engineering Works, Ltd., is an English company whose works are situated at the foot of Heatley Avenue, Vancouver, on the shores of Burrard Inlet. The works were taken over on January 1st, 1901, by the new company



The Foundry from the Water End.

from the firm of Armstrong & Morrison, who had conducted the works for a number of years. A large appropriation was made for new buildings and tools and an equipment was decided on which would put these buildings in the very front rank among manufacturing. In the spring of 1901 a large number of new machine tools were ordered for the machine shop

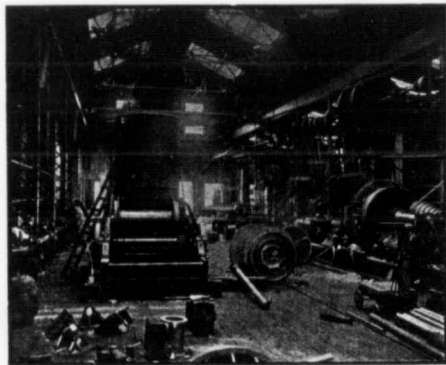


The Foundry from the Land End.

which it was decided to replace with the larger and better building, so there was ordered from the American Bridge Company a building 33 feet between

posts by 120 feet long; the building is made entirely of steel and is equipped with travelling cranes running the full length made by the Whiting Foundry Co., of Harvey, Ill. These cranes at the present time are hand cranes but so rigged that they can be equipped with motors at very little expense. The new equipment ordered for the machine shop was one 54-inch engine lathe from the American Tool Works Co., one 6-inch full universal radial drill from the same firm, one milling machine with all attachments from the Owen Machine Co., one small centering drill from the Fox Machine Co., and one double headed Acme screwing machine to cut bolts up to 2 inches; one Bignall & Keeler No. 3 Peerless pipe machine to cut pipe up to 3 inches. These tools were purchased after much deliberation by the management and they have proved very excellent tools. A new foundry was erected at the same time as the machine shop.

The building which has been described before is commodious, is made entirely of steel and is well lighted from every side. The skylights in the roof are the very latest practice. This building was equipped with Whiting cupolas of three and six ton capacity each. The blast was driven by a 30 horse power Canadian General Electric motor which motor also operates the elevator and the various tools for cleaning

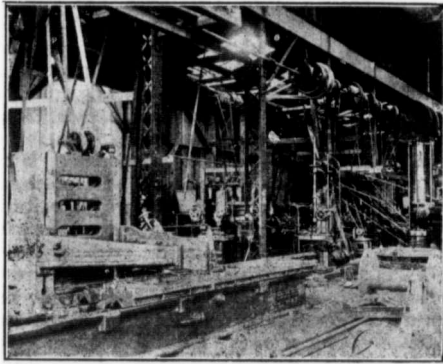


Machine Shop from the end with Large Logging Engine under Construction.

castings. Large core ovens and brass furnaces were also installed and altogether the foundry is the most complete and up-to-date of any of the small foundries on the Coast and can equip favourably with any in San Francisco.

A new pattern shop was also built at that time. The pattern shop is also very light and commodious and has benches for half a dozen men. It is equipped with new tools throughout, there being a buzz planer from the Fay-Egan Co., a hand jointer from the same company, as well as a pattern makers' double ended lathe. Fox wood trimmers were purchased for every bench and a large one for the floor. Recently there has been added to this installation a new band saw with 36-inch wheel and tilting table, bringing this shop equipment up to the very best and latest practice.

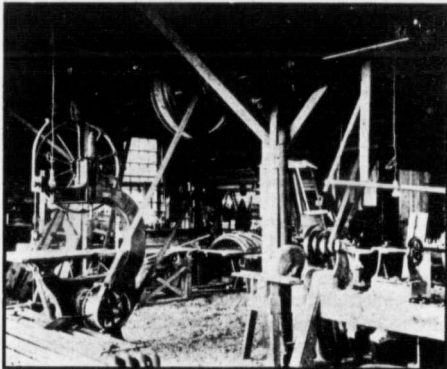
It was found that even with the enlarged equipment, the capacity of the machine shop was too small for the work which it had to do, so recently at a cost of \$10,000 the following new tools were purchased: One Detrick & Harvey open slide planer, one 42-inch



The Bullard Coring Mill and New Detrick Harvey open side Planer, which have just been installed in the Machine Shop from the water end.

Bullard vertical boring mill with swivel head and turret head with screw cutting attachments; two Bradford lathes 18-inch swing by 10-foot centres.

There was also purchased from the Acme Machinery Co. a bolt heading machine for making bolts and rivets. A full equipment of pneumatic tools purchas-



A Portion of the Pattern Shop of the Vancouver Engineering Works.

ed from the Philadelphia Pneumatic Tool Co. has been ordered, and a Leyner compound steam, compound air, air compressor has been ordered to replace the one now in the shop, and in fact no expense has been spared to make these shops the most up-to date on the Coast and the very best tools have been purchased.

The logging engine business, of course, for the last year was a large part of the work in these shops and

a night crew was constantly employed to keep up with the orders. At the present time the shops have on hand a large contract for the Vancouver Power Company. This contract consists in the making of the gates and steel intake pipes which go through the dam at Lake Beautiful, and also the furnishing of the pipe which runs from the dam down to the power house at the foot. This is the biggest pipe contract ever undertaken in British Columbia and a new equipment, consisting of punches, rolls and pneumatic tools, has been ordered to do this job and a new shop has been erected specially to undertake this work. This contract has to be finished by the first of the year and the shops will be kept exceedingly busy until it is completed. The manufacture of hydraulic steel rivetted pipe is a specialty of the company and large orders have been sent to Atlin, Dawson, Fish Creek Country, Big Bend Country and through the mining districts of the Boundary. These orders have been taken in competition with firms who make a specialty of this pipe and who do nothing else.

The outlook for the future is very bright and no doubt with the superior equipment now in these shops, there will be no trouble in getting all the work that can be handled and thus enlarging one of the leading industries in the city of Vancouver.

#### ELECTRIC LIGHT AND WATERWORKS PLANT AT KAMLOOPS, B. C.

**I**N the year 1894 the corporation of the City of Kamloops decided to install and operate their own waterworks and electric lighting plants. One year later the waterworks was completed and in the spring of the following year the electric light plant was put in operation.

The waterworks at that time consisted of two return tubular boilers, built by the William Hamilton Manufacturing Company, of Peterboro, Ont., and two duplex pumps, one being a Worthington with a capacity of 600 gallons per minute and the other a Northey underwriter's pump having a capacity of 900 gallons per minute as against a head of 160 lbs. pressure per square inch.

The electric light plant consisted of one Robb-Armstrong, high speed, simple, automatic engine, cylinder diameter 13 inches, stroke 12 inches, running at 310 r.p.m., which was belted to a 60 k.w. United Electric Improvement Co. (Philadelphia, Pa.) alternator having a frequency of 125 cycles, 1,000 volts, at 680 r.p.m.

The machinery was installed in one building and continued to give satisfaction until 1900, when the rapidly increasing demand for both water and light rendered the extension of plant necessary. After receiving the advice of Mr. Willis Chipman, C.E., of Toronto, the City Council decided to abandon the old site and construct complete new works. This was done, and in the fall of 1902 the new works were taken over; the old pumps and electric plant being removed to the new building.

The power house is built of brick on granite and cement foundations, and has a frontage on Lorne Street of 80 feet, with a depth of 60 feet, the interior being divided on longitudinal centre line by a brick fire wall extending the entire length, making on one side dynamo and engine room 60 ft. x 28 ft. 6 in., workshop 28 ft. 6 in. x 10 ft., office and laboratory, etc., 28 ft. 6 in. x 10 ft.; on the other side the space is again divided by a brick partition, making pump room 28 ft. 6 in. x 30 ft. and boiler room 28 ft. 6 in. x 47 ft.

The building is roofed with galvanized iron, with standing seams, laid on shiplap, the whole being carried by heavy timber trusses, by which the machinery can be hoisted for repairs, etc. The whole building is well designed and con-

structed, comfortable and convenient, and presents a very neat and attractive appearance.

The new electric light plant consists of a Robb-Armstrong, tandem compound, condensing, side crank engine, cylinders 12 inches and 20 inches in diameter by 16-inch stroke, running at 210 r.p.m., which is connected to a Northy jet condenser. It is giving splendid satisfaction, making an actual saving of 1300 lbs. of coal per 12 hours run over the high speed simple engine formerly used, and this when the engine is running under most disadvantageous conditions of light load, while the former engine was run under fairly good conditions, being for the greater part of the time well loaded. The saving will be more noticeable as the load is increased. This engine was manufactured and supplied by the Robb Engineering Company, of Amherst, N.S. It is belted to a Canadian General Electric standard 120 k.w. composite wound single phase alternator having a frequency of 125 cycles, 1000 volts, at a speed of 1070 r.p.m., and gives very close regulation.

The switchboard is of blue Vermont marble, finely polished and fitted with quick break switches, detachable fuse blocks, and Weston instruments in black oxide finish, the whole presenting a very handsome appearance. The lightning arresters, rheostats, transformers, etc., are mounted on the back of the board. The old board is temporarily set on one side. At the present time there are about 3,000 16 c.p. lamps wired on the circuits, not including the street lights, but as current is supplied to the consumers by meter, the average load does not reach the capacity of the plant.

The streets are lighted with series incandescent lamps, mounted on neat goose-neck brackets (supplied by Munderloh & Co., Montreal), placed at a height of 16 feet from the ground, and visitors say Kamloops streets are very well lighted. The lamps are placed 250 feet apart and are wired on two circuits of 26 in series, 6 amperes across the primaries. There is also another circuit of 14 32 c.p. lamps in series, and in the outlying districts several 16 c.p. lamps are temporarily connected to the commercial secondaries. The old plant is installed on the other side of the engine room and forms a duplicate or reserve.

This department is under the charge of City Electrician Fred J. Marshall, who has been in the employ of the city in that capacity for nearly eight years. T. A. Shackleton is second engineer.

The waterworks, which are under the control of C. L. Wain, who has been with the city for seven years, has also a reserve plant. The new high duty pumping engine was manufactured and supplied by the Smart Turner Machine Company, of Hamilton, Ont., and is a vertical cross-compound condensing Corliss pumping engine, the first of this type to be manufactured in Canada, and has a capacity of 1000 imperial gallons per minute against a head of 140 lbs. pressure per square inch. The pumps are placed immediately below the engine in the well, the concrete walls of which serve as foundations. The pumps are placed as near the water as practicable on account of the great difference between high and low water levels on the South Thompson River, from which the water is taken, about 600 feet distant from the power house.

The water flows into the well through a syphon, 12 inches in diameter, there being a rise in level between the river and the well of two feet; after entering the well it has a drop of 18 feet to the bottom of the well, giving at extreme low water a working head of nearly six feet; this was done to avoid expensive ditching across the flat. This syphon was designed by Mr. Willis Chipman and is giving good satisfaction.

The pumping engine is run surface condensing, the discharge water from the pump being delivered through the condenser to the main, thus providing ample cooling medium without cost. This, of course, adds greatly to the efficiency. The condenser, air pump, hot well and boiler feed pump are placed in the basement in close proximity to the engine. The contract for this engine is not as yet completed, as the manufacturers desire to make another test to reach the guaranteed duty of one hundred and fifteen million foot pounds, which was very nearly attained on the previous trial.

The water is delivered by the pump into the mains and thence to the reservoir, the mains being connected at the intersecting streets by special crosses, tees, and gate valves, thus giving complete control of the supply to any part of the town. The reservoir is on the hill immediately south of the town at an elevation of 280 feet, and gives a static pressure on the mains of 125 lbs. per square inch. It is excavated in the ground, the soil being a conglomeration of "hard pan" and gravel. The excavating was extremely difficult on account of the nature of the soil, digging being impossible, and the material could only be removed by blasting.

The sides of the reservoir are built of Portland cement concrete sloping to the top, 48 inches thick at the bottom and 24 inches at top. The floor or bottom of reservoir is dished and about 18 inches thick. This all received a coating of one inch of cement plaster, and was then repeatedly washed with cement wash to render it impervious. The capacity of the reservoir is 150,000 imperial gallons. It is covered with a strong shingled cottage roof and has a very attractive appearance.

The boilers were also manufactured by the Robb Engineering Company and are the "Mumford standard boiler," a type which possesses a great many important points in their favour, and which so far have fully carried out the claims made for them by the manufacturers. They each have a guaranteed evaporation of 5,250 lbs. of water per hour from and at an initial temperature of 212 degrees Fahrenheit, and have a working pressure of 125 lbs. per square inch. They are self contained, having no brick setting, being cased in a sheet steel case covered with two inches of asbestos plaster to prevent radiation.

The smoke stack was supplied with the boilers and is constructed of steel plates. It is 88 feet high and 45 inches in diameter, the first 40 ft. being of ¼-inch plate and the remainder of 3-16 plate. It is erected outside the building on a solid granite and cement foundation 12 feet high, making the total height from ground level to top of the stack 100 feet.

The cost of the new building and plant, reservoir, mains, etc., was \$50,000. The increased economy of operating the new plant compared with the old has resulted in a reduction of 5 per cent. on both water and light rates to the consumer.—*Canadian Electrical News.*

#### PATENTS TO BRITISH COLUMBIA INVENTORS.

Mr. Rowland Brittain, patent attorney, of Vancouver, sends us the following monthly report:

V. D. Sibley, of Port Hammond, U. S., and Canadian patents on a wire snap hook.

Hugh Condren, Vancouver, a British patent on his body indicating buoy.

G. Cassidy, Vancouver, a U. S. patent on a sash-lifting device.

Messrs. Smith Bros., the mattress manufacturers of Vancouver, have registered as a trade mark the word "Jumbo" to protect the mattress known by this name.

C. B. Mansell, Vancouver, a U. S. patent on a hitching device.

Two Canadian patents were issued this week to citizens of Vancouver, one to B. P. Vance *et al.*, and the other to W. J. Cummings *et al.*, both for the same purpose, viz., the salvaging of wrecks sunk in water too deep for the operation of divers, yet each seeking to attain the desired result by entirely different means.

Vance and his associates provide a drag, the particular construction of which permits it to encircle the vessel from stern to stem, and so designed that any hauling effort exercised on it tightens its hold on the hull and enables a lifting effort to be exercised on it without fear of the tackle being drawn off. The inventors are men particularly acquainted with wrecking work and they expect to be able at an early date to prove the efficiency of their tackle in actual work.

The invention of Cummings and his colleagues seeks to obtain a more positive lifting effort by passing slings under

the vessel's hull and to enable this to be done provides a suitable braced tube having a curved lower end through which compressed air or other fluid may be discharged, which clears a passage under the vessel for a light line which, when the clearing operation is finished, is discharged through the tube and having a light buoy at its free end, rises to the surface on the other side of the hull and enables a stronger line to be passed through suitable for hauling the lifting slings by which the vessel may be raised. This device contains several ingenious features fitting it for the work it is required to perform.

To enable the position of the sling to be correctly located, the same inventors have also designed a submarine telescope having electric searchlights which will enable the condition of the work to be examined from the surface as it proceeds.

Mr. Brittain begs to notify his clients and the general public that he has moved his office from the Bank of B. N. A. Building to more convenient and suitable quarters in the Fairfield Block, Granville Street, at the corner of Pender Street, opposite the post office.

#### THE LUMBERING INDUSTRY.

**I**N an interview published in the Rossland *Miner*, Mr. John G. Billings, manager of several sawmills, estimated that the exports of lumber from East and West Kootenay this year will not fall short of 200,000,000 feet; and this output, he added, is likely to be further increased next year by the addition of several large mills to the number of those now in operation. Lumbering is commencing, in fact, to rival mining in the Kootenays in point of importance and rapid growth. In the Kootenays in point of importance and rapid growth.

In the Revelstoke district, the Arrowhead Lumber Co. is besides is sawing some 20,000 feet a day. It is the intention to get out three million feet of logs this season. The new mill is to be equipped with a stock gang of forty saws. Another mill is also to be erected, of 60,000 feet capacity at Trout Lake. Lumbering, the Revelstoke *Herald* remarks, is at present the great industry on the Upper Columbia River and will certainly assume ten times its present magnitude ere long. From Carnes Creek to Canoe River there is an immense growth of timber along the Columbia River and its tributaries. This timber consists mainly of cedar, but there are also considerable quantities of fir, spruce and pine, though much of the fir has been destroyed within the past few years by some fungoid disease. Montreal investors are reported to have just purchased several limits at Bigmouth Creek; American investors have been dealing for limits above Death Rapids, and negotiations are proceeding for the sale of the 30,000 acres between Goldstream and Bigmouth for \$750,000, or at the rate of \$25 an acre, including the freehold title to the land, much of which, when cleared of timber, will become valuable for agricultural and pastoral purposes, as these blocks include some of the most fertile lands in the Province.

In connection with the export of lumber to Cape Town and South Africa good news has been received by Coast lumbermen. It is to the effect that a preferential tariff is being considered, and is likely to pass the Cape Legislature shortly, which will put British Columbia lumber on the favoured list. A preferential tariff will be made on imports from points within the British Empire, and this will mean that the big lumber trade of Cape Town and ports in Cape Colony and South Africa generally, which has heretofore been divided with mills of the United States, will hereafter come to British Columbia. It is expected that the B. C. mills, aided by the new tariff to be imposed when the legislation passes the South African House, will be able to secure all the business of the growing markets in the south of Africa.

#### THE SALMON CANNING SEASON.

The salmon fishing season in northern waters closed early in August, the results this year being far from satisfactory, only about half the average pack being reported. On the Skeena River the eleven canneries put up approximately

80,000 cases; three canneries on the Naas, 8,000 cases; four canneries on Rivers Inlet, about 70,000 cases, and one cannery at Alert Bay, 15,000 cases. The Fraser River season has also been unsatisfactory, but the returns are not yet in. Mr. G. I. Wilson, secretary of the British Columbia Packers' Association, expresses the opinion that the great falling off in the catch of sockeyes on the Fraser River is without doubt due to the fact that there are not sufficient hatcheries on the river to maintain the supply. Personally he is in favour of the Americans being allowed to contribute toward the establishment of more hatcheries on the river. He also favours the limiting of fishing licenses hereafter. This year there are licenses for 3,100 boats on the Fraser River and Gulf. Mr. Wilson avers that 2,000 boats only should be allowed to fish. He believes that with the curtailed number of boats the canners would receive as many fish as they do now, and furthermore he thinks that the fishermen would have better catches.

We have since learned that the Fraser River pack to date is 177,992 cases.

The following telegram has been sent to Ottawa by the Canners' Association:

"Hon. Raymond Prefontaine, Minister of Marine and Fisheries, Ottawa.

"The Fraser River Canners' Association, in view of the lamentably short run of sockeyes on the Fraser River, and their entire absence from the spawning grounds, respectively pray that your department will prohibit all fishing on the Fraser from August 29 to September 12, inclusive, in order that the balance of the sockeyes remaining outside may be enabled to reach the spawning grounds and the hatcheries get some supply of spawn. If close season is not ordered, future industry seriously threatened. Immediate consideration and favourable reply requested in the interests of the canners and of the fishermen.

(Sd.)

W. D. BURDIS,

"Secretary."

#### TRADE PROGRESS IN CANADA.

**I**N the year 1880 the aggregate trade of Canada amounted to \$174,000,000; in 1888 it was \$202,000,000. By 1896 it had advanced to \$239,000,000; in 1901 it was \$396,000, and this year it reaches \$424,000,000. These figures are noteworthy, not only for their size, but for their relative increase in two decades.

The change in the character of our exports is an element to be borne in mind. Years ago the great item of Canada's export was lumber and timber, ranging from \$25,000,000 to \$30,000,000 a year in value. In 1873, it constituted one-third of all our home export; in 1881, 31 per cent, and as late as 1892 32 per cent. while the item of animals and their products, which attained such large proportions in recent years, was then quite subsidiary. For the last few years, two divisions of our export trade, live and dead meat, including dairy and field produce, have surpassed forest products in export value. Minerals form a much more considerable item of our outward trade. Exports of these last year, \$34,497,000, were ten times what they were 20 years before. Our fishery product has developed, too, and manufactures shipped abroad have made strides which are illustrated if we compare the \$16,000,000 and \$18,000,000 of manufactures exported in 1901 and 1902 with the \$3,000,000 of 1882 and the \$6,000,000 of 1892 under the same category.

The character of our import trade varied somewhat in the last twenty years. In 1882, out of total imports amounting to \$111,145,000, we bought \$50,356,000 worth from Great Britain and \$47,006,000 worth from the United States. To-day out of total imports of \$196,000,000 we buy only \$49,000,000 worth from the Old Country and \$114,740,000 worth from the States. That is to say, the proportion of our purchases from Great Britain was 45 per cent. in 1882, and 25.36 per cent. in 1902, while from the United States it was 42.33 per cent. in 1882, and has grown to 58.4 per cent. last year. Almost half these purchases from the States, however, were raw materials

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for manufactures, such as raw cotton, crude rubber, wool, tobacco, hides, chemicals, besides steel rails and coal, and we must remember that these purchases by our manufacturers from the Americans have already gone to swell the aggregate of our 18,000,000 of manufactured goods sent abroad.

The following is a *resumé* of our domestic products exported:

Exported from Canada, 1902:—	
Produce of the mine . . . . .	\$34,947,574
Fish and fishery product . . . . .	14,143,294
Products of forest . . . . .	32,119,429
Animals and their produce . . . . .	59,161,209
Agricultural products . . . . .	37,152,688
Manufactured goods. . . . .	18,462,970

### FREIGHT AND SHIPPING REPORT.

Messrs. R. P. Rithet & Co., Ltd., issue the following report for July:

The high price at which wheat is held has brought the grain freight market practically to a standstill, rates showing a downward tendency all through the month. The farmers are asking as much f.o.b. as can be got c.f.i. U.K. and until some improvement in the grain situation abroad takes place it is impossible to quote rates.

Lumber freight rates are slightly lower with few engagements reported.

We quote freights as follows:

Grain.—San Francisco to Cork, f.o., 14s. to 16s. 9d.; Portland to Cork, f.o., nominal; Tacoma and Seattle to Cork, nominal.

Lumber.—British Columbia or Puget Sound to Sydney, 30s. to 31s. 3d.; Melbourne or Adelaide, 35s. to 37s. 6d.; Port Pirie, 33s. 9d. to 35s.; Fremantle, 45s. to 47s. 6d.; Shanghai, 35s. to 37s. 6d.; Kiao-Chau, 40s.; Taku, 38s. 9d. to 41s. 3d.; Vladivostok, 40s.; West Coast, S. A., 30s. to 32s. 6d.; South Africa, 54s. to 55s.; U. K. or Continent, 50s. to 51s. 3d.



### PROVINCIAL SECRETARY'S OFFICE.

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

20th August, 1903.

BENJAMIN W. LEESON, of Yreka, Esquire, to be Mining Recorder of the Quatsino Mining Division, with recording office at the said place, *vice* Mr. E. E. Potts, resigned.

### PULP AND PAPER MANUFACTURE.

There seems now to be some likelihood of an early commencement of pulp and paper manufacture in British Columbia. According to a report the statement is attributed to Mr. J. J. Palmer, of Toronto, that within the next sixty days the work of building a large mill on the Coast, probably on Princess Royal Island, will be started. Mr. Palmer is associated with an English syndicate which recently acquired valuable timber limits in this neighbourhood, and thirty-two timber cruisers have since been engaged in surveying the property. The proposed mill is to have an initial capacity of 100 tons a day. Mr. Palmer expresses the opinion that the British Columbia "pulp" timber is infinitely superior to the Eastern Canadian growths, and expects consequently to manufacture from it an exceedingly fine grade of paper.

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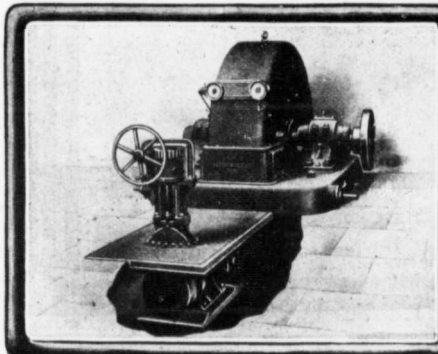
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